THE PEREGRINE FUND

Vision 2050

A Strategic Plan for 2018-2022

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Executive Summary

The Peregrine Fund is responding to 21st Century conservation challenges with a new strategic plan based on the conviction of our founders—"we will succeed by using science to inform decisions and by not accepting failure as an option"—so that by the year 2050 we will have helped create a vision of success in which bird of prey populations and their ecosystems thrive; we have enriched the lives of local communities where we work and improved their future; we have earned the reputation and serve as global experts on birds of prey and their conservation; and raptors are valued by all humans.

Our strategy stands upon three transformative outcomes: conservation, engagement, and capacity. Conservation will be achieved by preventing raptor extinctions, protecting areas of high raptor conservation value, and addressing landscape-level threats impacting multiple species. Engagement will be reached by inspiring people to value raptors and take action, serving as a catalyst for change, and investing in tomorrow's conservation leaders. Capacity outcomes are centered on The Peregrine Fund's capacity to apply our core values, promise, and guiding principles to complex conservation challenges. Capacity will be built by assembling the infrastructure, facilities and people, and raising sufficient funds to execute the actions needed to reach measurable, time-bound goals on an iterative five-year planning cycle.

In the first year of our five-year plan we will focus on building our organizational capacity for raising funds, building facilities, and creating science-based decision tools. In five years we will have modernized and expanded our headquarters in Boise, created and implemented a data driven global raptor assessment program, and built our endowment to fund these support services in perpetuity. With these resources in progress, in the second and following years we will focus on new and expanded conservation projects around the world that optimize return on investment by addressing the greatest conservation benefits for raptors worldwide. In five years we will have developed scientifically defensible priorities for endangered species conservation, prioritized places of conservation value to raptors, and selected the greatest threats to raptors at the landscape level to confront. Two new conservation programs and a major engagement initiative will be in progress, providing vital feedback for strategic decisions on funding, impact, and return on investment:

- **Darien Productive Landscape Project** to conserve one of Earth's most valuable and intact tropical forest blocks at the nexus between Central and South American biodiversity where the Harpy Eagle and Orange-breasted Falcon are sentinels of healthy ecosystem structure and function.
- **North American Non-lead Program** to end lead poisoning of California Condors, Bald Eagles, Golden Eagles and other avian and mammalian scavengers from the remains of spent lead ammunition used to harvest or kill animals that are left in the field for wildlife to consume.
- **Global Engagement Program** to connect with people locally and globally to inspire them to value raptors, take action and be the catalyst for change that conserves raptors and other biodiversity.

Our mission is to conserve birds of prey worldwide. By conserving birds of prey worldwide we promise to ***change the future to benefit nature and humanity***.

Our promise is bold and we are optimistic. Our past successes are demonstrable evidence for our future accomplishments. Failure—is not an option.

Acknowledgments

Collectively, many thousands of hours have contributed to developing, documenting, writing, reviewing and editing this plan. We particularly wish to thank the following for their unstinting work and intellectual contributions:

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Preface

This strategic plan represents a significant evolution in The Peregrine Fund's conservation approach. We were motivated to reconsider our strategy of almost 50 years by a rising sense that threats to raptors and other biodiversity, including humanity, are increasing at a rate that outpaced our capacity to save critically endangered species. Evidence was mounting that our decision tools were too slow and inefficient to keep up with sudden and catastrophic change in populations of once common raptor species, or to detect slow and chronic loss of infrequently recorded species in remote locations. Conservation priority was given to recognized species, but island forms of species on unique evolutionary trajectories were ignored, even though evidence showed that some were potentially unique species. These deficiencies in our prioritization tools led us to consider that in addition saving critically endangered species on the brink of extinction, proactive, pre-emptive action to conserve intact habitats and healthy populations of species would be a sound investment of resources. The vast landscape scale of some threats to raptors, such as electrocution worldwide or poisoning across the African continent, prompted another realization—some threats can only be tackled effectively at a vast scale, including international and national policy changes to alter the drivers of threat. Also important in affecting our strategic thinking was the realization that some of our greatest and most sustainable successes in the past have been built upon recognizing and strengthening the relationship between nature and human well-being. Reaching out to engage people at all levels has become an imperative of sustainable conservation action.

In 2016 The Peregrine Fund began a year-long process of strategic planning at Board and staff levels. Will Murray was engaged as a consultant to facilitate planning, and the Board created a temporary Strategic Planning Committee to oversee the process. On 7-8 March 2017, staff and several board members convened to develop a strategic plan for the next five years (2018-2022) and establish a long-range vision. The results of this planning session were compiled and reviewed by staff and the Strategic Planning Committee and approved with important additions by the Board of Directors at the Spring 2017 Board of Directors Meeting. Through the summer of 2017, staff drafted detailed project plans and budgets. These were reviewed and edited by ten authorities on the Board of Directors in the fields of conservation, ornithology, and public engagement. The compiled strategic plan and detailed project plans were reviewed by the Strategic Planning Committee and prepared for presentation and approval by the Board of Directors at the October 2017 Board meeting.

The following document represents a cohesive consensus of discussions, recommendations and comments made over a year-long process by the Board and Staff. It is The Peregrine Fund's Vision 2050 Strategy and 2018-2022 Action Plan.

Our **Mission** is to conserve birds of prey worldwide.

We have identified five **Core Values** [*our fundamental standards*] as follows:

1. **We cherish birds of prey.** We believe they are more than just symbols of resilience, agility, beauty, and strength; they enrich our lives and the planet in immeasurable ways. They are integral components of earth's ecosystems, consequently, conserving birds of prey contributes to conserving biodiversity and the overall well-being of humanity. We strive to prevent human-caused extinction of raptor species and promote conservation of their habitats.

2. **Sound scientific knowledge is our foundation.** We commit to acquiring new knowledge and will gather, store, analyze, and disseminate information in keeping with the highest ethical standards and current technology.

3. **We embrace diversity.** Just as biodiversity sustains resilient ecosystems, diversity in staff and strategy embodied in varied disciplines, opinions, and cultures provide critical inputs to our work. We actively seek diversity within our staff and we embrace diversity as we reach out to educate, train, empower, and collaborate with others. We respect the delicate balance of indigenous people's livelihoods, their connection with nature, and habitat preservation.

4. **Integrity is precious and paramount.** From research and conservation results to education and fundraising, we express the truth in a straightforward, authentic manner regardless of pressures to compete for attention or funding.

5. **Saving birds of prey is our life's work.** We inspire passion, courage, and tenacity to achieve tangible and enduring results, even if those results are realized decades into the future.

We identified our **Promise** as the *overall key message we try to communicate to donors and partners*. Unlike the mission statement, which answers the question *what* do we do, the promise answers a deeper question: **WHY** we do what we do; what motivates us? All of our communications should support and add credibility to this message. Our promise is the single statement that may take many forms over time but will always be central and present in our product. Our answer to *why* we do what we do is:

We believe we can change the future to benefit nature and humanity

In addition, we answered the questions: How do we keep our promise? What do we focus on? And who do we call to action?

- **HOW we achieve our promise**: We save species and the places (habitats or landscapes) they need to survive. We save species and places by solving conservation problems and developing sustainable solutions based on sound scientific evidence.
- **WHAT we focus on**: We specialize on birds of prey as charismatic and efficient sentinels of change, and indicators of success, and because actions to conserve birds of prey provide an umbrella of protection for entire ecosystems.
- **WHO we call to action:** Individuals who are committed, passionate, and hopeful—the kind of person who wants to improve the future of this world.

We identified three main Guiding Principles for *how we conduct ourselves as we work:*

1. **Excellence in everything we do**. We value our staff. We hire skilled and committed people, and build credibility through integrity, innovation, and accomplishment. We establish and maintain work priorities consistent with available resources and pursue those priorities with persistence and a positive attitude to a successful outcome. We operate the organization in an environmentally and fiscally responsible manner.
2. **Through cooperation we are more effective**. Through cooperation we leverage resources and thereby magnify results. We cultivate lasting relationships with supporters based on earned mutual respect. We are a team-oriented organization that works with local partners who are key to realistic solutions to environmental problems.
3. **We are results oriented.** We use a sound scientific-based, hands-on, action-oriented approach to achieve specific objectives.

Vision

Collectively we defined what our **Vision of Success** would be by the year 2050. We imagine a world where:

Birds of prey populations and their ecosystems thrive. Raptor populations are resilient and self-sustaining with minimal active conservation. By ensuring healthy ecosystems, biodiversity remains intact and ecosystem integrity is sound. Protections are in place for the well-being of raptors, other species of wildlife with which they coexist, ecosystems as a whole and thus for humans.

We have enriched the lives of local communities where we work and improved their future. When local peoples are eager and empowered stewards of their environment, society and conservation benefit. By offering tangible economic benefits we provide alternatives to environmental degradation and promote stewardship, sustainability, and economic independence and well-being. We have the power to train local experts, contribute to community planning for sustainability, and add raptor conservation to local curricula.

We have earned the reputation and serve as global experts on birds of prey and their conservation. We establish the gold standard for collecting, assimilating, archiving, and disseminating data on raptors, and are a state-of-the-art hub for raptor-related technology. Through public sharing of knowledge we set and actively promote ethical standards for hands-on work with raptors, such as captive propagation, translocation, capture, marking and monitoring. Our world-wide network of trained students and professionals are recognized as leaders in raptor conservation, and project our reputation as active collaborators – we are colleagues. By acting as the favored source of information on all things raptor, we capture the mindshare of bird enthusiasts around the world who think of The Peregrine Fund first for any topic related to birds of prey.

Raptors are valued by all humans. They are respected as megafauna and revered culturally throughout the world. The biological, human and environmental services provided by raptors are recognized as common knowledge, leading humans to coexist with and value healthy raptor populations and their habitats.

Strategy

Our strategy centers on three major outcomes: **Conservation, Engagement, and Capacity**.

Conservation Outcomes

The Peregrine Fund will maximize its conservation impact worldwide by developing science-based, transformative actions for raptor conservation within the framework of these goals:

- **Prevent raptor extinctions**
    - Our time-tested and proven strategy of species-based conservation has been the mainstay of The Peregrine Fund's conservation actions for almost 50 years. It will remain one of three key conservation strategies as we move forward. Determining which taxa require conservation intervention and causes of decline will be a dynamic process evolving from IUCN species status—adding information for data deficient species and new analyses of species distributions and threats. Once in place this process will allow us to move quickly to halt species declines using hands-on techniques such as captive breeding and release, or assisted dispersal, to save populations on the brink of extinction.

- **Protect areas of high raptor conservation value**
    - This new (to The Peregrine Fund) strategy works proactively to preempt species declining into a state of emergency when conservation options are likely to be limited and expensive. We will identify areas of high conservation value based on ecological needs characteristic of raptors and aligned with the Key Biodiversity Areas concept (IUCN 2016). We will use this strategy to identify and protect ecologically intact sites and landscapes with high raptor conservation value as measured by their irreplaceability (e.g., high diversity and endemism) and vulnerability (i.e., the breadth of options available to conserve a given site or landscape over time) by working collaboratively with local and international partners.

- **Address landscape level threats impacting multiple species**
    - Alternative energy facilities, expanding energy infrastructure, poisons, and parasites or disease are just some of the serious threats affecting multiple species of raptors across large portions of the earth. Rather than wait until a threat endangers one or more species, as we have in the past, we will work at scale to proactively develop strategies and tactics to minimize landscape level threats so that endangerment is avoided.

Engagement Outcomes

The Peregrine Fund will optimize our effectiveness worldwide by engaging people in conservation as partners and future leaders within the framework of our goals listed below.

- **Inspire people to value raptors and take action**
    - Through all of our projects we will seek to create a balance between the needs of humans and all raptor species. We will work on a global scale to positively influence attitude and behavior, and promote both an understanding of, and support for, science and conservation. We will address large-scale challenges including habitat degradation, climate change, and resource sustainability through the lens of raptor conservation.
    - As the nucleus of our education, marketing, and engagement efforts, the World Center for Birds of Prey will serve as ground zero for all things 'birds of prey' and will attract both local and global support and attention.
- **Be the catalyst for change**
    - The next leap in The Peregrine Fund's evolution is to become a *catalytic agent of change* that works within, and changes, entire systems (e.g., ranging from a village social system in Madagascar to international conventions such as the UNCMS—Convention on Migratory Species). We will scale up our effectiveness by employing a strategy of leverage, using government, business, the public, and other non-profits as *forces for conservation,* helping them deliver greater social behavior change than we could possibly achieve alone.
- **Invest in tomorrow's conservation leaders**
    - One of The Peregrine Fund's enduring achievements through the decades has stemmed from our training and support of young scientists and exceptional individuals, helping them initiate their careers and inspiring a lifelong commitment to conservation. Our reputation as a trustworthy and collaborative organization sought out by others from around the world is built upon relationships with former beneficiaries of intentional mentoring. Our conservation leadership initiative will reaffirm our dedication to ultimately create a raptor biologist in every country in the world; someone with conservation leadership training and skills on whom we can rely to help at all levels to implement our strategy.

Capacity Outcomes

This strategic plan applies The Peregrine Fund's core values, promise, and guiding principles to very complex conservation challenges. To implement new conservation and engagement strategies described above, The Peregrine Fund will need to grow in size and capability through

additional infrastructure, with new areas of expertise, and growth in funding and fundraising capacity. Our goals are to:

- **Assemble infrastructure, facilities, and people**
    - Updated and expanded information technology infrastructure, including data storage and security, is required for efficient and effective communication and operations within The Peregrine Fund, and for communication with partners and those we wish to convey scientific and educational information about birds of prey and conservation. New strategies need new expertise in fields such as social sciences, economics, and policy to ensure mission success. Current facilities are at capacity, so growth will necessarily require expansion of work space.
- **Raise sufficient funds**
    - The Peregrine Fund annually raises its entire project budget while administrative support is partially funded by a payout from our endowment. The endowment allows fundraisers to boast very low overhead so that more than 90 percent of any donation goes directly to "on the ground" needs. Additional new support functions, such as needed to accurately assess the conservation status of all 586 raptor species worldwide and improve decision-making tools, may also depend on income from our endowment.

Five-year Objectives FY2018-2022

Over the next five years we aim to:

1. Identify and begin monitoring or managing critically endangered raptor species to prevent raptor extinctions.
2. Identify and prioritize landscapes of global conservation importance to raptors and biodiversity, and initiate protection of the top five sites.
3. Identify and prioritize the major landscape-level threats to raptors and develop and execute action plans to mitigate the threats.
4. Engage people, institutions and governments across our current and future programs to achieve conservation success.
5. Strengthen support in human resources, information technology, financial management, and facilities to achieve the goals of this plan.
6. Raise funds sufficient to succeed in our plan and set a trajectory for future funding.

Outcomes, Goals, Objectives and Actions Required

In broad terms, the actions needed to achieve our main Outcomes, Goals, and Objectives are organized below.

Conservation Outcomes

Goal: Prevent raptor extinctions

Objective 1. Identify and begin monitoring or managing critically endangered diurnal and nocturnal raptor species to prevent raptor extinctions.

- Adaptively monitor and manage (including propagation and other techniques for restoration) raptors currently recognized as Critically Endangered
- Identify which data deficient species are also Critically Endangered by assessing the status of all 586 raptors worldwide
- Adaptively monitor and manage raptors newly recognized as Critically Endangered

Goal: Protect areas of high raptor conservation value

Objective 2. Identify and prioritize landscapes of global conservation importance to raptors, and initiate protection of the top five sites.

- Develop criteria for selection of areas
- Inventory and survey resources and potential threats
- Secure "protection" of area by government regulation, easements, empowerment, etc.
- Make conservation plans with specific management actions
- Implement plans

Goal: Address landscape-level threats impacting multiple species

Objective 3. Identify and prioritize the major landscape-level threats to raptors and develop and execute action plans to mitigate the threats.

- Identify existing and emerging major threats and develop criteria for prioritizing actions
- Align existing projects with priorities and define plausible goals, such as:
  - Energy Infrastructure. Ensure that ≥25% of the proposed infrastructure in East Africa is Raptor Safe.
  - *Philornis* parasitism. Test whether sterile *Philornis* production is needed and feasible at the scale required for effective multi-species conservation.
  - Poisoning.
    - Identify and initiate lead reduction programs in four western states/regions and in the first five years achieve a 50% reduction in use of lead ammunition to kill animals whose remains are left in the field.
    - Reduce retaliatory poisoning in Africa's greater Mara Ecosystem and Northern Rangelands by at least 25%.

    - Work with SAVE partners in Asia to reduce exposure of critically endangered vultures to NSAID pharmaceuticals.
- Habitat Conversion. Restore and maintain prairie habitat for 60 pairs of Aplomado Falcons in South Texas.
- American Kestrel Partnership. Identify the threat(s) to sustainability of the American Kestrel across North America.
- Gyrfalcons as sentinels of climate change. Identify ecological and/or behavioral resilience to climate change impacts that may be adapted to benefit especially vulnerable species.

Engagement Outcomes

Goal: Inspire people to value raptors and take action, be the catalyst for change, and invest in tomorrow's conservation leaders

Objective 4. Engage people, institutions and governments across all our current and future programs to achieve conservation success.

- Achieve at least 50% positive gain in the desired results of solving the main, direct anthropogenic threats facing each project, and identify new threats.
    - Capture the mindshare to position The Peregrine Fund as the global expert in raptor conservation
    - Investigate and identify the threats and audiences
    - Establish people on the ground to do outreach and form partnerships
    - Tell stories that inspire
    - Help create feedback mechanisms to evaluate success and progress
    - Help obtain money to fund initiatives
- Develop at least one strategic partnership with stakeholders in each of the five place-based areas of high raptor conservation value.
    - Hire staff to coordinate
    - Identify potential partners
    - Clearly communicate shared goals

Capacity Outcomes

Goal: Assemble people, infrastructure and facilities to ensure mission success

Objective 5. Strengthen support in human resources, information technology, financial management, and facilities to achieve the goals of this plan.

- Human Resources. Ensure we are properly staffed and supported to accomplish the goals and objectives of this strategic plan
    - Improve employee retention, leadership development, and employee growth to ensure our longevity, productivity, and integrity
    - Hire Geographic Information System expertise and data management capability to support decision-making, research, and education in all current and future programs
    - Enhance volunteer engagement to improve the success of our education and outreach programs
    - Hire an Asia program manager to manage conservation programs in a region with a great number of endangered raptors and where we are currently underrepresented.
- Information technology. Develop and implement a proactive strategy to meet the technology needs of the organization based on efficiency, security, scalability and stability
    - Add additional IT staff and/or contractors to ensure our current and future operations meet project and organizational needs
    - Invest in equipment, staff IT-training, communication technology, public wi-fi, and IT needs of the Global Raptor Databank and Global Raptor Impact Network
    - Adopt best practices for data and IT facilities security, data standards, metadata, data archive and backup
    - Integrate IT systems between sales—constituent management—accounting
    - Build a state-of-the-art website to help fulfill the public's perception that we are world leaders in raptor conservation and capture the global mindshare surrounding birds of prey
- Financial management. Improve processes and communications
    - Dedicate more resources to fundraising and marketing
    - Provide better assistance to program staff for financial management
    - Improve use of technology to maintain accurate financial records more efficiently, with less paper
    - Create an emergency response plan/fund for unexpected catastrophic events affecting raptors anywhere in the world
    - Build and support trust in project managers' financial discretion for optimal project success

- Update reporting systems and provide increased assistance to program managers as it relates to financial management, including budgets, income and expenses
- Celebrate funding successes
- Spend less than we make

- Facilities. Establish and maintain world-class facilities that support the needs of staff, birds, visitors and volunteers, and that support our earned reputation
  - Expand current work space to meet the needs of current and projected growth in project and development staff
  - Improve our public facilities to merit recognition as the World Center for Birds of Prey, such as:
    - Raptor exhibits and holding space that set the bar for zoos and other organizations that house birds of prey.
    - Scale up and redesign the interpretive center and entire public presentation of our facilities to meet increased demand/need that recognizes we are an asset to the Boise and Treasure Valley communities, and fund the expansion through a dedicated local capital campaign. Some specific needs include:
      - Theater with flex space
      - Outdoor exhibits that show our conservation successes
      - Contemporary signage to announce and brand the destination
      - Fire-wise landscaping and new roofs
      - Improved gift shop as the public's first and final impression of their visit
  - Ensure that propagation program imperatives are considered in any facilities plan

Goal: Raise sufficient funds

Objective 6. Raise funds sufficient to succeed in our plan and set a trajectory for future funding

- Hire and promote from within as applicable to build a dynamic and successful fundraising team to ensure completion of all fundraising goals. At least part of the team will be based in Boise.
- Develop and launch fundraising plans and specific activities supervised and executed by the Board of Directors.

- Launch a campaign to establish an endowment sufficient to fund critical support functions such as administration, development, and research. Achieve the campaign incrementally, aiming to build annual revenue from the endowment to at least $1.2M during the first 5 years.
- Match or exceed revenue to budget annually by building development capacity in areas:
    - Individual major donors
        - Identify, attract, and establish relationships with at least five new major donors annually
    - Foundations
        - Identify, attract, and establish relationships with at least five new major Foundations annually
    - Government
        - Increase public funding by 25% over the next five years
    - Develop multilateral support for place-based conservation project(s)
        - Pursue sources such as GEF, CEPF, REDD+, Green Climate Fund
    - Corporations
        - Accomplish conservation and raise funds by expanding upon our collaboration with Minera Panama, a copper mining company, and/or developing a “Raptor Safe Initiative” for other industries such as electric utilities, renewable energy companies, and pesticide and ammunition manufacturers.
    - Membership
        - Build membership income by at least 10% per year
    - Crowd sourcing
        - Develop a program of regularly occurring crowd-funding campaigns

Evaluation

To be successful The Peregrine Fund will develop effective ways to measure and track not only particular species and species groups but also the conservation actions being implemented, their effects on habitat, and ultimately the results that those actions have on priority species. This monitoring effort will provide a measure of project and program success that can be used to determine if our goals and objectives are being met. Monitoring feedback is a critical piece of the adaptive management process that will keep projects and the organization goal-oriented and on task.

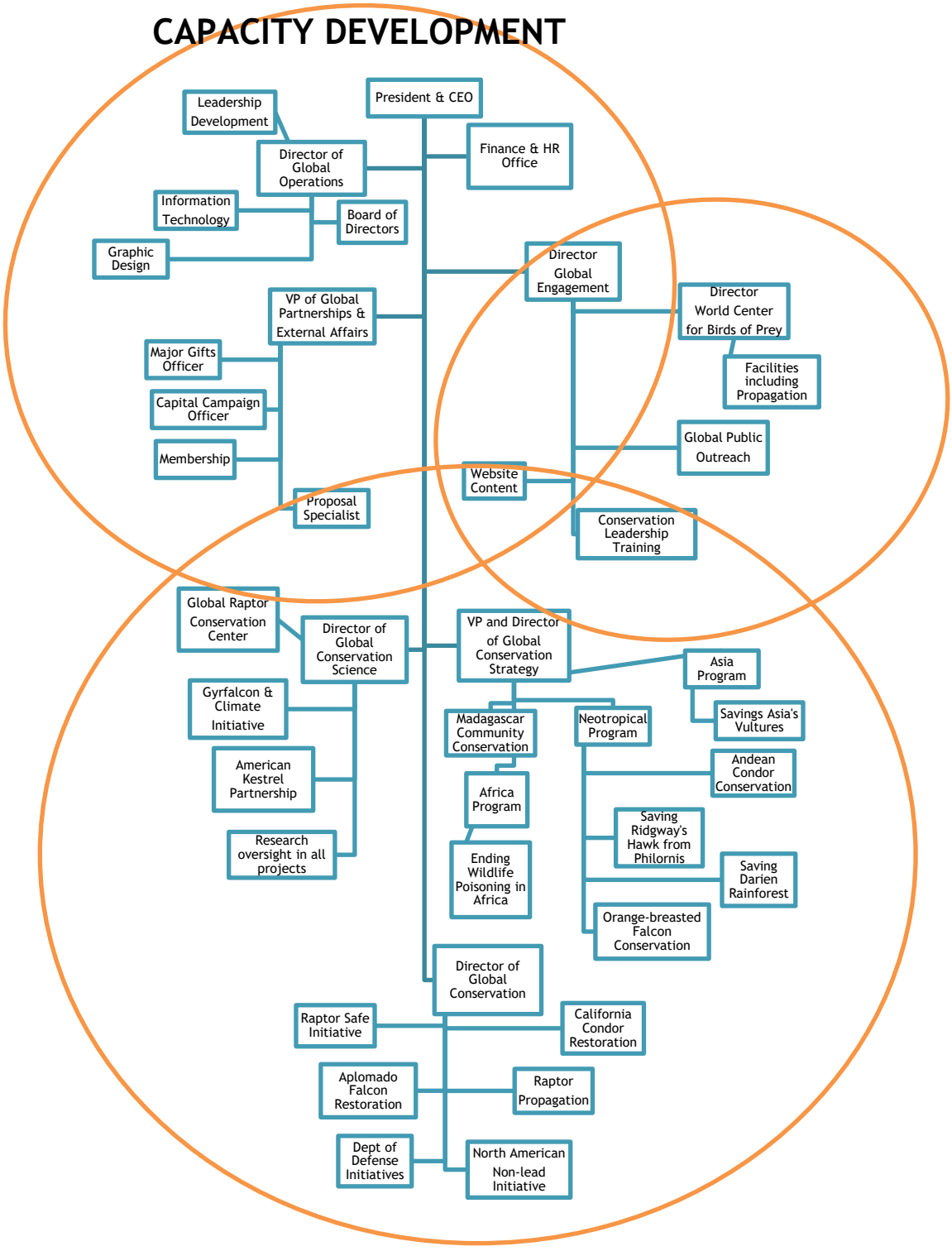
Organizational Structure

To pursue the new strategy, the organizational structure is divided into three overlapping and complementary divisions corresponding with our strategic outcomes: Capacity, Conservation, and Engagement (Figure 1). Leadership responsibility within each division is conferred upon eight positions, each of whom report to the President and together form the Executive Leadership Team:

Table 1. Executive Leadership Team (ELT) members.

Position	Currently filled by:
President and CEO, and ELT leader	Rick Watson, Ph.D.
Vice President of Global Partnerships and External Affairs	Geoff Pampush
Vice President of Global Conservation Strategy	Munir Virani, Ph.D.
Director of Global Operations	Joell Brown
Director of Global Engagement	Erin Katzner
Director of Global Conservation Science	Chris McClure, Ph.D.
Director of Global Conservation	Chris Parish
Director of the World Center for Birds of Prey	Tate Mason
Director of Accounting and Human Resources	Cindy Attaway

Functional Structure of The Peregrine Fund


CAPACITY DEVELOPMENT
President & CEO
Leadership Development
Director of Global Operations
Finance & HR Office
Information Technology
Board of Directors
Graphic Design
Director Global Engagement
VP of Global Partnerships & External Affairs
Director World Center for Birds of Prey
Facilities including Propagation
Major Gifts Officer
Capital Campaign Officer
Membership
Global Public Outreach
Website Content
Proposal Specialist
Conservation Leadership Training
Global Raptor Conservation Center
Director of Global Conservation Science
VP and Director of Global Conservation Strategy
Asia Program
Savings Asia's Vultures
Gyrfalcon & Climate Initiative
Madagascar Community Conservation
Neotropical Program
American Kestrel Partnership
Andean Condor Conservation
Africa Program
Research oversight in all projects
Saving Ridgway's Hawk from Philornis
Ending Wildlife Poisoning in Africa
Saving Darien Rainforest
Orange-breasted Falcon Conservation
Director of Global Conservation
Raptor Safe Initiative
California Condor Restoration
Aplomado Falcon Restoration
Raptor Propagation
Dept of Defense Initiatives
North American Non-lead Initiative

Five-year Detailed Action Plans

Over the next five years, The Peregrine Fund will focus on actions detailed in the Action Plans that follow. Plans are organized by Conservation, Engagement, and Capacity outcomes. By necessity, most Action Plans overlap synergistically between outcomes (Figure 1), but each has a clear primary outcome:

PRIMARY OUTCOMES	CONSERVATION			ENGAGEMENT			CAPACITY	
CONSERVATION OUTCOMES	Endangered Species	Saving Places	Landscape Threats	Inspire Action	Catalyze Change	Leadership Investment	Infrastructure, Facilities, People	Funding
Global Raptor Impact Network	●	●	●					
Recovering the Northern Aplomado Falcon	●	●	●					
Golden Eagle Conservation on U.S. Dept of Defense Lands			●					
Propagation at World Center for Birds of Prey	●							
California Condor Propagation	●							
California Condor Reintroduction	●							
North American Non-Lead Program	●		●	●	●			
American Kestrel Partnership			●					
Gyrfalcon and Tundra Conservation Program			●					
Andean Condor Conservation in Ecuador	●		●					
Impact on Andean Condors of Yawar Fiesta in Peru	●			●				
Ridgway's Hawk Conservation Project	●		●					
Puerto Rican Sharp-shinned Hawk Conservation	●							
Cuban Kite Project	●							
Orange-breasted Falcon Conservation	●			●				
Harpy Eagle Conservation	●			●				
Darien Landscape Conservation Initiative		●		●	●			
Saving Africa's Vultures from the Scourge of Poisoning	●		●					
Madagascar Conservation Project	●	●		●	●	●		
Philippine Eagle Conservation	●		●	●	●			
Critically Endangered Vultures in Central India	●		●		●			
Raptor Safe Initiative			●					
ENGAGEMENT OUTCOMES								
Global Engagement Strategic Plan				●	●	●		
Velma Morrison Interpretive Center Education Program				●	●			
Neotropical Raptor Network				●	●	●		
Neotropical Raptor Conservation Leadership Development				●	●	●		
Developing Africa's Raptor Conservation Leadership				●	●	●		
CAPACITY OUTCOMES								
Development Strategic Plan								●
Business Office							●	●

Information Technology Strategic Plan		●
Facilities, Maintenance & Construction, and Vehicles		●

Five-year Budget Projections

PROJECT	FY18	FY19	FY20	FY21	FY22	TOTAL
The Global Raptor Impact Network (GRIN)	846,600	1,153,700	1,195,700	1,281,500	1,287,100	5,764,600
Recovering the Northern Aplomado Falcon	342,500	203,000	203,100	203,300	204,300	1,156,200
Golden Eagle Monitoring	135,100	116,600	111,500	111,500	107,400	582,100
Propagation at the World Center for Birds of Prey	116,000	115,200	118,200	118,800	120,800	589,000
California Condor Propagation	437,800	417,900	423,000	429,700	435,100	2,143,500
California Condor Reintroduction Program	579,300	540,300	522,900	520,800	518,900	2,682,200
North American Non-Lead Program	721,300	820,900	1,190,500	1,458,200	1,826,000	6,016,900
American Kestrel Partnership	215,100	263,200	252,200	244,100	244,800	1,219,400
Gyrfalcon and Tundra Conservation Program	231,400	199,200	196,800	206,400	207,100	1,040,900
Andean Condor Conservation in Ecuador	145,000	145,700	149,400	152,300	156,500	748,900
Impact on Andean Condors of Yawar Fiesta in Peru	107,800	60,800	45,300	49,000	52,800	315,700
West Indies-Ridgway's Hawk Conservation Project	423,000	359,000	325,000	350,500	360,500	1,818,000
Puerto Rican Sharp-shinned Hawk Project	63,300	71,000	72,700	74,600	76,400	358,000
Cuban Kite Project	49,300	52,900	8,100	8,100	8,100	126,500
Orange-breasted Falcon Conservation	165,700	166,000	166,400	166,800	167,300	832,200
Harpy Eagle Research and Conservation	219,200	198,100	190,200	61,500	62,000	731,000
Darien Landscape Conservation Initiative	133,100	114,700	178,800	304,000	332,100	1,062,700
Saving Africa's Vultures	339,500	159,000	159,400	157,400	157,600	972,900
Madagascar Conservation Project	454,400	514,900	455,900	463,700	476,300	2,365,200
Philippine Eagle Conservation Project	35,300	35,300	35,300	35,300	35,300	176,500
Critically endangered Vultures in Central India	42,500	29,700	29,700	30,600	29,700	162,200
Raptor Safe Initiative	90,500	135,000	127,900	127,900	127,900	609,200
Global Engagement	467,200	561,100	637,300	671,400	671,800	3,008,800
Education Program at VMIC	380,300	388,700	394,300	442,500	449,100	2,054,900
Neotropical Raptor Network	16,000	28,900	101,400	16,000	16,000	178,300
Neotropical Leadership Development	174,400	175,800	186,500	197,000	209,100	942,800
Development	576,400	595,800	599,900	604,100	608,400	2,984,600
Membership	169,500	172,500	182,200	181,900	191,600	897,700
Gift Shop	135,800	134,900	136,100	136,600	137,600	681,000
Business Office	387,700	348,600	429,900	438,500	429,400	2,034,100
Information Technology	561,100	315,600	324,300	340,700	353,000	1,894,700
Facilities Maintenance	193,100	195,900	198,100	200,200	202,600	989,900

Velma Morrison Interpretive Center Expansion	-	920,000	3,000,000	7,160,000	-	11,080,000
TOTAL	**8,955,200**	**9,709,900**	**12,348,000**	**16,944,900**	**10,262,600**	**58,220,600**

CONSERVATION STRATEGIES

Global Raptor Impact Network: Building the Foundation of Science

Current Personnel

Director of Global Conservation Science:	Chris McClure, Ph.D.
President & CEO:	Rick Watson, Ph.D.
VP & Global Director of Conservation Strategy:	Munir Virani, Ph.D.
Director of Technology:	Paul Spurling
Library Director:	Travis Rosenberry
Library Coordinator:	Jamie Holfeltz

Project Background

Nearly 20 years ago, Lloyd Kiff created The Peregrine Fund's Global Raptor Information Network (GRIN) to synthesize and disseminate information regarding birds of prey and increase collaboration between raptor researchers. The Peregrine Fund will soon expand GRIN to become the Global Raptor Impact Network. This expanded GRIN will guide the conservation work of The Peregrine Fund and represents a commitment to the science-based management of raptors. Conservation outcomes outlined in the strategic plan will all be addressed and assessed by GRIN:

- Prevent raptor extinctions
- Protect areas of high raptor conservation value
- Address landscape level threats impacting multiple species

These conservation outcomes are crucial, yet ambitious–requiring examination of which species are under threat, which areas should be conserved, and what threats need the highest intervention priorities. Essential to this effort will be a team of professionals with access to the data needed to make science-based decisions at scales from nest sites to continents. The Global Raptor Impact Network therefore will consist of five complimentary ventures (Figure 1):

- *GRIN Team*

  The team consists of professional ecologists, social scientists, economists, policy scientists and conservation practitioners equipped with the tools, research opportunities, and data needed to pinpoint conservation priorities, design solutions, and implement them quickly.

- *Global Raptor Assessment*

  The assessment is an iterative process to assess species conservation status, identify areas of high raptor conservation value, and assess landscape level threats impacting multiple species. The assessment program feeds critical information to GRIN, which in turn, updates the conservation priorities of The Peregrine Fund, and feeds solutions and resources back to the field for time-bound conservation interventions.

- *GRIN DataBank*

  The GRIN DataBank is a central depository of contemporary and historical ecological data on raptors, as well as an ultra-safe bank vault for safekeeping of historically valuable data sets, that the GRIN professionals turn into conservation action. The GRIN DataBank joins a growing international partnership to compile and contribute to massive biodiversity data sets accumulated by investigators across international boundaries and scientific disciplines, such as the Avian Knowledge Network (http://www.avianknowledge.net/), Arctic Biodiversity Data Service (http://www.abds.is/), and the African Raptor Databank (http://www.habitatinfo.com/ardb_resources/).

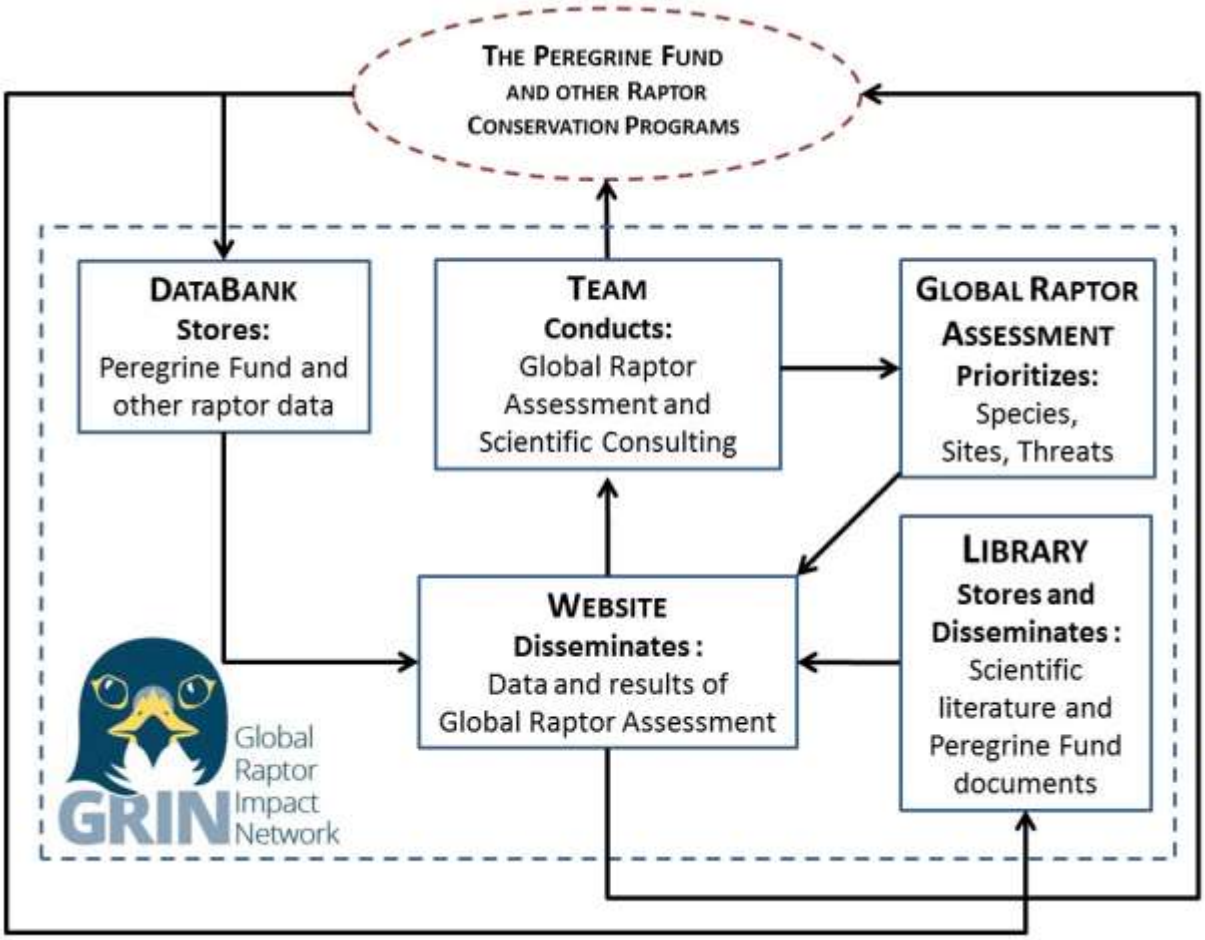
- *GRIN Website*

  The current GRIN website contains pages that describe conservation status and life history for each species of diurnal raptor. There are also researcher profiles and a bibliography. This functionality will be maintained, but we will revamp the website to integrate the DataBank, allowing data visualization, download and entry. The GRIN website will thus become the raptor node of the Avian Knowledge Network and the public interface with the GRIN DataBank.

- *GRIN Research Library*

  The Peregrine Fund Research Library was initiated in 1994 and has grown to be one of the most extensive collections of scientific literature on raptors in the world. The collections include more than 20,000 books and reports, 26,000 reprints, full or partial runs of over 1,500 journal titles, and many newsletters, conservation magazines, videos, CDs and DVDs, and maps. The emphasis is strongly ornithological, although there are also many titles on other groups of animals, general ecology, environmental contaminants, and conservation biology.

Figure 1. Schematic showing relationships between the five aspects of the Global Raptor Impact Network and raptor conservation programs around the globe.



Need Statement

To achieve our 2050 vision we must develop the quantitative tools to gather precise and accurate science-based knowledge to optimize conservation actions on the ground. The methods must adhere to scientific integrity and, because of the rate of change of earth's landscapes they need to be faster and at scales larger than any currently available. The methods and systems must also keep pace with advances in technology to ensure global acceptance, usability, and stability.

Global Raptor Assessment

The Global Raptor Assessment will be used to combine raptor-specific data with socioeconomic data to create an accurate global roadmap that prioritizes raptor conservation for each of our three major strategies:

- Prevent endangered species extinction by identifying species on the brink and in need of restoration.
- Protect areas of high conservation value for raptors, for example, by identifying areas of high diversity and endemism.
- Address landscape threats affecting multiple species, for example, by finding solutions to make wind power more raptor-safe, or dealing with vulture poisoning in Africa.

Additionally, the Global Raptor Assessment will determine the best management options for restoring species, preserving landscapes, and addressing threats. The continuing effort of the GRIN Team via the Global Raptor Assessment will therefore guide the current and future priorities of The Peregrine Fund's conservation programs, while insuring scientific rigor in The Peregrine Fund's applied research.

The Global Raptor Assessment will update and compliment other efforts to determine species threat status and identify areas of conservation importance. For example, Birdlife International produces the species classifications for the International Union for Conservation of Nature's (IUCN) Red List (www.iucnredlist.org). The Red List describes population status, range size, ecology, major threats, and needed conservation actions for plants, fungi, and animals across the globe. IUCN's classification system is the gold standard for assessing risk of species to extinction, but often data are lacking for a quantitative assessment of a given listing criterion and assessors must often rely on expert opinion. IUCN classifications are also updated roughly every four years. The precipitous decline of vulture populations during the 1990's across the Indian subcontinent highlighted that the threats raptors face can act rapidly, and that species assessments must keep pace. The Global Raptor Assessment will use data from the GRIN DataBank to quantitatively assess species threat status and will be updated in real-time to immediately inform conservation in a rapidly changing world. The Global Raptor Assessment will therefore bolster IUCN assessments of raptors by constantly and quantitatively assessing threat status. The Red List is also somewhat taxonomically limited. For instance, Ferguson-Lees and Christie justified the split of *Spilornis cheela* and its 23 sub-species into seven new species with 16 sub-species, while the "official" Red List recognizes just one species and no sub-species. The Global Raptor Assessment will undertake a taxonomic assessment of all raptors to ensure that the appropriate taxonomy is used.

BirdLife International (www.birdlife.org) compiles a list of Important Bird Areas (IBAs), which are areas that are important for global bird conservation. Important Bird Areas are sites containing species that are endangered, have restricted ranges, or are restricted to certain biomes. Some IBAs are sites where birds congregate in substantial numbers. The Global Raptor Assessment will identify areas across the globe that are important for raptor conservation. Certainly, many of these areas will be IBAs and the Global Raptor Assessment will help determine which IBAs are most important for raptors. Because raptors have particularly large ranges and provide many ecosystem services such as carcass removal, the Global Raptor Assessment might identify areas that are not designated IBAs—perhaps accounting for areas where raptors are culturally important or are particularly important for ecosystem stability. Because raptors are indicators of areas of high biodiversity and often need large undeveloped areas, conserving places that are important to raptors will protect areas of high biodiversity and conserve wilderness.

Raptors are recognized as sentinel species in that the status of their populations can reveal unknown environmental hazards. For example, the decline of the Peregrine Falcon alerted us to the dangers of DDT, and the California Condor highlights problems associated with lead poisoning from spent ammunition. In recognition of the value of raptors as sentinels, The Peregrine Fund has undertaken initiatives including the American Kestrel Partnership to determine the cause of the mysterious decline of the American Kestrel, and the Gyrfalcon and Tundra Conservation Program to assess the impact of climate change on Arctic ecosystems. These initiatives will help to understand the landscape-level threats affecting both raptors and humans. The Global Raptor Assessment will continue The Peregrine Fund's work on sentinel species—identifying species in decline and determining the underlying cause or using raptors as a model to understand landscape-level threats.

GRIN DataBank

The Global Raptor Assessment will require vast amounts of data, readily available to the GRIN Team. The GRIN DataBank will collect, store, and make available to researchers worldwide, ecological data on raptors that no other existing central database collects. Neither the depth nor breadth of the GRIN DataBank will be matched by any other existing database. For example, it is set apart from Cornell's eBird and Nest Watch databases because, in addition to collecting bird sightings and nest observations, the GRIN DataBank collects formal research data that quantifies effort and allows measurement in time and space of conservation-critical ecological parameters of:

- Demography – data regarding tagging, tracking, counting, and monitoring all inform the key population processes of productivity, mortality, immigration, and emigration—allowing us to track the strength of raptor populations, worldwide.
- Health – data regarding physiology, morphology and genetics will allow us to measure contaminants, parasites, diseases, and other stressors on raptor populations that drive species' decline across the globe.
- Ecology – The life-history, behavior, distribution, and abundance of many raptor species remains poorly understood. Data regarding tagging, sightings, re-sightings, and diet will allow us to determine habitat associations, home ranges, annual movements, predator-prey interactions, and competition and how these are impacted by landscape-scale drivers of decline such as habitat change and climate change. We will also be able to track changes in phenology, population size, and distributions across space and time.

The GRIN DataBank will make data freely available to researchers across the globe by connecting to the Avian Knowledge Network (AKN)—a network of partners committed to the sharing of data and dissemination of results to improve the conservation of birds (www.avianknowledge.net). Partners of the AKN house data regarding a particular taxon or theme. For example, the Rocky Mountains Avian Data Center serves as a regional node of the AKN—producing and presenting information and conservation tools for management of birds within the Rocky Mountains, Great Plains, and Intermountain West. And, Integrated Waterbird Management and Monitoring is a program for waterfowl, shorebirds, and waders that makes data and decision support tools freely available as a part of the AKN. Similarly, the GRIN DataBank will make data and decision support tools regarding raptor ecology and conservation freely available to researchers and decision makers across the globe. The need for such a data storage and dissemination mechanism is highlighted by commitments that researchers have made to upload data to the GRIN DataBank after conversations with Peregrine Fund staff. Earthspan is eager to upload their 40-year dataset of data regarding trapping and blood testing of Peregrine Falcons, and Paul Spitzer and Alan Poole expressed desire for a secure place to store their data regarding Osprey ecology.

The Peregrine Fund has already made progress in the management of large, online databases through the American Kestrel Partnership, the Polar Raptor Data Bank, and the African Raptor Data Bank. Moving toward a single, global, online database is a natural progression that will safe house, organize, and make accessible the immense amount of data collected by The Peregrine Fund. Currently, the bulk of The Peregrine Fund's data are scattered across personal computers, Peregrine Fund servers, Dropbox folders, Google documents, field notebooks, and storage units. The Peregrine Fund's data are therefore vulnerable to outside hacking and internal loss. For example, a fire in the library would destroy all of Tom Cade's field notes from

the Peregrine Falcon restoration, or a laptop stolen in Mumbai could contain the only records of an entire year of vulture surveys.

Data collection and management are also not currently standardized across The Peregrine Fund. For instance, banding and resighting data for Aplomado Falcons and Ridgway's Hawks are kept in Excel spreadsheets and Google Sheets, respectively, and in completely different formats. Estimating survival for either species therefore requires a request of the files from the field biologists, then discernment of the structure of the files for each species before analysis can be run. Conversely, the GRIN DataBank will store data such as these in a common format that is easily assessable and backed up offsite.

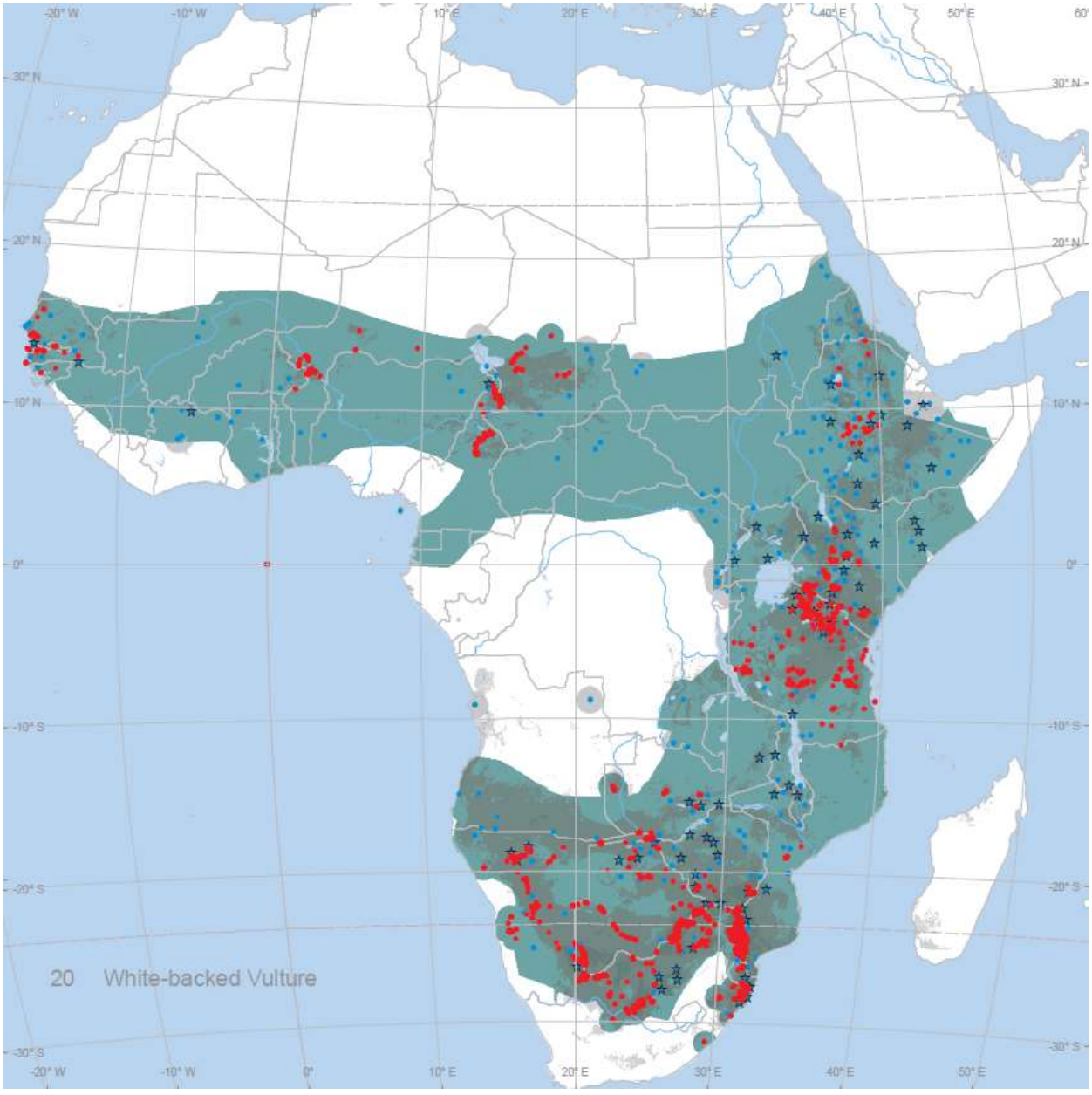
The GRIN DataBank will also house The Peregrine Fund's historical data across several formats including photos, video, and notebooks. As technology advances storage media will become obsolete and eventually inaccessible. The dozen or so videos stored on Betamax cassette tapes or the Aplomado Falcon captive breeding data that can only be accessed through FoxPro are examples of data that must be updated to remain usable. The GRIN DataBank will ensure that these data last and are accessible, in perpetuity, by promptly adapting to new formats and storage methods as they become standard. Additionally, GRIN DataBank will implement maintenance and backup protocols to protect against threats to its stability.

The GRIN Smartphone App

The GRIN app is an expansion of the highly successful African Raptor Observations (ARO) app, which was created by habitat INFO in collaboration with The Peregrine Fund and other partners. The ARO app can collect myriad kinds of data including: sightings, productivity, mortality, resightings, museum specimens, etc. The ARO app can thus be used to collect data in the field regarding raptor distribution and demography and upload data to a web-based server, thus eliminating the need for subsequent data entry. Citizen and professional scientists across Africa have used the ARO app to submit roughly 175,000 raptor entries. Using these data, habitat INFO created maps of suitable habitat for African Vultures (Figure 2) and the threats those vultures face, which helped justify uplisting these species on IUCN's Red List.

By taking the ARO app global, the GRIN app will be used by scientists to submit data to the GRIN DataBank—thus allowing the GRIN Team to map distributions and monitor populations of raptors around the world. Maps, charts, and statistics created using data from the GRIN app can be updated in real-time, ensuring that assessments of populations are up-to-date. As with the case of African Vultures and the ARO app, data from the GRIN app can help inform the status of raptor populations around the globe.

Figure 2. Map of Africa showing the locations recorded for the critically endangered White-backed Vulture using the ARO app (red dots), areas of modeled suitable habitat (grey shading), and IUCN range map (green shading). Blue dots and stars represent atlas data also used in modeling. Map is courtesy of our partner, Habitat Info.



GRIN Website

The Global Raptor Impact Network (GRIN) has been integral in The Peregrine Fund's decision making for the past 20 years—providing information on hawks, eagles, and falcons while facilitating communication between raptor researchers and conservation organizations. The GRIN website will be revamped and updated to be the public face of the Global Raptor

Assessment and portal to the GRIN DataBank. Goals of the rebuild include global usability on multiple device types for ease of use and fast adaptation to changes in technology expectations from researchers. Currently on GRIN, there are accounts for each species of diurnal raptor that are similar to IUCN Red List accounts and accounts found on Cornell's Birds of North America Online, and Neotropical Birds Online. In revamping GRIN, care will be taken not to lose the information already contained on the website, but also not to duplicate the efforts of others. The new species profiles will contain, at a minimum:

- Current conservation status as determined by the Global Raptor Assessment
- A list of all datasets available for that species on the GRIN DataBank , with links to download
- Maps showing locations recorded by the GRIN app (and perhaps eBird)
- Predicted areas of suitable habitat, population threats
- Research and conservation needs

Profiles might also contain graphs of population trends if such data are in the GRIN DataBank, or a taxonomic assessment of the species. Other information currently found on GRIN including researcher profiles, raptor news, and meeting abstracts will be re-evaluated to determine if they are still desired components of the GRIN website. The GRIN website might also retain its detailed searchable bibliography, which is compiled by staff at GRIN Research Library.

GRIN Research Library

The Peregrine Fund's Research Library (hereafter, 'Library') serves the mission of disseminating published literature to Peregrine Fund scientists and raptor biologists around the world. Since 2002 the Library has distributed more than 12,500 scientific articles to biologists in 74 different countries. The Library also archives the material published by The Peregrine Fund.

The Library will likely remain an important facet of The Peregrine Fund because in conducting the Global Raptor Assessment and determining best management practices for raptors, the GRIN Team must have access to the most recent scientific literature. The GRIN Team and Library staff, perhaps with outside consultants, will audit the Library holdings to determine which journal subscriptions are needed, which printed work should be obtained, and how best to organize and disseminate material.

Goals and Objectives

GRIN Team

At its core, the GRIN Team (the 'Team') consists of the Director of Global Conservation Science, the Spatial Ecologist, and the Quantitative Ecologist. Social scientists, economists, policy

scientists, and conservation practitioners would also be hired or consulted as needs arise. The Team uses data from the GRIN DataBank to conduct the Global Raptor Assessment. Because the Global Raptor Assessment identifies priorities for future research, the Team will also prioritize applied research projects such as the Black Shaheen project in the Western Ghats and the Pallas's Fish Eagle—projects designed to assess conservation status, identify causes of decline, or test methods to ameliorate threats. The Team also coordinates the data collection by programs of The Peregrine Fund and serves as a resource to Peregrine Fund conservation programs—and perhaps other entities—in designing scientific studies and measuring conservation outcomes.

Global Raptor Assessment

The Global Raptor Assessment will be an iterative and ongoing project by the Team to determine the conservation status of all raptor species, identify areas of high raptor conservation value, and assess landscape-level threats that affect multiple species. Students supported by The Peregrine Fund will likely play a large role in the assessment of species status, trends, and conservation needs.

GRIN Data Bank

The GRIN DataBank will be managed by the Data Scientist who will build a database to house data relevant to raptor ecology and conservation. The database will adhere to global standards and best practices for data collection and archival. This includes use of a Relational Data Base Management System (RDBMS) that is fully mature and is actively supported by a stable external entity, to ensure permanent viability and compatibility with current technology standards. The GRIN DataBank will first combine The Peregrine Fund's Polar Raptor Data Bank, the American Kestrel Partnership's data base, and data from the GRIN and ARO apps. Next, additional functionality will be added to specifically fit the needs of The Peregrine Fund and eventually for other researchers. The GRIN DataBank coordinator will solicit data from outside researchers and provide customer service for the GRIN DataBank and the GRIN app. All programs of The Peregrine Fund as well as students and outside researchers funded by The Peregrine Fund will be required to upload their data into the GRIN DataBank. The database will follow the AKN guidelines of allowing researchers to specify how accessible to the public their data are, with options ranging from freely accessible to not accessible at all.

GRIN Website

The current GRIN website will be realigned to be the raptor node of the AKN and will provide access to and visualization of the GRIN DataBank. Further, GRIN will also incorporate the results of the Global Raptor Assessment. This realignment will require a re-designed GRIN website and will require a full-time GRIN website coordinator/editor who will recruit experts to continually

update species profiles based on the most current information. The new GRIN website and its apps will be regularly maintained and updated in perpetuity to ensure usability, stability, and security.

The GRIN Research Library

The Library will maintain subscriptions to relevant scientific journals, house relevant printed materials, archive non-digital Peregrine Fund media, and disseminate these materials to raptor researchers around the globe. The Director of the Library will be a full-time position responsible for the maintenance of subscriptions and material and the methods of dissemination. The Library Coordinator will also be a full-time position helping to organize and disseminate material.

Activities

2017

- Expand the Africa Raptor Data Bank (ARDB) to cover the world as the GRIN DataBank and expand the African Raptor Observations (ARO) app to become the GRIN app.
- Sign partnership with habitat INFO.
- Increase global visibility of the GRIN app by making two presentations entitled “From Continental to Global: The African Raptor Data Bank and Its Potential as a Citizen Science Tool for Global Raptor Conservation” at the Raptor Research Foundation Conference in November, 2017 as well as the Asian Raptor Research and Conservation Network meeting in Philippines in October, 2017.
- Develop a short training video on how to use the GRIN app.
- 2017-ongoing: Conduct Audit of the Library, enact recommendations of audit.

2018

- Following the success of the ARDB model, we will launch the use of the GRIN app at raptor and ornithological conferences around the world, provide training to the scientists present, and ask them to voluntarily collect and submit data during the course of their normal work routine.
- Hire Data Scientist, Spatial Ecologist, and Quantitative Ecologist to manage GRIN DataBank and model distributions and population trends.
- 2018-ongoing: Build GRIN DataBank, first to combine the Polar Raptor Data Bank, The American Kestrel Partnership’s data base, and the data from the GRIN and ARO apps. Next, additional functionality will be added to specifically fit the needs of The Peregrine Fund, then for other researchers.

- 2018-ongoing: Standardize data collection and entry into GRIN DataBank across Peregrine Fund programs.
- 2018-ongoing: Solicit data from non-Peregrine Fund researchers.
- 2018-ongoing: Begin digitizing Peregrine Fund's historic data.
- Begin talks with AKN to begin process of becoming the raptor node.
- Hire someone to answer questions regarding the use of the GRIN app and GRIN DataBank.
- Revamp the GRIN website.

2019

- 2019-22: Identify species and geographic areas in special need (data deficient) and provide small grants (US$5-10,000) to local field biologists to help pay their gas and expenses to get into the field to complete surveys.
- 2019-22: If it is clear that the ARDB model will not collect enough data, then we will recruit field biologists to make two-person teams who travel to sites to conduct surveys, and train local biologists (professionals, students, bird guides etc), putting the GRIN app in their hands to collect data to fill gaps.
- 2019-ongoing: Use GRIN data to build GIS-based raptor distribution and abundance models (Maxent models). Provide results of these models to experts on each species and have them investigate the population distribution and abundance trends revealed. Experts write a synthesis of their species' status using the contemporary data and prepare it for presentation at a conference, publication in the conference proceedings, and online on our GRIN website.
- Hire new GRIN website coordinator.
- Potentially hire sociologist.

2020

- 2020-ongoing: Potentially distribute the GRIN app to any birders worldwide if there's a market and if data quality can be maintained.
- In Boise, hold a conference on the State of Raptors Worldwide that brings participants together, and invite special contributions from the broader conservation community, and broader considerations such as sustainability and telecoupling (e.g., Falk Hautman, AK) who would broach subjects on what to do about global raptor declines like the poisoning of vultures in Africa, over-harvesting of Saker Falcons by Arab falconers, electrocutions and collisions as the multi-billion dollar "Power Africa" initiative goes forward, persecution of Andean Condors for tourism to festivals, loss of forest habitats in the tropics, etc.
- Potentially hire economist.

2021

- Publish online the State of Raptors of the World…the "bible" on changing raptor distributions and abundance, and what to do about it.
- Potentially hire policy scientist.

2022

- 2022-ongoing: Use ongoing GRIN DataBank data collection to periodically (annually or more often) update the State of Raptors online, provide the quantitative data to IUCN for species' status changes in a timely manner, and prioritize The Peregrine Fund's conservation actions.

Partners involved

habitat INFO

Perhaps the most important partner of GRIN will be habitat INFO (www.habitatinfo.com). The African Raptor Data Bank, the ARO app, and the Polar Raptor Data Bank were all developed in partnership with habitat INFO. Further, habitat INFO currently houses the data for all of the aforementioned endeavors. Moving forward, habitat INFO will likely play a large role in development of data recording, storage, and analysis.

Boise State University

Boise State University (BSU) hosts the only Raptor Biology degree program in the world and is located in Boise, Idaho—making BSU a great partner in raptor research, conservation, and education. It is likely that the GRIN coordinator will elicit BSU professors to edit GRIN species profiles and Peregrine Fund will likely continue to provide grants to and mentor students in the BSU Raptor Biology program. Further, Peregrine Fund staff might approach BSU faculty to upload data to the GRIN DataBank and use the GRIN app. Member of the GRIN Team might also teach a class on quantitative raptor ecology at BSU, in part, to make future raptor researchers comfortable with using GRIN in their research.

Evaluation

GRIN Team

The GRIN Team will be evaluated by the success of the Global Raptor Assessment (see below), and the success of the science implemented across The Peregrine Fund—e.g., efficacy of conservation efforts, number of peer-reviewed publications. The Team will also be evaluated,

along with the GRIN DataBank, by the standardization of data management across The Peregrine Fund.

Global Raptor Assessment

The Global Raptor Assessment will be evaluated yearly by the number of species assessments produced, and the timely publishing of the State of the Raptors of the World.

GRIN Data Bank

The GRIN DataBank will be evaluated by the standardization of data collection across The Peregrine Fund, the assimilation of datasets into the GRIN DataBank, and the number of observations entered into the GRIN app.

GRIN Website

GRIN will be evaluated by the numbers of species accounts updated, hits on the website, and citations.

GRIN Research Library

The Library will be evaluated based on implementation of the recommendations of the audit, number of articles disseminated, and timely archival of non-digital Peregrine Fund material.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$846,600	$1,153,700	$1,195,700	$1,281,500	$1,287,100	$5,764,600

Recovering the Northern Aplomado Falcon

Current Personnel

Director of Conservation:	Chris Parish
Fieldwork and Management:	Brian Mutch, Paul Juergens
Director of Global Conservation Science:	Chris McClure, Ph.D.
U.S. Partners:	Jeff Johnson, Ph.D., Miguel Mora, Ph.D.
International Partners:	Alberto Macías-Duarte, Ph.D.
Veterinary:	Bruce Rideout, D.V.M, Ph.D.

Background

The Northern Aplomado Falcon, a colorful mid-sized falcon of open savanna, was once known to occur within a range extending from Guatemala north to the southern United States. Formerly a part of a dynamic and diverse wildlife community associated with southwestern grasslands in the United States, the species had vanished there by the early 1950's. In the following decades, various hypotheses were developed in an attempt to explain the falcon's disappearance, but it seemed likely that distinct changes in habitat associated with human land use and the introduction of contaminants were responsible. Fortunately, the development of captive breeding and release by The Peregrine Fund offered the possibility of restoring falcons to their former range where savannah habitat remained, a plan made more promising by the removal of the contaminant DDT which had threatened the existence of Peregrine Falcons and other bird-eating raptors. Pilot releases confirmed that practices developed by The Peregrine Fund for Peregrine Falcon reintroductions were suitable for an Aplomado Falcon Recovery Program. Following the listing of the Aplomado Falcon in 1986, the United States Fish & Wildlife Service (USFWS) invited The Peregrine Fund to lead in recovery efforts, a project we have been pursuing since 1987.

A Recovery Plan published in 1990 set a downlisting target of 60 breeding pairs of Aplomado Falcons in the U.S. In 1995, just two years after reintroduction efforts began in earnest, we located the first returning pair of released falcons and later documented they had

fledged a single nestling that season. This milestone event represented the first documented successful nesting attempt by Aplomado Falcons within the United States in 43 years! Since that initial success, our survey efforts have revealed 39 territorial pairs of Aplomado Falcons along the Texas Gulf Coast, and we have documented more than 500 young fledged.

The results of our efforts to restore Aplomado Falcons in South Texas during the past three decades have demonstrated a primary need to conserve essential grassland habitats and the biological diversity found within them if we are to meet the downlisting goal of 60 breeding pairs. Our on-the-ground observations have been confirmed through population simulation modeling using parameters measured in the field (McClure et al. 2016).

One innovative tool we have developed to increase the suitability of nesting habitat for Aplomado Falcons is a unique artificial nest structure placed in suitable habitat where historical nest sites are now limited for one reason or another. This simple and yet effective tool has improved Aplomado Falcon nest success and productivity and has the potential to aid other species recovery programs worldwide. To date, we have installed 180 structures with approximately 69 in service throughout the range of the recovering South Texas population; among the 39 known territorial pairs, 28 are using artificial structures. We continue to improve on this innovation by exploring the use of longer lasting materials for construction of artificial nests to provide a more permanent solution to the original wooden design.

This project has also highlighted the importance and need for building lasting partnerships in cooperation with private landowners and government agencies alike. The “Safe Harbor” program for Aplomado Falcons in Texas for example, has opened doors to otherwise inaccessible private land and habitat. Such an approach allows for the type of adaptive management necessary for a restoration program to work efficiently and effectively in the contemporary landscape.

Chihuahuan Desert - West Texas, New Mexico and Mexico

Our restoration activities in the Chihuahuan Desert region of trans-Pecos Texas and southern New Mexico, while unsuccessful in terms of establishing a population of falcons in this part of their historical range, as well as support of research of an existing population in Chihuahua, Mexico revealed significant problems for the falcon. We discovered climate change-induced severe drought in the Chihuahuan Desert and its subsequent negative impacts on the falcon’s prey base were substantial. We also illustrated that habitat loss in the northern prairies of North America have resulted in declines in an important prey base for the falcon – grassland birds that winter in the Chihuahuan Desert. Habitat loss from grassland conversion to

agriculture in Chihuahua is threatening the last known remaining desert dwelling population of Aplomado Falcons in North America. We realized, even though millions of acres of grassland habitat are available outside the range occupied by the declining Chihuahuan population, problems facing the falcon in this environment were far reaching. This realization has doubled our focus on restoration of the falcon in South Texas where the climate and prey resources appear sufficient. Here, unlike in the grasslands in southern New Mexico and western Texas, the amount of suitable habitat is extremely limited and threatened not only by encroachment of two woody plant species, Mesquite and Huisache, into prairie habitat but also by urban and industrial development. Habitat restoration and protection is needed to benefit the Aplomado Falcon and other grassland species in this region.

Need Statement

The Aplomado Falcon is the only species of falcon with endangered status in the U.S. The Peregrine Fund and its partners have restored this charismatic species back to parts of its historical range on the Texas Gulf Coast; the population now numbers 39 territorial pairs. We have discovered the Aplomado Falcon requires a unique habitat type of coastal grassland which has been greatly altered and reduced in scope by people over recent decades. To reach the USFWS recovery goal of at least 60 breeding pairs we will work with land owners and government land management agencies to increase suitable grassland landscape by at least 50% over the next five years. Protecting and managing this important habitat on a landscape scale will help ensure this species survives into the future while simultaneously providing benefits to many additional species of grassland birds. Close monitoring of the recovering Aplomado Falcon population to detect an increase in abundance will be our ultimate measure of success. **This project is aligned with The Peregrine Fund's strategic plan to conserve endangered species, protect landscapes of value to raptors, and tackle landscape level threats to multiple species.**

Goal

Through cooperation and coordination with state, federal, and private entities, our goal is to remove the Aplomado Falcon from the Endangered Species List to join in the ranks of the previously delisted Peregrine Falcon. The 1990 Aplomado Falcon Recovery Plan proposed at least 60 breeding pairs of Aplomado Falcons restored to the plain of southern Texas, a significant portion of its historic range in the United States.

Objectives

We have six principal objectives for the next five years:

1. Increase suitable, prairie habitat to a contiguous area sufficient to support an additional 10 breeding pairs of Aplomado Falcons aiming for 45-50 pairs by 2022.

2. Provide long-lasting artificial nest structures for Aplomado Falcons to habitat depleted of tree-yuccas or other suitable nest sites.

3. Track Aplomado Falcon population ecology parameters to verify population growth and model the species' survival probability as suitable habitat is accumulated.

4. Use genetic markers to estimate the size of the South Texas population of Aplomado Falcons.

5. Toxicology screen of addled egg and egg shell samples already collected.

6. Examine and revise the 1990 Aplomado Falcon Recovery Plan to include our increased knowledge of today's threats to the species' survival in contemporary landscapes.

Activities

Increase Habitat

Under The Peregrine Fund's guidance, more than 2,000 acres of prairie have been enhanced using mechanical, chemical, and prescribed fire techniques in the last 5 years in the Bahia Grande Unit, along the west boundary of Laguna Atascosa National Wildlife Refuge (LANWR), the Boswell-Jenkins tract, and the Palo Alto National Battlefield Historical Park. We will work with the USFWS to identify areas of habitat management need, particularly where brush has invaded grassland habitat not long ago occupied by breeding Aplomado Falcons. Through partnership agreements we will contract with operators to treat select areas by means of mechanical, chemical, or fire to promote grassland/prairie/savannah habitats.

Proposed improvements to maintain existing habitat:

- Bahia Grande, >2000 ac.
- Cameron County Airport
- LANWR and Lower Rio Grande Valley National Wildlife Refuge
- Power Pole 7 (Port of Brownsville)
- Highway 4 territory
- Highway 100 area: Power Pole 4, 9 Mile, and 10 Mile

Provide Artificial Nest Structures

Artificial nest structures are a valuable tool in both maintaining and reestablishing nesting pairs in recent historic habitats. Nest success and reproductive rates at artificial structures are equal to that of natural tree-yucca nests, and compared to natural nests in other woody plants, artificial nests are roughly twice as successful and productive.

Land management practices resulting in woody plant encroachment into prairie habitat have increased predation on falcon nestlings. An observed decline in nest-building species like the Chihuahuan Raven, possibly due to West Nile Virus, also contributed to decreased availability of natural nests. We therefore identified artificial nest structures as one of the most effective solutions to both short- and potentially long-term impediments to recovery. Since 2003, we have constructed and erected more than 180 wooden artificial nest structures at nearly one hundred sites, and we annually maintain approximately 65 of them.

On an annual basis, we build a minimum of 10 new artificial nest structures to replace aging units previously deployed or to place in habitat lacking suitable nests sites. We will maintain all other potentially active artificial nest structures in the field ensuring they are ready for use each breeding season and will continue to explore ways to improve them. In FY17, we designed and constructed modified nest structures, replacing treated wood with a welded-aluminum frame, floor, and roof in two configurations. In-the-field testing will allow us to determine if the longer-lasting aluminum structures are suitable. It is our hope that, despite a greater initial investment, the longevity will decrease overall expenditures of time and money.

Track Population Parameters

We currently focus our survey efforts in South Texas in LANWR and Matagorda Island National Wildlife Refuge (MINWR) to determine occupancy at all known territories and document all individuals observed. We survey an average of 50 territories in South Texas annually. We pay particular attention to the age of the individuals occupying territories, noting if lone adult females are residing in territories or if juvenile males are paired with adult females as this demonstrates a lack of non-breeding adult males in relation to the number of adult females available in the landscape.

We attempt to band and collect blood samples from as many falcon nestlings in artificial nest structures as possible and collect productivity data from all of the territorial pairs observed during the occupancy survey. We send blood samples to Dr. Jeff Johnson for genetic analyses. We also collect addled eggs and egg shell fragments for ongoing contaminant studies in cooperation with Dr. Miguel Mora.

For logistical reasons and avoidance of leading ground-dwelling predators to nests, we monitor falcons nesting on power poles and in other natural nests from a distance to determine the number fledged.

Having a large proportion of the fledgling population banded is important because reading bands in subsequent years allows us to better understand the dynamics of this population, particularly with respect to breeder turnover and floater survival. In addition to surveys in known territories/habitats, periodic exploratory surveys are sometimes warranted due to either reported sightings, new findings in habitat analyses suggesting previously unknown suitable habitat, or in the future, the implications of the findings of genetic analyses. The results of these studies combined with population modeling by Dr. Chris McClure will greatly enhance our understanding of Aplomado Falcon population ecology, allowing a finer tuned recovery effort.

Estimate Aplomado Falcon Population Size

Our objective is to estimate the size of the northern-most portion of the Aplomado Falcon population. Surveys alone are greatly challenged by the scale of the landscape, difficulty in accessing private lands, and the difficulty in detecting breeding Aplomado Falcons during the nesting and post-nesting season. Recent and ever-improving advancements in technologies and tools for genetic analyses have improved the potential for a greater understanding of population dynamics.

To date we have collected 282 blood samples from juvenile and adult Aplomado Falcons in South Texas spanning a decade of recovery work. Using these samples, it is possible to estimate the total breeding population based on several genetic markers associated with gene locations. Our long-time partner, Dr. Jeff Johnson of the University of North Texas, is keenly interested in our contracting him to conduct this analysis. This work will serve as the cornerstone to inform us and the USFWS as to whether the population size is larger than we have field-sampled and approaches the 60 pair downlisting goal. This work would begin during the summer of 2017 to gather another year of blood samples from juvenile Aplomado Falcons and be completed by winter 2017. This analysis will not only estimate the size of the population of Aplomado Falcons in South Texas, but it may also inform us as to whether gene flow is occurring from Mexico.

These results will provide guidance on future conservation action as we reconsider the Recovery Plan in the contemporary landscape.

Toxicology Screening

Annually, eggshell and addled egg samples are collected from nest sites during banding efforts. The Aplomado Falcon is an important "indicator species" for environmental quality due to its unique ecology and propensity to accumulate environmental contaminants. Previous studies (Mora et al. 2008 & Mora et al. 1997) found mercury (Hg) in both egg samples and in potential prey at levels high enough to warrant concern and recommended continued monitoring. We will analyze a sample of this collection to quantify inorganic elements, organochlorine, and small molecule petroleum-based hydrocarbons to identify potential impediments to recovery. Results will inform revision of the Recovery Plan.

Revise Aplomado Falcon Recovery Plan

After decades of recovery efforts resulting in an ever growing knowledge base and a refined vision of what recovery might entail, we and our partners agree that the need to update the 1990 Aplomado Falcon Recovery Plan is a must for moving forward. We plan for a group meeting in late 2017 or early 2018 to begin discussions about how best to initiate this process.

Build Partnerships and Financial Support

The South Texas prairie is a mix of private, state and federal lands. To reach the goal of sufficient contiguous habitat for 60 breeding pairs of Aplomado Falcons, we have built partnerships among stakeholders founded on integrity and trust over time. We will build new and maintain existing relationships with key cooperators to leverage results towards the ultimate recovery goal of delisting the Aplomado Falcon. With ever changing land management practices resulting in loss or gain of suitable habitats, we will build upon our tradition of establishing lasting relationships to ensure adequate space for these falcons to exist in perpetuity.

Supporting and participating in further research in both Mexico and the United States will contribute to further understanding and cooperation among stakeholders.

We will develop creative and effective methods of securing funds to:

1. Employ sufficient numbers of qualified, motivated biologists to bring the project to completion.

2. Acquire and maintain adequate forms of transportation, facilities, and tools to carry out daily activities to meet annual objectives.

3. Beyond annual monitoring, it will be necessary to share our growing knowledge of the Aplomado Falcon with partners in such a manner that habitats are improved, maintained, and protected now and in the future.

We will work closely with our Vice President for Global Partnerships to identify individuals, foundations, and other groups to maximize opportunities to share our vision of healthy ecosystems by providing the opportunity to be a part of saving this charismatic sentinel species. Through these opportunities we will share our intimate knowledge and passion for raptors beyond that of scientific products to inspire people to adjust their behaviors in a way that supports sustainable populations of falcons.

Fieldwork and Management – Brian Mutch and Paul Juergens

At the conclusion of the Aplomado Falcon propagation and release efforts in 2013, emphasis has shifted to closely monitoring the newly restored/recovering falcon population on the Texas Gulf Coast. Efforts have also evolved to include assisting land managers in prioritizing sites requiring restoration and protection of coastal prairie critical to the survival and expansion of Aplomado Falcon populations in South Texas.

The field season, February through July, is spent on the Texas Coastal Bend. Prior to the falcons' nesting season, all artificial nest structures are visited to perform maintenance and replacement as necessary. Currently, approximately 69 structures are maintained annually along 150 miles of the Gulf Coast. Monitoring the population yields important data about the health of this restored falcon population. Occupancy and productivity surveys are accomplished during nesting through fledging stages and occur April through July.

Working with land management agencies such as USFWS, TPWD, and NPS is an important part of our duties. Habitat is being prioritized where management actions can improve, maintain, and create important prairie landscapes for the falcon. We help to steer these agencies in the right direction where brush encroachment is threatening existing falcon territories and where territories have been recently lost due to invasion of brush into these coastal prairies. Habitat management creates its own unique field work; conference calls, sharing, management, and analyses of data, meetings with agencies, assisting with language for proposals are just some of the duties necessary for our role with habitat management processes.

The project also requires many hours of office work, both during the field season and at the conclusion of each field season. Many state and federal permits are maintained for the project, each requiring its own unique renewal and annual reporting procedures. Reports must be completed for deadlines within the organization and to satisfy requirements of funding received by state and federal agencies and private foundations. Attending meetings and conferences and preparing presentations for these events occurs annually.

Field work varies from many hours sitting and driving in a vehicle to extreme physical exertion. Heavy lifting, construction, hiking, operating All-Terrain Vehicles, or spending hours behind a spotting scope and/or binoculars recording data in any and all weather conditions occurs daily in the field. We spend many hours in watercraft as many of the nesting locations are located offshore on barrier islands. Some surveys also require the use of chartered or agency provided aircraft. Thorough note taking and recording of observations in the field is important. Notes are referred to at every level of report writing, maintaining permits, and accurately supporting all research. Field work provides most of the important data/information to the questions asked by our organization, federal, and state agencies, board members, and foundations providing support. Field work must be accomplished thoroughly, accurately, efficiently, and always with safety in mind. Duties require the safe and humane handling of an endangered species with decisions made quickly in the field.

Many hours in an office setting are necessary to attend to and maintain required permits. Data entry, writing/editing reports, and preparing presentations are some examples of required office work.

Work requires professional interaction with a wide spectrum of important contacts from agency personnel, board members, and foundation representatives traveling to the field to witness the project first hand and for development opportunities. Many private individuals provide access to ranch land where field work occurs, and this requires that good working relationships be maintained.

Personnel Needs

Given increased needs of staff for cross-program support outside of the Aplomado Falcon Program, there will be an increased need for administrative support that could be shared by multiple programs in the form of a seasonal or part-time position. Additional seasonal field crew may be warranted dependent upon the results of population analyses.

Permitting

We currently maintain six Federal permits (USFWS-4, Department of the Interior-1 and (NPS-1) and one State permit with Texas Parks and Wildlife Department (TPWD)). These permits are required to conduct all aspects of our field work in South Texas. Renewal and reporting processes are unique to each permit and must be completed annually prior to the end of each calendar year.

Partners

USFWS – permitting, funding, land management agency

- Refuge System – land management (2/3 of the Aplomado Falcon population is on refuge lands) and acquisitions
- Partners Program – source of funding and personnel for habitat management and conservation easements
- Coastal Bay & Estuary Program – source of funding and personnel for habitat management

National Park Service (NPS) – land management and permitting agency (one Aplomado Falcon territory is located on NPS lands)

Non-governmental Organizations

- Texas Conservation Fund (TCF) – land acquisitions have protected and included at least two falcon territories
- The Nature Conservancy (TNC) – land acquisitions and habitat management

Universities – Science support

- University of North Texas (Dr. Jeff Johnson) – genetics
- Texas A&M University (Dr. Miguel Mora) – analysis of egg, egg shells, and carcasses for environmental contaminants
- Universidad Estatal de Sonora (Dr. Alberto Macías Duarte) – ecology and monitoring of APFA populations in Mexico

Private Landowners – access for restoration activities and habitat management

State Agencies

- Texas Parks and Wildlife Department (TPWD) – land managers and permitting agency (one territory on TPWD lands)

Evaluation

We will evaluate our progress towards our six objectives annually and after five years:

Measures of annual progress:

1. Increase suitable, brush-free prairie habitat to a contiguous area sufficient to support additional breeding pairs of Aplomado Falcons. Providing artificial nest structures in grassland habitats mostly devoid of suitable natural nesting substrates like those found on the Texas mid-coast barrier islands also effectively increases suitable habitat (also fulfills #2 below).
    a. Prairie restoration efforts will annually improve >500 acres. The net positive gain realized on the ground will likely be much larger in scope than acres managed.

2. Provide long-lasting artificial nest structures for Aplomado Falcons in existing territories and to habitat depleted of tree-yuccas or other suitable nest sites.
    a. Replace five to ten existing wooden artificial nest structures with aluminum structures, providing maintenance to the remainder (~60 total).

3. Track Aplomado Falcon population ecology parameters to verify population growth and model the species' survival probability as suitable habitat is accumulated.
    a. Complete occupancy and productivity surveys of known falcon territories and identify additional Aplomado Falcon territories. Identify as many individual falcons as possible through banding and band reading.

4. Use genetic markers to estimate the size of the South Texas population of Aplomado Falcons.
    a. Blood samples have been collected annually and 282 samples have been collected and stored from the South Texas population. This genetics study could be completed during the next fiscal year.

5. Toxicology screen of addled egg and egg shell samples already collected.
    a. Annually, eggshell and addled egg samples have been collected from nest sites during banding efforts. Seek funding to analyze a sample of this collection for toxicology results. Results are needed for the revised Recovery Plan process.

6. Examine and revise the 1990 Aplomado Falcon Recovery Plan to include our increased knowledge of today's threats to the species' survival in contemporary landscapes.

a. Meet with partners to discuss and initiate the process to revise Aplomado Falcon Recovery Plan. Annually provide the data required to help complete the species status assessment, from which the revised plan will be written.

Measures of success in five years:

In five years over 2,500 acres of prairie will have been improved for the Aplomado Falcon and other prairie obligate species. We will have replaced >50% of existing wooden nest structures with aluminum structures. Through our banding/band reading and survey efforts, we will have developed a greater understanding of annual falcon survival and the overall status of the Aplomado Falcon population in South Texas. The completed genetics study will also give us an estimate of size of the South Texas Aplomado population. The completed eggshell and addled egg toxicology study will detect contaminants (i.e., Hg and PAHs are a concern) and is important for the revision of the Recovery Plan. The 1990 Aplomado Falcon Recovery Plan will have been revised. We will know what further actions and benchmarks will need to be achieved to down- or de-list the Aplomado Falcon from the U.S. list of endangered species.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$342,500	$203,000	$203,100	$203,300	$204,300	$1,156,200

Golden Eagle Monitoring
White Sands Missile Range, New Mexico

Personnel

Principal Field Biologist:	Paul Juergens
Director of Global Conservation:	Chris Parish
Director of Global Conservation Science:	Chris McClure, Ph.D.
Senior Scientist:	Grainger Hunt, Ph.D.

Project Background

The Golden Eagle (*Aquila chrysaetos canadensis*), a species protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (Eagle Act), is a wide- ranging species in North America, primarily in the western states west of the 100th meridian and consists of northern migratory populations and southern resident populations. Of eagle conservation concern, anthropogenic mortality factors are becoming more prevalent. Among the many factors causing eagle fatalities are lead poisoning, electrocutions, wire strikes, automobile collisions, and collisions with wind turbine blades. Given the increase in prevalence of human caused mortality in recent years, the U.S. Fish and Wildlife Service (USFWS) has a growing concern for this species listing the eagle as a Bird of Conservation Concern in the Southwest and Mountain- Prairie Regions. Furthermore, the U.S. Department of Defense (DoD) Partners in Flight Program (PIF) considers the Golden Eagle a mission-sensitive priority bird species on DoD lands. White Sands Missile Range (WSMR) has also recognized this concern and has partnered with The Peregrine Fund (TPF) to gain an understanding of how eagles are distributed on the Range.

In November 2012, we began cooperative research with WSMR to gain an understanding of how Golden Eagles are distributed on WSMR. WSMR is a DoD military training and weapons test-facility operated by the Department of the Army located in south-central New Mexico. It encompasses 2.2 million acres predominantly in the Chihuahuan Desert ecoregion and is located in the USFWS Bird Conservation Region 35 (i.e.,

Chihuahuan Desert BCR). The climate is arid characterized by low and variable precipitation, high summer temperatures, and low relative humidity.

Our main focus is to find breeding Golden Eagle pairs on WSMR, determine annual territory (breeding area) occupancy rates, make reproductive assessments, and estimate the size of the breeding population. The information we are collecting will augment a WSMR Golden Eagle Management Plan (draft expected to be completed in 2017) as well as WSMR's Avian Protection Plan, which offers guidance pertaining to infrastructure maintenance and development, mission planning, etc. on the Range to minimize or eliminate sources of avian injury and mortality, principally electrocutions at power poles, vehicular collisions, nest disturbances, and other harmful events. Furthermore, because the Golden Eagle population in this area of New Mexico is not well known with only a few localized surveys on WSMR conducted in the past, results from our work will broaden eagle conservation in the Southwest and supplement other Chihuahuan Desert studies. In addition, the eagle population in the Chihuahuan Desert region is of particular interest because of the present and predicted drought and an increasing human population. While Golden Eagles are the focus of the study, its overall benefit will help conserve other large raptors on WSMR as well.

Accomplishments

Our first step in developing a GOEA management plan for WSMR is quantifying baseline population-level assessments of species distribution within the installation.

Nest Inventory Flights

We conducted Golden Eagle nest site inventory flights in March and April 2013 and 2014 by helicopter in cooperation with WSMR personnel and Army Air. We focused on mountainous habitat within the boundaries of WSMR. An additional survey of cliff nesting habitat on San Andres National Wildlife Refuge (SANWR), within the boundaries of WSMR, was conducted in September 2015. We used Eurocopter UH-72 Lakota helicopters as the principal aircraft to efficiently and effectively locate eagle nests; a Bell UH-1 Iroquois helicopter was also utilized on one nest inventory flight in 2013. We were able to locate 217 nests during the 2013 and 2014 inventory flights. Analysis of the data revealed 48 nest clusters with each cluster identified a potential breeding area (PBA) for future monitoring efforts. We located 41 nests within the boundaries of SANWR during two flights in 2015; however, we were unable to complete the nest inventory flights of cliff nesting habitat to include Black Brushy, Bennett, and Goat Mountains. Of the nests observed on SANWR, we estimated they comprise six PBAs. The WSMR GIS lab produced a set of maps for each PBA using updated data from the FY15, FY16 ground based survey efforts as well as for the PBAs delineated from the SANWR nest inventory flights.

Breeding Area Occupancy Survey and Nesting/ Reproduction Assessment

We conducted breeding area (BA) occupancy surveys during the months of January and February 2015, 2016, and 2017 utilizing nest site locations gathered during inventory flights in 2013 and 2014 and some found during the 2015 flights. During these aerial surveys, we identified 236 nests associated with WSMR BAs. Additional nests were located via ground-based observation in 2015 and 2016; therefore, a total of 239 known nests on WSMR (not including SANWR) are now recognized for survey purposes. Our field observations revealed that the initial estimate of 48 PBAs was high. Based on observations of eagles made through 2016, we estimate there are 31 territories on WSMR not including nests/BAs on SANWR. This indicates the territory/BA defended by many of the WSMR eagles encompasses a larger area and a greater number of nests than expected.

In FY15, we detected adult Golden Eagle pairs occupying 28 of the 31 territories (90%). We observed a single adult eagle at two other territories and did not observe any eagles at one territory, Big Gyp Mountain North, during two survey attempts. We suspect the nest clusters, Rhodes Canyon and Ash Canyon, are part of occupied BAs Tip Top and Gunsight Peak; respectively. We also suspect the Hospital Canyon BA, based on observations made in 2016, is part of the Dead Man Canyon BA. This required re-examination of occupancy data resulting in adjustment of territory occupancy reported for 2015 from 29 occupied out of 32 BAs to 28 occupied BAs out of 31. Data represented for 2016 recognizes the same 31 territories. Furthermore, the Big Mesa – Good Fortune Canyon PBA has not been identified as a BA based on the disrepair of the few nests on that very small cliff complex and the presence of a breeding pair of Prairie Falcons (*Falco mexicanus*). The Big Mesa – Good Fortune Canyon PBA is approximately 3.5 km WSW of the active 2015 & 2016 Mount Baldy BA nests. We also conducted additional reproduction assessment monitoring of four active nests in 2015 to understand the nesting chronology in the WSMR population. Two of the four nests failed. We observed large young of six weeks of age or older at the two remaining nests. Our observations indicate that nest incubation began in mid to late-February for these two eagle pairs. In FY16 we detected adult Golden Eagle pairs at 26 of the 31 territories (84%). We observed a single adult eagle at five other territories. We also conducted additional monitoring of nine active nests to assess reproduction and nesting chronology. Three of the nine nests failed. We observed large young of six weeks of age at one nest and seven weeks of age or older at the remaining five nests. Our observations indicate that nest incubation initiated as early as mid-January and as late as mid-February for these nesting eagles; most pairs initiated incubation around February 1st. We are in the process of finalizing data collection and analysis in FY17, but our preliminary results seem in agreement with previous years. This information is valuable to WSMR for mission scheduling in order to minimize disturbance to eagles.

Eagle tracking and monitoring at Southwest Mockingbird/Granite Site

Under an additional grant through WSMR titled "Golden Eagle Monitoring Associated with Operation of the Granite Target Site," we began monitoring a breeding pair near a test site to determine if testing activities impact eagle occupancy, nesting, and general behavior. In January 2017 we, with contracted assistance from Gregg Doney of American Eagle Research Institute, successfully trapped and tagged with GPS Platform Transmitter Terminals (PTTs) the breeding pair of eagles prior to test site development and activation. The information we gather from the PTTs will augment field observations to help WSMR understand and respond to potential impacts associated with the operation of the test site. These activities are in accordance with permits WSMR has with the USFWS.

Development of prey surveys

We have secured staff, developed and beta-tested prey surveys within habitats identified from initial nesting and occupancy surveys. Results will be forthcoming.

Draft Management Plan

WSMR identified the need for a Golden Eagle management plan to summarize WSMR eagle survey and monitoring data and to detail plans for adaptive management for compliance with the Eagle Act. This plan will supplement the WSMR Integrated Natural Resources Management Plan (INRMP), which currently does not include sufficient detail on eagles for management purposes. We have collected enough baseline data to complete a draft management plan in FY17-18 and should have a final draft in FY18-19.

Need Statement

The Golden Eagle is considered a data deficient species in the Chihuahuan Desert part of their range and is a species of conservation concern, given the increase in anthropogenic threats on the landscape. Our work will assist WSMR to ensure that the installation is in compliance with federal laws designed to protect the species and contribute to eagle conservation. **This project addresses The Peregrine Fund's strategic conservation outcome to conserve species and tackle landscape-level threats affecting multiple species using the Golden Eagle as a sentinel of change.**

Goal

Fulfill contractual obligations with WSMR while increasing our knowledge of this Golden Eagle population which will aid WSMR in better managing their wildlife resources while maintaining their military mission.

By working to develop a quantitative adaptive management tool that can be applied to pragmatic conservation of raptors at military installations throughout the U.S., we build our capacity and knowledge to better conserve eagles and other raptors over large landscape scales.

Objectives

In FY18 we will achieve the following objectives:

1. Golden Eagle BA occupancy surveys.
2. Perform additional monitoring of active nests to further our understanding of nest productivity and nesting chronology and continue monitoring program for eagle prey based on established protocol.
3. Attempt to complete nest inventory flights on SANWR.
4. Determine additional future research and management needs (e.g., landscape level assessment of lead (Pb) burden relative to scavenging raptors).
5. Provide site-specific monitoring and evaluation of eagles potentially threatened by WSMR missions as defined and requested by WSMR biologists.
6. Write a management plan for Golden Eagles on WSMR to aid in implementing conservation strategies on the Range.

Long-term Plan: Beyond developing the first management plan we will continue Golden Eagle territory occupancy surveys on WSMR and provide site specific monitoring and evaluation of eagles potentially threatened by WSMR missions until at least FY19; and publish our findings on this unique population of desert dwelling eagles.

Activities

Rangewide Monitoring

As part of an ongoing study to determine Golden Eagle distribution and population size on WSMR, TPF will continue to monitor all known golden eagle territories range-wide to determine occupancy. Nesting chronology, success and productivity will be investigated, particularly at territories near test sites. Methods may include aerial or ground-based surveys. The budget also includes funds for a lead (Pb) assessment study (one year FY17-18), development and implementation of prey (i.e., lagomorph) surveys, and as deemed necessary, capturing and monitoring WSMR eagles via PTT transmitters.

Granite Test Site Monitoring

TPF will monitor nesting/territorial eagles in the vicinity of a new test site called the Granite

Target Site on WSMR. Project will focus on monitoring requirements of WSMR eagle take permits issued by the USFWS, above and beyond the rangewide territory occupancy surveys conducted annually. Monitoring will focus on the Southwest Mockingbird territory, and secondarily on adjacent eagle territories. Permit monitoring requirements will include the monitoring of nest building, nest chronology, reproductive success, movement patterns, and eagle response to construction and testing at the Target Site. Methods may include aerial or ground-based surveys. The budget included funds for two eagles to be captured (completed) and monitored via PTT transmitters (ongoing), and also funding for management activities (such as nest removal or coning as per permit to encourage alternate nest use) to minimize or eliminate potential take of eagles. This work is currently planned to continue at least through December 31, 2021.

WSMR Golden Eagle Management Plan

We will continue drafting and complete a management plan that will summarize known information on Golden Eagles on WSMR, such as distribution, population size, territory occupancy, nesting chronology, and threats to the species. The plan will discuss the status of the eagle, and threats, in the Southwest and Western U.S. Background will be provided on the Eagle Act (including permit process/requirements) and the MBTA. We will discuss specific plans for eagle monitoring, proposed research, management recommendations, pertaining to habitat, power line collision/electrocution, vehicle collision, disturbance, and lead exposure pathways.

Lead (Pb) burden assessment (FY17-18)

Lead poisoning has been identified as a preventable cause of sickness and death in human systems for hundreds of years, yet relatively new findings in the past one hundred years suggest that additional sources and pathways of lead poisoning remain a threat to scavenging wildlife. The negative effects of lead found in the remains of hunted animals has come to the attention of many land management agencies and continued studies are resulting in a heightened awareness of what can be done to avoid preventable lead exposure. The first step in this investigative process is to ascertain the breadth of potential lead-burden within a landscape and to introduce the question to land managers and resource users simultaneously.

With a more complete knowledge of Golden Eagle ecology informed by our work on WSMR, combined with annual big-game hunting, it stands to reason that the potential for lead exposure exists. The first step is to quantify the rates of carrion use by scavenger and second, the persistence of said carrion. Biologists from TPF have been investigating the relationship between scavengers and lead ammunition residues in carrion for nearly two decades in

northern Arizona and southern Utah as part of the California Condor Recovery Program. TPF will begin the process of assessing lead burden on WSMR by deploying camera traps on offal piles during and following their annual big-game hunting season beginning Fall FY17.

A key component of initiating this investigation is engaging with hunters and managers alike to introduce the conversation and work through the investigation together in each step of the process. We will introduce the study by asking hunters for their support by helping us deploy cameras on their big-game offal piles and then share the results with next year's hunters. A formal proposal has been submitted by WSMR biologists for the FY17-19 seasons, but as of yet, only partially funded for the first season where we will begin placing camera traps on offal piles to begin quantifying rates of visitation by species, and persistence and availability of carrion per unit time.

Fieldwork and Management – Paul Juergens, seasonal employee(s), temporary staff, & volunteer(s)

The Principal Investigator and Manager for Golden Eagle Studies occurring on WSMR is responsible for project planning, hiring and supervising seasonal field assistant(s), temporary employee(s) and volunteer(s), conducting Golden Eagle breeding area occupancy surveys and reproduction assessments at a sample of territories, advising WSMR personnel on possible management activities to benefit eagles, and writing periodic updates to the WSMR point of contact as well as annual reports on work completed during the year.

- Field work begins in late December to early January each year during the eagles' courtship period prior to nesting and continues periodically until early July.
- Pass security clearance to maintain an unescorted up-range access to WSMR.
- Receive Unexploded Ordnance (UXO) and Range hazards safety training.
- Maintain WSMR Special Photo Permit following photo permit briefing requirements.
- Hire and supervise seasonal field assistant.
- The biologist and field assistant conduct a Golden Eagle territory occupancy survey on WSMR visiting approximately 30 territories annually. This work usually requires 6 weeks to complete and involves long days in the field and extensive driving in rugged off-road conditions in potentially harsh winter weather conditions.
- Accurately and thoroughly fill out WSMR Golden Eagle Occupancy and Reproduction Assessment Forms for each territory surveyed. Each territory visited during the occupancy survey is observed for a minimum of four hours and up to four times during the survey period or until occupancy is confirmed whichever comes first.
- Periodic monitoring of select territories/eagle pairs from mid-February until ca. mid-July is conducted on a case-by-case/territory-by-territory basis to acquire additional data pertaining to nesting activities of monitored eagles and to monitor impacts to eagles

from military missions and other activities on WSMR.
- Maintain databases of information collected during field work.
- Provide up-to-date information to WSMR staff/contacts on Golden Eagles monitored on WSMR.
- Perform all the same duties as field assistant(s) as necessary

The main duties of the field assistant are to work closely with the project biologist/manager, and sometimes independently, on most aspects of field activities related to Golden Eagle studies occurring on WSMR. The bulk of the work revolves around territory occupancy surveys conducted at 30+ eagle territories with the goal of locating nesting eagles and determining the ages of all birds observed and document the behaviors of observed eagles to determine territory status. Additional surveys at a sample of territories may occur to document nesting activities and to identify pair/territory status after potential disturbance activities near nest sites. Golden Eagle prey surveys (e.g., cottontail and jackrabbit counts) also may occur and would follow protocol similar to nighttime spotlight counts often used for other wildlife, such as deer. The field assistant must pass a background check to acquire unescorted access to up-range areas, complete a briefing on UXO and maintain a WSMR Special Photo Permit. Careful and thorough observation and data collection in the field is paramount and important for all reporting and dissemination of results that are required of the project. Familiarity with GPS receivers, tablets, smartphones, and desktop and laptop computers and associated programs is important for data collection, analysis, storage, and dissemination as well as for the communication needs of the project. Notes are referred to at every level of report writing and project planning, and the field assistant is expected to at times record data independently and assist in the entry and storage of data collected in the field. Field work must be accomplished thoroughly, accurately, efficiently, and always with safety in mind. During the occupancy survey period (January and February), fieldwork can occur during any day of the week and is often regulated by WSMR military testing and training activities which often require large sections of WSMR to be closed and inaccessible. Days in the field are often long and challenging with many miles logged in vehicles as well as on foot. Good physical condition is required as are good communication and organizational skills. The field assistant when working independently must report to the project biologist to discuss findings of the day and make plans. Proper care and maintenance of TPF equipment ranging from high performance optical gear to the vehicles used for transportation is critical.

Temporary staff and highly qualified volunteers are hired on a needed basis to perform specific duties as required to fulfill contractual obligations with WSMR that cannot be fulfilled by the Project Principal Investigator and Manager and Field Assistant(s) alone. Duties can include all those listed above for the Field Assistant and may extend into tasks related to technical writing

and data analyses (e.g., we have hired a temporary employee and volunteer to help draft the WSMR Golden Eagle Management Plan and design and test protocol for Golden Eagle prey surveys).

Permitting

WSMR Uprange access - maintain for all

WSMR Photo permits - add CP

Capture and handling permits - USGS BBL (#20499) GOEA - add PJ, CP

Evaluation

Objectives will be evaluated:

Golden Eagle BA occupancy surveys.

- Occupancy surveys completed annually at 31 BAs according to protocol. Data collected, collated and entered into database. Report written.

Perform additional monitoring of active nests to further our understanding of nest productivity and nesting chronology and continue monitoring program for eagle prey based on established protocol.

- Active nests monitored annually at regular, frequent intervals of at least on visit per month during nesting cycle until nest success of failure documented. Data collected, collated and entered in a database. Data analyzed for nesting productivity and chronology, and report written.

Attempt to complete nest inventory flights on SANWR.

- Inventory flights conducted in vicinity of Black Brushy, Bennett, and Goat Mountains; data entered in data base, update map booklet, and report written.

Determine additional future research and management needs (e.g., landscape level assessment of lead (Pb) burden relative to scavenging raptors).

- Estimate Golden Eagle and other scavengers' use of remains of hunted oryx relative to rates of lead ammunition used during hunt as quantified by pre- and post-hunt surveys. Study designed and started. Data collected, collated, and entered into a data base. Study managed adaptively as DoD installation modifies hunting conditions.

Provide site-specific monitoring and evaluation of eagles potentially threatened by WSMR missions as defined and requested by WSMR biologists.

- Data on occupancy, nesting status, movement and behavior collected, collated and entered in a database and provided to WSMR biologists in near real-time if required.

Write a management plan for Golden Eagles on WSMR to aid in implementing conservation strategies on the Range.

- Plan completed and delivered by end of the year.

Partners

DoD – Department of Army - White Sands Missile Range

USFWS – permitting

USGS – permitting

Universities – Dispensing funds, New Mexico State University

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$135,100	$116,600	$111,500	$111,500	$107,400	$582,100

Budgets are approximated because these single-source grants from the US Department of Defense (DoD) vary in duration, and amounts allocated are highly flexible and can move by category or by year. Budgeting and proposed actions will be adjusted based on funding and permissions from White Sands Missile Range. We will seek Cooperative Ecosystems Study Unit (CESU) accreditation to allow direct contracts with DoD.

Propagation at the World Center for Birds of Prey

Current Personnel

Propagation Manager:	Marti Jenkins
Propagation Specialists:	Leah Medley, Hana Weaver
Propagation Specialist & Registrar:	Heather Springsteed

Project Background

Since 1973, The Peregrine Fund has served as a global expert in the captive propagation and reintroduction of birds of prey. Between the facilities at Cornell University, Fort Collins, Colorado, and the World Center for Birds of Prey in Boise, Idaho TPF staff have produced over 3,000 Peregrine Falcons, 2,000 Northern Aplomado Falcons and 250 California Condors, in addition to numerous other species. The propagation facility at the World Center for Birds of Prey currently holds six pairs of Taita Falcons, one pair of Northern Aplomado Falcons and 16 pairs of California Condors.

Need Statement

This project is categorized by The Peregrine Fund as experimental propagation. It addresses the need to maintain skills and experiment with methods necessary for propagating species in need of conservation. The current method utilizes similar common surrogate species with the goal of producing young suitable for captive propagation programs or release into wild populations. The project maintains the flexibility to adapt captive propagation efforts to emerging conservation needs.

Goals and Objectives

1. Create a healthy breeding population of Taita Falcons for propagation, education and experimentation of propagation methods.
    - Establish new and maintain existing breeding Taita pairs.
    - Establish copulating, incubating pairs that hatch and raise young.
    - Foster or cross foster falcon chicks to non-breeding Taita pairs giving them

experience hatching and raising chicks to improve pair bond and hopefully future breeding success.

2. Gain experience and establish protocols to create a small, captive breeding population of Sharp-shinned Hawks to use as a surrogate species for other accipiters in need of conservation.
    - Refurbish accipiter chambers in existing falcon barns to best suit two new breeding pairs of Sharp-shinned Hawks.
    - Acquire all necessary documentation and permits from Idaho Department of Fish and Game and the United States Fish and Wildlife Service to retain captive produce and release Sharp-shinned Hawks.
    - Obtain four Sharp-shinned Hawks to create two breeding pairs either from other captive facilities or wild birds that have been taken by falconers and flown for no less than one year per USFWS requirements.
    - Establish copulating, incubating pairs that hatch and raise young.
    - Retain some young to establish new breeding pairs while banding, releasing and monitoring others to evaluate their success of reaching independence.

3. Continue to grow as a professional team that directly contributes to the conservation of birds through research, education, communication.
    - Fill open position in Propagation department with qualified applicant in October 2017 and replace other positions with qualified applicants should positions become available.
    - Maintain a culture of supportive team work that embraces professional behavior, self-improvement, education and acceptance of strategic change within the propagation department.
    - Complete annual permit reports and renewals as needed.
    - Compile TPF specimen inventory and all activities report for Federal and State permits.
    - Create a system for documenting incoming and outgoing specimens from Collections Building Specimens Lab and specimen freezers.
    - Maintain updated permits on the Eyrie.
    - Create and post to Science drive all specimens held in TPF Collections.
    - Work with IT team and any outside source designated to first create a system to protect database of historic falcon data in The Peregrine Fund server and then transfer data into future TPF wide database.
    - Mentor new employees by teaching responsibilities of incubation and falcon breeding.

- Replace obsolete equipment with more contemporary technologically advanced equipment over the next five years.

Activities

All members of the propagation team participate in the activities of this project. The work is accomplished annually throughout the year and adheres to a strict seasonal timeline:

October-December: Clean falcon barns, repair or replace camera equipment and make improvements and repairs as needed to chambers.

January: Establish new breeding pairs of falcons as needed, trim talons, cope beaks and hand clean chambers.

February: Monitor and record data for courtship and breeding, prepare incubation room and incubators for upcoming season.

March-April: Record data on courtship, breeding and egg laying, collect eggs for artificial incubation and prepare brooder room for chick rearing as needed in upcoming season.

March-May: Observe record and assist egg hatching.

April-May: Monitor and record data on chick rearing, health and development of chicks.

June-August: Refurbish chambers in falcon barns to best suit raptor species identified for experimental propagation and acquire permits necessary.

July-September: Acquire individuals of species identified for experimental propagation for acclimation and pairing prior to breeding season.

August-September: Prepare and submit Operations Report and Executive Summary with results from previous fiscal year.

Partners Involved

Idaho Department of Fish and Game-Permitting

Dr. Reed Linenberger, DVM / Habitat Veterinary Clinic-Veterinary Care

United States Fish and Wildlife Service-Permitting

Jim Weaver and Willard Heck / Weaver Ranch-Taita Falcon Donation and Funder

Other partners may be identified as projects progress.

Evaluation

Our goals and objectives are primarily time bound to the seasonal activities and therefore are measurable by completion of the tasks outlined and the numbers of young produced. The true measure of success will be the formation of naturally copulating pairs of Taita Falcons and Sharp-shinned Hawks that produce fertile eggs, incubate, hatch and raise young with behavior suitable for captive propagation or release into wild populations.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$116,000	$115,200	$118,200	$118,800	$120,800	$589,000

California Condor Propagation at the World Center for Birds of Prey

Current Personnel

Propagation Manager:	Marti Jenkins
Propagation Specialists:	Leah Medley, Hana Weaver
Propagation Specialist & Registrar:	Heather Springsteed

Project Background

Since 1973 The Peregrine Fund has served as a global expert in the captive propagation and reintroduction of birds of prey. Between the facilities at Cornell University, Fort Collins, Colorado and the World Center for Birds of Prey in Boise, Idaho TPF staff have produced over 3,000 Peregrine falcons, 2,000 Northern Aplomado Falcons and 250 California condors in addition to numerous other species. The World Center for Birds of Prey currently houses 16 pairs of California condors, the world's largest captive breeding population.

Need Statement

This project addresses our strategic plan conservation outcome to save critically endangered species. We breed in captivity critically endangered California condors to produce young suitable for release into the wild. Specific annual guidelines are set by the California condor recovery program partners coordinated by the United States Fish and Wildlife Service. Since 1993, and by invitation from USFWS, The Peregrine Fund has been managing the largest captive-breeding flock, producing 16-20 condors per year at our Boise facility, the World Center for Birds of Prey, for distribution to the entire reintroduction program in California and Arizona and to build additional captive flocks.

Goals and Objectives

Our goal is to produce 16-20 young condors suitable for release into the wild each year while maintaining a healthy captive breeding flock of California condors and meeting the greater organizational needs of engagement and capacity building.

- Follow seasonal work timeline and protocols each year.
- Adjust procedures and protocols when necessary to insure the health and wellbeing of breeding condors and young produced.
- Nurture professional relationships with partners and stakeholders in the California condor recovery program.
- Annually maintain permits and submit reports required for captive propagation; obtain temporary permits required for specific activities such as import of birds and eggs.
- Replace obsolete equipment with more current equipment over the next five years.

Work with Education, Engagement and Development Teams to share updates and information for use in fund raising proposals, media releases and community outreach.

- Transfer all condor propagation related photos and videos currently in various locations to Resource Space with accompanying Meta data and continue to add new materials.
- Add individuals from each team onto propagation group email list that distributes time sensitive information about eggs laid, chicks hatched, birds moved and other pertinent information related to California condor captive propagation.
- Contact Director of Global Engagement when unique situations or stories arise in propagation department that could be of interest to the community, media outlets, members and donors.

Grow as a professional team that directly contributes to the conservation of birds through research, education, communication.

- Publish paper on Methods Used to Artificially Incubate California Condor Eggs from World Center for Birds of Prey 2009 – 2017.
- Fill open position in Propagation department with qualified applicant in October 2017 and replace other positions with qualified applicants should they become available.

- Maintain a culture of supportive team work that embraces professional behavior, self-improvement, education and acceptance of strategic change within the propagation department.
- Mentor new employees by teaching responsibilities of condor breeding. Help new employees to learn historically relevant information about The Peregrine Fund and the California Condor Recovery Program.

Activities

All members of the propagation team participate in the activities of this project. The work is accomplished annually throughout the year and adheres to a strict seasonal timeline:

September-November: Observe condor behavior and fledging condor chicks, establish new breeding pairs as recommended by team of geneticists, transfer any incoming or outgoing condors for breeding, make wing tags for the seasons' chicks and identify any unpaired adults that will be used for chick rearing in the following season.

December-January: Trap and process condor chicks to transfer to socialization pen.

January: Clean condor nest boxes to prepare for upcoming breeding season, repair or replace condor cameras, prepare incubation room and incubators for upcoming season and do fire safety system repairs as needed in propagation barns.

January-February: Prepare brooder room for puppet rearing of condor chicks as needed in upcoming season.

January-April: Observe and record data on condor courtship, breeding and egg laying, collect eggs for artificial incubation and increase production by double clutching pairs that lay early enough in the season.

February-June: Maintain appropriate incubation practices and data collection throughout the season. Properly incubate all condor eggs produced and collect all relevant data.

April-June: Observe, record and assist condor egg hatching.

April-September: Observe and record data on chick rearing, health and development of chicks and vaccinate all chicks 2-3 times against West Nile Virus.

June-July: Trap and administer booster vaccine to all adult and sub adults semi-annually to protect against West Nile Virus.

July: Conduct fire safety system inspections and fire extinguisher inspections for all buildings on grounds, clear designated World Center for Birds of Prey grounds of brush and grass stands for fire season, clean all condor breeding chambers and repair and replace cameras as needed.

July-August: Purchase and prepare kennels for upcoming shipment of juvenile birds to field sites.

August: Prepare and submit Operations Report and Executive Summary with results from previous fiscal year of California Condor Propagation.

September: Trap and kennel condors from group socialization pen and transfer to designated field sites and attend Condor Field Team Meeting with condor program partners and stakeholders.

September-October: Clean group socialization pen and make any necessary modifications and prepare puppet rearing nest boxes for next season.

Partners Involved

The Peregrine Fund –Condor Reintroduction

United States Fish and Wildlife Service–Condor Reintroduction

National Park Service–Condor Reintroduction

Ventana Wildlife Society–Condor Reintroduction

Oregon Zoo-Condor Propagation and Holding Facility, Veterinary assistance

Los Angeles Zoo- Condor Propagation and Holding Facility, Veterinary assistance

San Diego Zoo Global- Condor Propagation and Holding Facility, Veterinary assistance, Condor Reintroduction, Wildlife Disease Laboratories and Pathology

Santa Barbara Zoo-Condor Holding and Reintroduction Assistance

Idaho Department of Fish and Game -Permitting

California Department of Fish and Wildlife-Permitting

Arizona Game and Fish Department-Permitting

Oregon Department of Fish and Wildlife-Permitting

Dr. Reed Linenberger, DVM / Habitat Veterinary Clinic-Veterinary Care

Double Eagle Dairy- Donated Food Supply

Evaluation

Our goals and objectives are primarily time bound to the seasonal activities and therefore are measurable by completion of the tasks outlined and the numbers of young produced. More specifically by meeting the goals and expectations set forth by the California Condor Recovery Program partners in coordination with the USFWS. The true measure of success will be the continuation and formation of naturally copulating pairs of California condors that produce

fertile eggs, incubate, hatch and raise young with behavior suitable for captive propagation or release into wild populations.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$437,800	$417,900	$423,000	$429,700	$435,100	$2,143,500

California Condor Reintroduction Program

Program Personnel

Director of Global Conservation:	Chris Parish
Condor Program Field Manager:	Tim Hauck
Assistant Field Managers (2):	to be named from existing field technicians
Field Technicians:	Erin Brannon, Angela Woodside, Joshua Young, Rebecca Bishop, and one position to fill in FY18
Administrative Assistant:	need to fill
Interns/Volunteers:	(3) vacant

Project Background

North America's largest flying land bird, The California Condor, survived Ice Age extinctions. Yet in the past 100 years, this obligate scavenger has spiraled toward extinction. By the time society took notice, condor numbers were so low and studies were so few that researchers raced to try and determine the causes of this drastic decline, but the end of the condor seemed eminent. The only sure thing, however, is that a captive breeding program would be necessary to save the species from extinction and allow for the potential of a reintroduction program.

The last free-flying condor was captured and added to a captive flock in 1987, leaving no condors in the wild until 1992 when reintroductions were initiated in California by the U.S. Fish and Wildlife Service (USFWS). Since 1993, and by invitation from USFWS, The Peregrine Fund (TPF) has been managing the largest captive-breeding flock, producing condors at the World Center for Birds of Prey for the purposes of building additional captive flocks and for the broader reintroduction program in California and Arizona. In 1996 The Peregrine Fund launched and continues to maintain a 10(j), non-essential experimental reintroduction program in northern Arizona and southern Utah under Memoranda of Understanding (MOU) and applicable special permits with the USFWS, National Park Service (NPS), Arizona Game and Fish Department (AZGFD), Utah Division of Wildlife Resources (DWR) and others.

Non-invasive research into captive breeding and restoration practices increases the body of

knowledge regarding condor conservation and natural science, and provides the basis for ongoing management decisions. Specific topics of field study include condor movements, behavior, foraging ecology, and toxicology, specifically lead poisoning. Findings and publications arising from these investigations provide guidance to this and other endangered species restoration programs through scientific exchange and publication.

Accomplishments

Following two decades of releasing and monitoring the southwestern condor flock, we have observed many successes like that of 30 documented wild-hatched fledglings since 2003, but the ultimate and final sign of success of a self-sustaining population has yet to be reached. Volumes of data have been collected, analyzed, and published (Appendix 1), and it remains clear that the primary impediment to recovery is of an anthropogenic and preventable source, lead poisoning from ammunition residues in the remains of shot carcasses consumed by condors. Lead poisoning accounts for nearly 55% of diagnosed fatalities, and each year the field team traps and tests an average of 92% of the Arizona - Utah population (N=76) finding an average of 75% of those trapped having elevated lead levels. An average of two dozen condors a year are treated with chelation therapy for dangerously high blood-lead levels following the hunting seasons spanning from September 1 through early spring each year. The second leading cause of death is predation, representing less than 25% of diagnosed fatalities.

Timeline of Accomplishments since 2005.

- Arizona Game & Fish Department began supplying free non-lead ammunition to hunters with tags in areas frequented by condors, specifically Kaibab Plateau (2005).
- Obtained evidence implicating rifle bullet fragments in deer as a primary source of lead exposure to condors. (2006)
- Greater than 80% of big-game hunters participated in lead-reduction efforts on the Kaibab Plateau, Arizona. (fall hunting seasons 2007-2016)
- Held an international conference on “Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans.” (2008)
- Published and distributed May 2008 conference proceedings*, Watson, R.T., M. Fuller, M. Pokras, and W.G. Hunt (Eds.), Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans. The Peregrine Fund, Boise, Idaho, USA*. (2009)
- The Utah Division of Wildlife Resources initiated efforts to reduce lead by offering a $50 coupon redeemable for any hunter that used non-lead on their big-game hunt. (2010)
- Utah Division of Wildlife Resources observed increased participation by offering free ammunition to individuals hunting big-game in the southern Utah condor range (2012).

- Four wild-hatched chicks confirmed in Arizona, the greatest number in any one year since the first wild-hatched chick in 2003 (2013).
- The Utah Division of Wildlife Resources reported increased participation in its second year of a structured non-lead ammunition program (2014).
- The Arizona Game and Fish Department maintained support for its voluntary lead reduction program at 88% (2014).
- A wild-hatched condor produced a viable chick in Arizona marking the beginning of a F2 generation (2014).
- First recorded condor chick confirmed in Utah (2014).
- Eleven of 25 confirmed wild-produced condors survive in Arizona (2014).
- Recorded toxic blood-lead levels from trapping data and required treatment for lead poisoned condors declined below levels observed in nearly a decade (2014).
- Arizona Game and Fish Department recorded the eighth consecutive year of greater than 80% voluntary participation in the Kaibab Big-game Lead Reduction Program with an all-time high of 91% participation (2014).
- Utah Division of Wildlife Resources recorded 84% participation in their big-game Hunters Helping Condors Program (2014).
- Through cooperation and funding from USFWS, TPF distributed non-lead ammunition to the Kaibab Paiute Indian Reservation hunters (2015 & 2016).
- Thirty wild-hatched chicks confirmed between 2003 and 2016, of which 10 are surviving today (2017).
- Established and maintained a population of condors numbering between seventy and eighty individuals since 2009.
- Publications (see appendix 1).

Need Statement

The California Condor is one of the original species listed on the endangered species list and remains critically endangered throughout its range still today. With support from cooperating agencies, The Peregrine Fund has reintroduced the species to portions of its historical range in northern Arizona and the resulting free-flying population has expanded into southern Utah. We will work with our partners to reach the USFWS recovery goal of 150 condors in the southwestern population through adaptive management and continued refinement of reintroduction techniques to maximize survival. **This project is aligned with The Peregrine Fund's strategic plan conservation outcome to conserve endangered species and tackle landscape-level threats affecting multiple species.**

In addition to sustaining California Condors in the wild in Arizona and Utah, the ultimate need for recovery of the species is to remove the leading cause of preventable mortality, lead poisoning. Without hope of removing lead from the condors food supply, the cost of artificially maintaining the population by replacing those lost to lead, and the expense of tracking, monitoring and trapping individuals to treat them, when necessary, for lead poisoning, is not viable for sustainable recovery. We will produce the scientific products which help to further represent and refine our understanding of the role that lead plays in scavenging communities. Now, through our new North American Non-Lead Program, we will share the implications of our findings to target audiences ranging from state, federal, private, and public audiences in such a manner to cause a full transition from lead-based to non-lead ammunition for the harvest or killing of animals whose remains are intended to be left in the field, available to scavengers.

Goal

Establish a self-sustaining population (minimum of 150 individuals and an estimated 15 breeding pairs) of California Condors (*Gymnogyps californianus*) through reintroduction of captive-reared condors and intensive management within the Grand Canyon/Arizona Strip regions of northern Arizona and southern Utah in cooperation with state and federal agencies, tribes, local communities, and the private sector.

Objectives

California Condor Release and Tracking

In 1996 The Peregrine Fund launched and continues to maintain a 10(j), non-essential experimental condor reintroduction program in northern Arizona and southern Utah under a Memorandum of Understanding (MOU) and applicable special permits with the USFWS, National Park Service (NPS), Arizona Game and Fish Department (AZGFD), Utah Division of Wildlife Resources (DWR) and others. We will continue to work towards establishing a self-sustaining population of California Condors through annual release of captive-reared condors, and tracking and monitoring captive-reared and wild-hatched condors within the Grand Canyon/Arizona Strip regions of northern Arizona and southern Utah in cooperation with state and federal agencies, tribes, local communities, and the private sector. This project requires a full-time year-round staff of five field technicians and a field manager in addition to the tools, supplies and facilities to house crew and birds awaiting release. Along with release and monitoring of the wild flock, we must also effectively communicate our findings to partners and public alike. This includes but is not limited to, engaging land-owners when condors become a nuisance to both dissuade condors from approaching areas of high human traffic, and educating land-owners on how to avoid such negative encounters.

California Condor Trapping, Testing and Treatment for Lead

Lead poisoning accounts for nearly 55% of diagnosed condor fatalities. To minimize lead poisoning fatalities, each year the field team traps and tests an average of 92% of the Arizona - Utah population (N=76) finding an average of 75% of those trapped having elevated lead levels. An average of two dozen condors a year are treated in our on-site medical facility with chelation therapy to reduce dangerously high blood-lead levels following the hunting seasons each year. This is a labor intensive process where each bird must be captured and given injections twice daily and fluids via subcutaneous delivery. Severely poisoned condors will be transported to rehabilitation centers for full-time intensive treatment by program veterinarians and staff at Liberty Wildlife or Phoenix Zoo.

California Condor Lead Exposure Reduction

The recovery of the California Condor requires amelioration of the leading cause of preventable mortality—lead poisoning. Without eliminating lead from their food supply, recovery is not achievable. We must share our scientific findings to target audiences (state, federal, private and public) in a manner that prompts a full transition from lead-based to non-lead ammunition for the harvest or killing of animals whose remains are intended to be left in the field, and thus available to scavengers. The Peregrine Fund is leading the campaign to move hunters from lead to non-lead ammunition voluntarily with an outreach effort to hunters that includes incentives for using non-lead ammunition, targeted demonstrations to key groups and media focused on the hunter. This effort requires a full-time commitment from The Peregrine Fund.

Activities

- Release 10-15 new condors into the southwestern population annually.
- Monitor and track the AZ/UT population daily to collect and compile information leading to better understanding of morbidity/mortality of reintroduced and wild-hatched birds.
    - Locate and identify carcasses where free-flying condors are feeding in order to better understand sources of contaminants.
- Maintain adequate numbers of qualified and dedicated field crew to accomplish objectives.
- Maintain existing and build new cooperative relationships. Through the last two decades we have developed lasting relationships with State, Federal, Tribal, Non-governmental Organizations (NGO), private and individuals from the general public. Working mindfully to engage individuals and groups by sharing the story of the potential for recovery of the California Condor based on our findings helps to identify remaining needs and solidify partners who support our program at levels ranging from philosophical to action-oriented actions defined by MOU for example.

  - Participate in the Southwest Condor Working Group to update partners, propose management strategies and represent annual results.
  - Share program results with, and inspire the public to build capacity for this and other raptor conservation programs.
- Conduct annual trapping and testing for general health checks, transmitter replacement and treatment for lead poisoning when necessary.
- Discourage condors from frequenting populated areas and/or human structures.
- Determine number of condors that need to be released in order to meet the goal of a self-sustaining population.
- Work with the States of Arizona, Utah, and the shooting sports industry through the North American Non-Lead Program to educate the shooting public on the dangers of lead ingestion by scavengers, scavenging predators, and humans and the desirability of using non-lead ammunition.

Permitting

- USFWS permit to propagate condors at the World Center and to release condors in northern Arizona.
- USFWS Endangered Species permit to release and manage condors in Arizona and Utah.
- Permit(s) allowing for our management of condors we release to the wild and their progeny.
- Permit(s) for holding addled eggs and eggshells, feathers, etc., of condors.
- Permit(s) to mitigate for depredating eagles and coyotes that kill, threaten, and/or harass condors.

Annual Evaluation

- Calculate, evaluate and report annual mortality and survival relative to the number of young produced and released.
- Confirm and re-evaluate collected data and compare results to previous years.
- Evaluate flock movements and lead exposure rates relative to each state as feedback for efficacy of lead-reduction measures.
- Perform annual performance reviews with crew members to evaluate performance, enhance methods of action.
- Quantify reach and breadth of program representation ranging from social media through participation in the Southwest Condor Work Group i.e. numbers of presentations, meetings, etc.
- Compile trapping and handling data and compare results to previous years.
- Quantify incidents of human/condor conflict and modify actions taken to ameliorate.

Partners

Non-Governmental Agencies (NGO)

- North American Non-lead Program: lead reduction, outreach and education
- Oregon Zoo - lead reduction, outreach and education
- Institute for Wildlife Studies: lead reduction, outreach and education
- Liberty Wildlife: intensive care treatment for lead poisoning cases, outreach, education
- The Phoenix Zoo: intensive treatment for lead poisoning cases, outreach and education

Federal

- USFWS (permitting and funding)
- National Park Service (Grand Canyon, Zion, Bryce, Pipe Springs, Glenn Canyon)
    - Permitting, outreach and education and potential funding
- Bureau of Land Management (Arizona Strip, Grand Canyon Parashant, Vermilion Cliffs)
    - Permitting as needed, outreach and education, possible funding

State

- Arizona Game and Fish Department
    - State-run lead reduction program, outreach and education, funding primarily for tracking and monitoring condor flock relative to lead exposure
- Utah Division of Wildlife Resources
    - State-run lead reduction program, outreach and education
- State Land Department

Tribes

- Kaibab Band of Paiute Indians - lead reduction, outreach and education
- Navajo Nation - lead reduction, outreach and education
- Hopi Nation - lead reduction , outreach and education
- Hualapai Nation - lead reduction, outreach and education
- Supai Nation - lead reduction, outreach and education

Program Staff, Roles and Responsibilities

The California Condor Reintroduction Program Field Manager will be responsible for the daily management and coordination of as many as six California Condor reintroduction biologists and their daily field activities. The field manager will also manage the wild population of reintroduced California Condors to best meet the species conservation goals. Duties will include: data management, administrative duties, facilities maintenance, fundraising and development, and education and outreach. The field manager will work under guidance and support of the Program Director.

Capable of performing all of the duties of the field technicians (see field technician duties) and additionally is required to: perform blood draws, affix transmitter and GPS units, paint and affix patagial tags, administer fluids, take X-rays and provide emergency field assistance to crew members when required (ie. vehicle recovery).

Data Management
Work with technicians to make sure the field data is clear and accurate. They will review all daily data forms and databases and update datasheets and databases as necessary. These data will be compiled for reporting purposes on an annual basis. Finally, they will be responsible for downloading and managing GPS Argos data to better understand the movements of the condor population.

Crew Management
Responsible for coordinating and overseeing the daily crew activities to best meet the needs of the condor recovery program. They will work closely with the assistant field managers to assure the field needs of the technicians are met. Along with the program director, the field manager will conduct annual reviews for field technicians, hold regular crew meetings and is responsible for hiring and training of new employees. Other administrative duties include creating monthly schedules for technicians and submitting accounting materials to the home office.

Facilities
Facilities utilized by the condor project often need upkeep. The Field Manager will design and construct hack boxes, blinds and holding cages. Other areas of the project need maintenance including: field housing and treatment facilities as well as the vehicle fleet.

Education and Outreach
Effectively communicate information to the public and groups requesting such. This includes field experiences for cooperators, donors and requesting groups to provide a snapshot of the field program in an effort to heighten awareness of the program. They will work with the program director to foster relationships with existing donors as well as explore and create new avenues for funding.

The California Condor Reintroduction Program Assistant Field Manager will be responsible for assisting the field manager with advanced field responsibilities, beyond what is required of technicians. They will work with the field manager and under the guidance and support of the Program Director and must also be comfortable making decisions regarding the condor population and the field crew, while the field manager is off site or off duty. The assistant field manager will perform all daily duties of the field technicians (see field technician duties) including: data collection/management, facilities and equipment maintenance, and public education and outreach.

Advanced Field Duties

Capable of performing all of the duties of the field technicians and additionally is required to: perform blood draws, affix transmitter and GPS units, paint and affix patagial tags, administer fluids, take X-rays and provide emergency field assistance to crew members when required (ie. vehicle recovery).

Effectively communicate information to the public and groups requesting such. This includes providing field experiences for cooperators, donors and requesting groups to provide a snapshot of the field program in an effort to heighten awareness of the program.

The California Condor Reintroduction Program Field Technician will be responsible for the daily monitoring, tracking (by vehicle and foot), and management of the Arizona-Utah condor flock. Duties will also include: data collection/management, facilities and equipment maintenance, and public education and outreach. All technicians will report to the condor project field manager

Technicians perform tracking duties on a daily basis, with a four on and three off weekly schedule, and are often working in remote locations. Tracking is performed both by vehicle and on foot, using radio telemetry equipment provided by the project, and is often done over rough terrain through canyon country and the mountain regions of the southwest. Technicians are expected to be proficient in the use of 4-wheel drive vehicles, ATV's and hiking. The goal of most every day in the field is to efficiently obtain signals or visuals of as many condors as possible in a particular region as designated by the Field Manager. Regions are broken down into four categories: Colorado River corridor, Kaibab National Forest, release site and Zion. Daily tracking duties require keen observational skills and meticulous note taking.

Releases of captive-bred condors are scheduled in both the fall and spring with the goal of releasing up to 11 birds annually. During this period it is imperative for crew members to monitor newly released birds closely to prevent possible depredation while young birds learn to navigate their new surroundings. Poor roosting locations can leave birds vulnerable to ground predators such as coyotes and therefore must be hazed to a suitable location should the situation arise. For technicians this involves technical hiking and long hours in the field. Technicians stationed at the release site on top of the Vermilion Cliffs are tasked with completing carcass drops to provide non-proffered carcasses for the population. Carcass drops are conducted after sundown so birds do not associate food with humans. Technicians must also be willing to pick up calf carcasses at the dairy in Phoenix, as well as dispose of spent carcasses in the Kanab landfill.

Technicians are expected to learn and perform proper handling techniques for the processing condors. Processing of condors includes: transfer of birds between flight pen, release pen and the barn, assisting in affixing transmitters/GPS units, chelation treatments and blood draws. Most handling is conducted with either the field manager or the assistant field managers.

Occasionally, field technicians will be working in populated areas and will be communicating with the public. This requires the ability to communicate effectively to provide accurate information about the condor project and issues related to the condor recovery. A consistent message that aligns with the views of The Peregrine Fund should be conveyed to the public as a clear and concise message.

The Peregrine Fund operates and maintains all site facilities and field technicians are expected to assist in their upkeep. This includes: housing, observation blinds, hack boxes, treatment facility and holding pens. Technicians will also assist in regular vehicle maintenance. Daily fieldwork involves the collection of data and with that comes the need for clear and accurate data recording. Technicians are required to complete daily data sheets such that a reader understands the field observations. Upon return to the field station the technician will accurately enter the data into the correct database as well as convey their daily findings to management and the rest of the crew.

California Condor Reintroduction Program Interns

Interns are invaluable to the condor program as a support team for field activities and education and outreach. The condor program will have up to three interns on site with the field technicians at any given time. Interns will be provided housing on-site with the field crew and work a similar schedule of four days on and three days off. After undergoing training by both the field manager and the assistant field managers, interns will be equipped with the tools to perform the duties of the field technicians (see field technician duties) for a six-month period. After the six-month period they may be evaluated for possible future employment with the condor program. All interns will report to the condor project field manager.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$579,300	$540,300	$522,900	$520,800	$518,900	$2,682,200

North American Non-Lead Program
A Partnership to Conserve Wildlife and Hunting Heritage

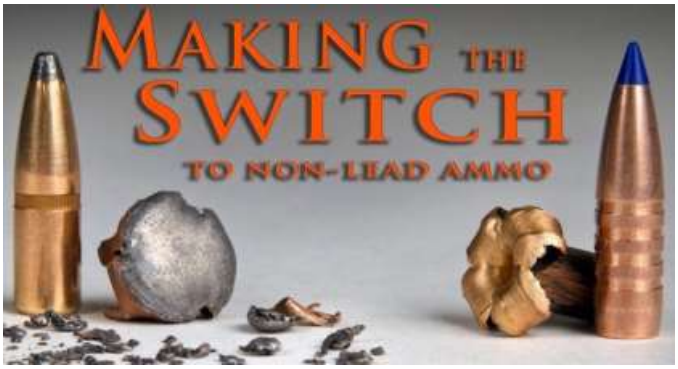
Personnel

Director of Conservation:	Chris Parish
Senior Biologist:	Brian Mutch
Biologist:	Paul Juergens
Administrative Assistant:	(open)

Project Background

Lead plays no beneficial role in biological systems. It is instead a frequent cause of debilitation and death in organisms that consume it. The reason is that lead substitutes for calcium and other metals in tissues, most notably nerve tissues. A bald eagle, for example, that has ingested lead may die a lingering death from starvation when neurons controlling peristaltic muscles cease to function.

Society is often slow to act on behalf of wildlife. Deleterious effects of lead ammunition residues, mainly lead shotgun pellets, were known to be toxic to waterfowl by the late 1800's yet actions to curb exposure did not materialize for nearly one hundred years. More recently, we have come to understand additional sources of lead ammunition residues and pathways of ingestion, this time, in the form of fragments from center-fire and even rimfire rifle ammunition used for the taking of wildlife (small-game, big-game, varmints, and furbearers) or dispatching domestic stock, a common practice in rural and wilderness landscapes. With this heightened awareness from relatively simple and direct studies, assessing rates of fragmentation of standard ammunition by x-rays of rifle shots into ballistics gelatin and the remains of hunted animals, the question of potential sources of lead in wildlife has been answered. As a result of sometimes very specific fine-scale studies where individuals of a population are tracked and monitored, researchers are discovering considerable rates of lead exposure, lead poisoning, and even lead-caused mortality. For example, through results from our work to recover the endangered California Condor, we have



found that lead poisoning accounts for over 50% of diagnosed condor deaths in reintroduced populations region-wide.

An effective lead reduction program is essential to recovering North America's largest flying land bird. If successful, complimentary actions of eliminating lead poisoning for other species, including humans, will stand in testament to a societal conservation ethic for future generations to acknowledge and improve upon. Thus far, numerous efforts to mitigate lead exposure in wildlife, including regulatory and voluntary actions, have been initiated. Yet, a concerted effort to enlighten the hunting public has not been organized or implemented on a landscape level, resulting in partial successes, and half-starts that have yet to adequately solve problems identified by an ever-increasing body of scientific evidence. In developing small-scale lead reduction programs in northern Arizona and southern Utah, we have identified and refined methods of engaging stakeholders, sharing scientific information, and developing lead reduction programs with surprisingly high rates of voluntary participation, but again this has been on the small scale of big-game hunters adjacent to the condor recovery area. Having navigated this process as a necessity for California Condor Recovery Program, The Peregrine Fund is uniquely suited and qualified to initiate additional programs nationwide for the benefit of all raptor species. We will use the voluntary, information- and incentive-based model we have applied successfully in Arizona and Utah to help state agencies across North America.

Accomplishments

- Produced foundational science to quantify rates of bullet fragmentation and effects of lead on scavenging species.
- Assisted in the formation of Big-game Lead Reduction Program in Arizona.
- Supported the formation of Big-game Lead Reduction Program in Utah.
- Participated in the formation of the North American Non-Lead Program - a partnership to conserve wildlife and hunting heritage.
    - Created a Wildlife Lead Exposure Reduction Resolution.
- Assisted Ruby Habitat Foundation in developing a Non-lead Ammunition Policy.
- International Hunter Education Association annual meeting (2017), Lincoln City, OR.
    - Presentation, booth, and shooting demonstration.
- 82nd North American Wildlife & Natural Resources Conference (2017), Spokane, WA.
    - Presentation to Lead and Fish and Wildlife Working Group proposing seeking partners in the North American Non-Lead Program.
- Backcountry Hunter and Angler Gathering, MT (2017).
- Oregon Department of Fish and Wildlife meeting to firm plans of initiating their Non-lead Ammunition Outreach, Education and Incentive Program (2017).

Need Statement

The presence of lead residues in animals shot with lead-based rifle and shotgun ammunition has been described by dozens of scientific papers in the ten years since The Peregrine Fund published *Implications for Lead Exposure in Avian Scavengers* (2006) in the Wildlife Society Bulletin. This source of lead exposure and lead poisoning is inadvertently poisoning scavenging and predatory wildlife, at a population-limiting level in the case of condors. The only means of disrupting this pathway is to transition to non-lead projectiles. To do so, shooters must first understand this relatively new finding, and second, have the desire and be able to make the transition. By engaging and partnering with agencies and sports groups, we intend to mediate increase in the use of non-lead ammunition by 50% in three western states/regions annually through FY22.

Goal

Increase the use of non-lead ammunition for taking or dispatching animals to the point of eliminating unintentional lead poisoning in wildlife scavengers and predators by maintaining existing, and building additional relationships with agencies, sports groups, and the hunting public.

Objectives

Our primary objective is to engage and partner with state agencies and sports groups in three western states or regions annually through FY22 to mediate an increase in the use of non-lead ammunition by 50% in each location. We will begin in FY18 with Oregon, Arizona, Utah and Department of Defense property at White Sands Missile Range in New Mexico. California may be added within a year and other states and regions as possible thereafter.

Activities

Build Relationships, Engage Groups and Individuals

Through the last two decades, we have developed trusting relationships with State, Federal and Tribal agencies, non-governmental organizations, the private sector, and individuals from the general public in our work to re-establish the California Condor. We will build upon those relationships by working mindfully to engage individuals and groups to share the story of lead exposure beyond that of the condor and what can be done to eliminate the threat for the sake of all scavenging and predatory species.

Activities are as follows:

- Support and expand lead reduction efforts in AZ and UT.
    - Increase outreach and target small game and varmint hunters.
    - Sustain dialogue and non-lead ammunition distribution with Kaibab Band of Paiute Indians and other tribal nations.
    - Continue outreach and education within local communities.
- Seek and gain the support of at least one national-level sports/conservation group.
- Engage with multiple (3/yr.) state/regional agencies to initiate conversations on the use of non-lead ammunition and the benefits of implementing programs similar to sister states of Arizona and Utah.
    - Conduct, gather, and/or model landscape-scale lead burden assessments.
    - Identify regional representative to carry lead reduction efforts.
    - Conduct presentations and shooting demonstrations with key decision makers and thought leaders.
    - Assess knowledge of the potential threat of lead residues in wildlife.
    - Determine what ammunition is being used now.
    - Assess attitudes towards transitioning to non-lead ammunition for the taking of game or dispatching moribund animals.
- Secure at least three additional states per year in non-lead ammunition outreach, education and hunting programs.

Funding

By working closely with our Vice President for Global Partnerships, we will explore new relationships, and maintain existing ones to secure necessary funding to build and maintain the North American Non-Lead Program. Sharing data and assignments of defined engagement will tighten the gap between the results of our programs and potential donors.

Administration

We plan to hire an administrative assistant whose salary will be split between a minimum of three programs (Condor, Aplomado, and Lead Reduction Programs) and one partner (Northern Arizona University) to assist with administrative program tasks. This position will assist in everything from answering general email questions and inquiries from the public to report writing, scheduling, and permit reporting and database management.

Annual Evaluation

Annual evaluation of progress will center of a measure of our objective to engage and partner with state agencies and sports groups in three western states or regions annually.

- Regional/Event Surveys
    - Assess knowledge of the potential threat of lead residues in wildlife pre and post-engagement.
    - Determine what type of ammunition had been used historically.
    - Assess attitudes towards transitioning to non-lead ammunition for the taking of game or dispatching moribund animals.
- Evaluate survey results from initiated programs to gain an understanding of baseline attitudes and knowledge of the issues associated with lead ingested by wildlife, and to quantify the amount of lead in use from year to year to better inform future efforts.
- Quantify and analyze, when possible, returns on investment relative to the number of outreach events (meetings, presentations, and sports shows), number of contacts, and follow-up requests or additional actions taken in each region.
- Quantify baseline data on the use of lead vs. non-lead ammunition in each region where we lead or assist existing non-lead ammunition programs.
- Monitor scavenger lead-burden measurements (where possible) to measure ultimate effectiveness of lead-reduction mitigation.

Partners

Non-Governmental Agencies

- *Oregon Zoo - lead reduction, outreach and education*
- *Institute for Wildlife Studies - lead reduction, outreach and education*
- *Liberty Wildlife - intensive care treatment for lead poisoning cases, outreach, education*
- *Phoenix Zoo - intensive care treatment for lead poisoning cases, outreach, education*

Federal

- *US Fish and Wildlife Service – funding, outreach and education*
- *National Park Service (Grand Canyon, Zion, Bryce, Pipe Springs, Glen Canyon) - outreach and education*
- *Bureau of Land Management (Arizona Strip, Grand Canyon Parashant, Vermilion Cliffs) - outreach and education*
- *US Forest Service - outreach and education*

State

- *Arizona Game and Fish Department*
  - *State-run lead reduction program, outreach and education, funding primarily for tracking and monitoring condor flock relative to lead exposure*
- *Utah Division of Wildlife Resources*
  - *State-run lead reduction program, outreach and education*
- *Oregon Department of Fish and Wildlife - outreach, education, non-lead ammunition program*
- *California Department of Fish and Wildlife - outreach, education, and non-lead ammunition program*

Tribes

- *Kaibab Band of Paiute Indians - lead reduction, outreach and education*
- *Navajo Nation - lead reduction, outreach and education*
- *Hopi Nation - lead reduction, outreach and education*
- *Hualapai Nation - lead reduction, outreach and education*
- *Supai Nation - lead reduction, outreach and education*
- *Nez Perce - lead reduction, outreach and education*

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$721,300	$820,900	$1,190,500	$1,458,200	1,826,000	$6,016,900

The Budget for FY18 includes expenses to make capital investments to establish the program and initiate three state/regional non-lead programs. Budgets for the following years increase annually by $100,000-$300,000 for an expected return of three additional Non-Lead Programs in three new regions, thus increasing in cost to maintain existing and add new arms of the program to the point where the regional efforts are self-supporting. Metrics to monitor changes in the use of non-lead in the absence of incentive programs will allow us to make decisions on when to withdraw or scale down existing regional programs and move into new areas with our resources and ever-growing knowledge.

American Kestrel Partnership

Project Personnel

Director of American Kestrel Partnership:	Sarah Schulwitz, Ph.D.
Director of Global Conservation Science:	Chris McClure, Ph.D.
American Kestrel Partnership Coordinator:	Delora Hilleary

Project Background

The American Kestrel (*Falco sparverius*) is North America's smallest and most colorful falcon. American Kestrels require open areas including meadows, pastures, grasslands, and agricultural lands where they feed on primarily on rodents, insects, and small reptiles. American Kestrels are secondary cavity nesting birds and they readily use nest boxes for reproduction. They can survive, even thrive, in human modified and urban habitats. American Kestrels are widespread and distributed throughout North and South America from the Yukon Territory south to Tierra del Fuego. There are seventeen subspecies in total. Populations range from fully residential to partially and fully migratory such that migrants from the north will overwinter in areas that support year-round residents further south.

Because of their widespread distribution, an extensive network of researchers is necessary to understand this species across its range. The Peregrine Fund's American Kestrel Partnership provides this network by standardizing and unifying data collection of breeding kestrels from citizen and professional scientists distributed across the Americas. This allows the American Kestrel Partnership to collect and analyze data at a geographic scale that would be impossible in absence of such a network.

The mission of the American Kestrel Partnership is to understand drivers of declining population trends and provide management recommendations that ensure sustainable populations of the American Kestrel. Outcomes regarding conservation and engagement outlined in The Peregrine Fund's strategic plan will be addressed and evaluated by the American Kestrel Partnership:

american kestrel partnership
a project of The Peregrine Fund

Conservation Outcomes:

- Address landscape-level threats impacting multiple species.

Engagement Outcomes:

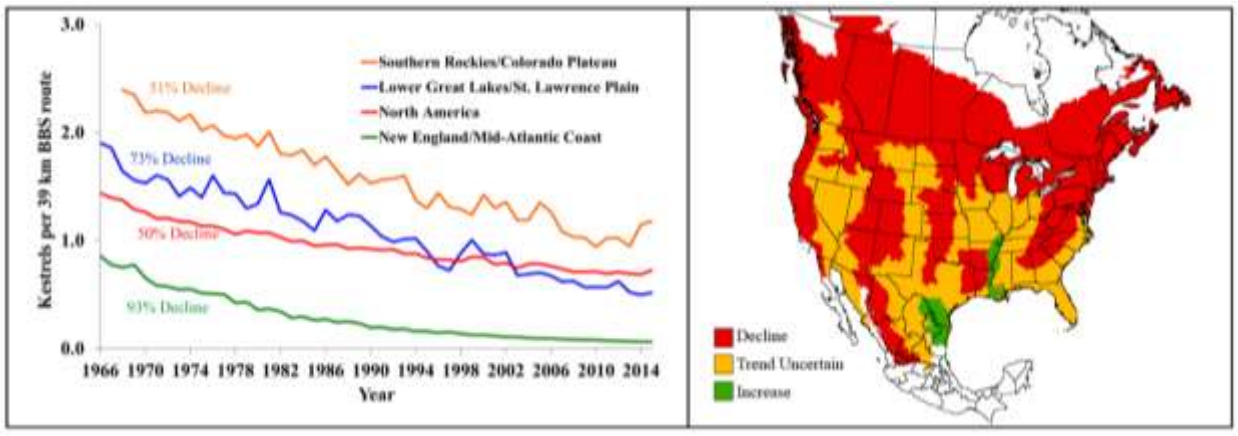
- Inspire people to value raptors and take action.
- Be the catalyst for change.

Both the conservation and engagement outcomes are critical to ensuring the long-term sustainability of American Kestrel populations. We must first discover *why* kestrels are declining. Once the causes are understood, we must ensure that policy makers, conservation scientists, and regular citizens across the Americas are willing to implement evidence-based management recommendations.

The Decline

The American Kestrel is one of the most widespread raptors in the Americas. However, data from the U.S. Geological Survey's Breeding Bird Survey (see Fig. 1), National Audubon Society's Christmas Bird Count, nest box monitoring programs, and migration counts indicate population declines for American Kestrels in much of North America. Rates of decline vary geographically but most are long-term (1966-2014) and continue through the last decade. Causes of population declines are unknown and limited to speculation because data regarding potential threats are sparse and inconsistent, highlighting the need to generate spatially and temporally extensive data and models for informing conservation strategies.

Figure 1. Breeding bird survey indicates long-term (left) and continent-wide (right) declines of the American Kestrel in North America.



In response to documented declines, The Peregrine Fund launched the American Kestrel Partnership in 2012. The mission of this partnership is to uncover the primary threats to American Kestrels and to conserve this falcon across its range. In achieving this mission, we focus simultaneously on strong research and education/outreach goals. Integral to both our research and outreach goals is our continent-wide nest box monitoring program. Citizen and

professional scientists install nest boxes and contribute nest observation data from across North America and expanding into South America to our online database accessed through our website at www.kestrel.peregrinefund.org. Hereafter, our research and education/outreach accomplishments, goals, and activities will be described separately.

Program Accomplishments

Research

The American Kestrel Partnership has steadily increased the number and geographic distribution of nest boxes that partners have registered and monitor (Figure 2) with a peak of 902 monitored nests in 2016. Each year, we evaluate American Kestrel and European Starling (*Sturnus vulgaris*) occupancy compared across Bird Conservation Regions (Figure 3). From these boxes, we are also able to coordinate large scale feather sampling for genetic analysis as part of the American Kestrel Genoscape Project (described below).

Figure 2. Growth in AKP participation based on total number of nests registered, nests monitored, and number of observations by year. Bubble size corresponds to number of observations, ranging from 2,315 (2015) to 2,801 (2016).

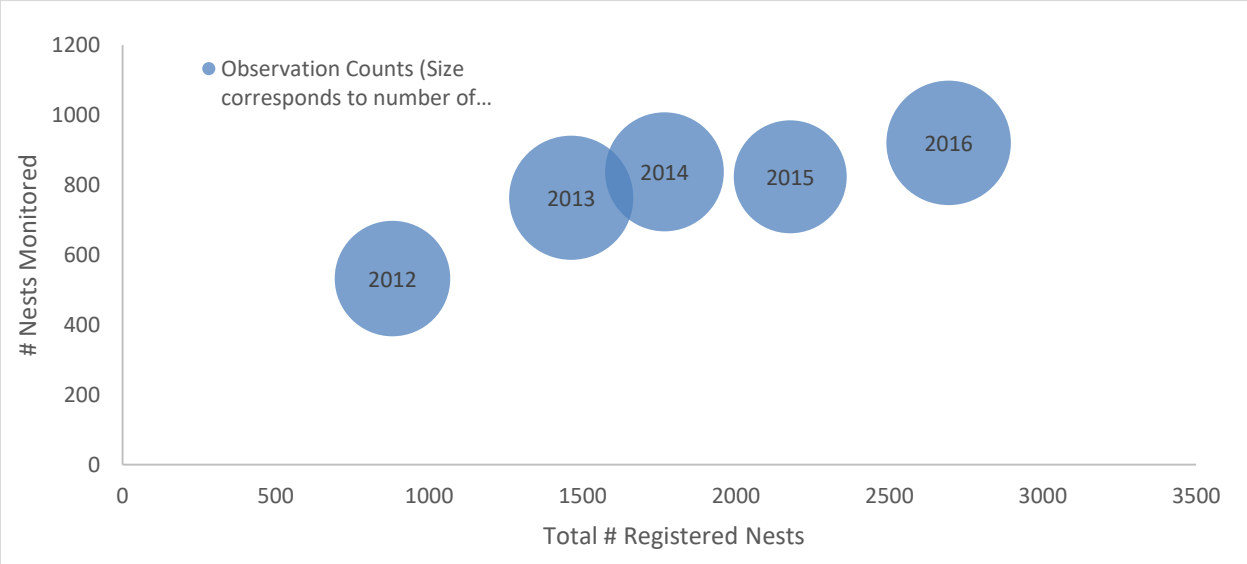
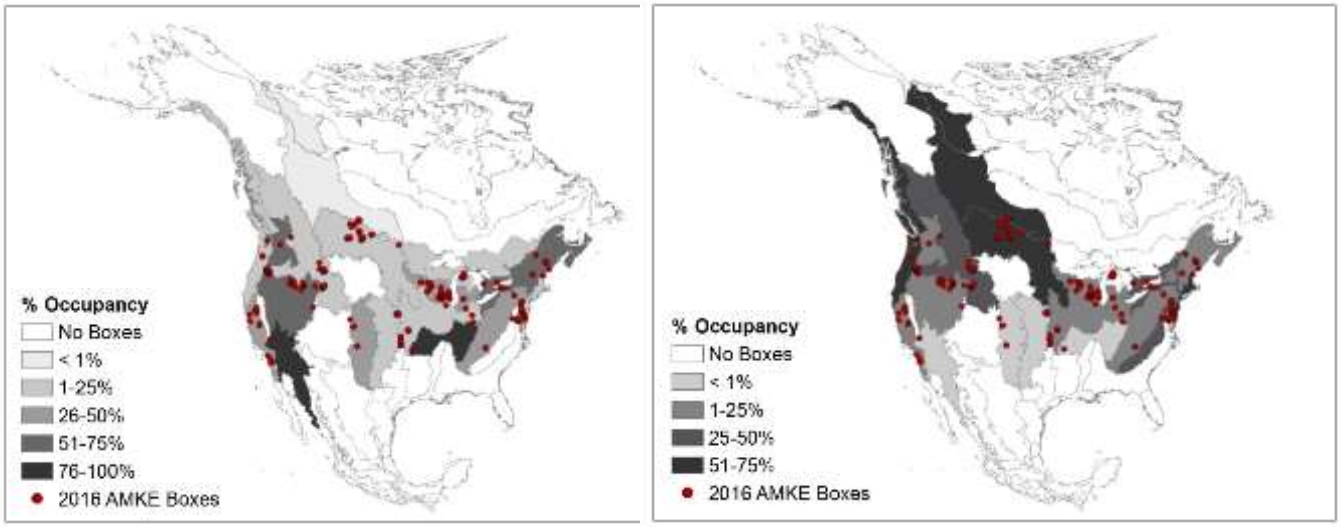


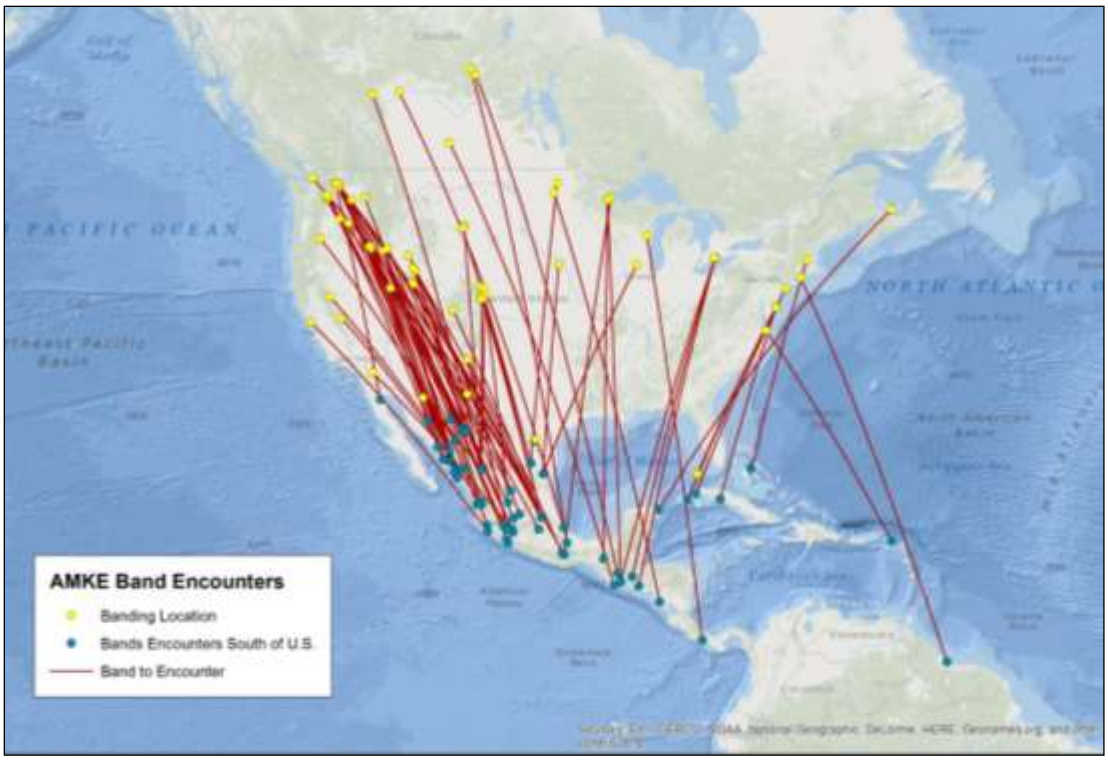
Figure 3. Each year, AKP data are analyzed for occupancy trends by American Kestrels and nest competitors, European Starlings. Distribution of American Kestrel nest boxes registered with the AKP in 2016 indicated with red dots. Shading indicates percentage occupancy within each Bird Conservation Region for American Kestrels (left) and European Starlings (right) in 2016.



With other professional kestrel researchers, we have laid outlined priorities for future research in understanding the decline in a manuscript accepted for publication in the Journal of Raptor Research. Additionally, we have used population modeling to explore hypotheses of decline and effects of nest boxes on population trends. Our findings are starting to suggest that kestrels may be facing increased mortality on their wintering or migration grounds. They winter mainly in the southern US and Central America.

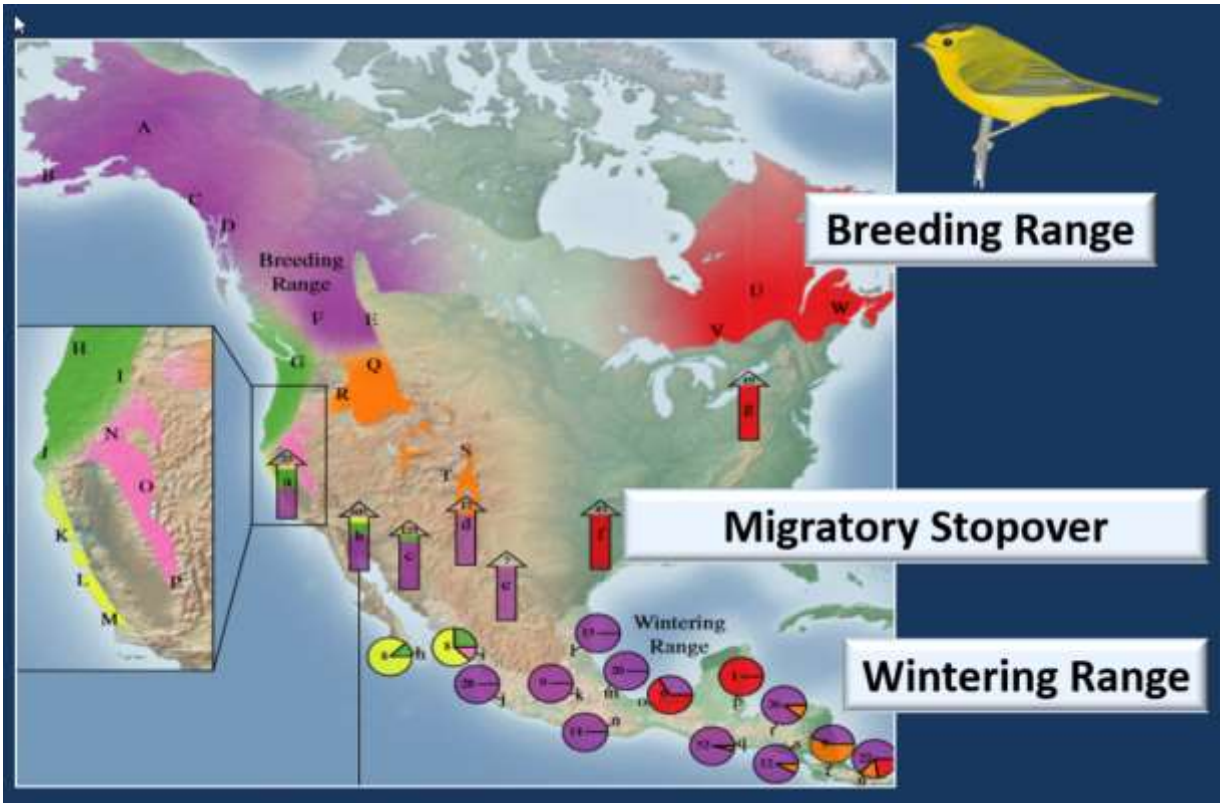
Together with Dr. Julie Heath of Boise State University, we have analyzed banding records from the USGS Bird Banding Lab to explore kestrel movements from birds banded in the US or Canada and recaptured south of the US. Between 1960 and 2016, 325,000 American Kestrels have been banded in the U.S. and Canada and 5,300 encounter records exist. We mapped banding locations and band encounters for all recoveries south of the U.S (n=87; Figure 4). Records indicate that kestrels are migrating or wintering south of the US. There are few records south of the US. Whether there are fewer records outside of the US because there are fewer kestrels there or because reporting rates are low has yet to be determined. We are preparing a manuscript for publication with these findings.

Figure 4. Banding location and encounter location for all kestrel band recoveries south of the US (n=87).



Among our most promising research avenues, the Kestrel Genoscape Project was recently accepted for funding by the Department of Defense. Led by Dr. Julie Heath of Boise State University, we are generating a genetics-based migratory connectivity map similar to that completed by Ruegg et al. 2014 for Wilson's Warbler (Figure 5). Professional and citizen scientists are contributing to this effort by providing plucked feather samples from across the range. More than half of the contributors are members of the American Kestrel Partnership. This is critical research that will tell us where the most severely declining breeding populations spend their winter and along which migration routes they travel. We will use the results of the kestrel genoscape to investigate possible causes of mortality on population-specific wintering and migration grounds.

Figure 5. Led by Kristen Ruegg at UCLA, this study of Wilson's Warbler (pictured) provides an excellent example of how we can study the migratory patterns of American Kestrel populations using genetic data. Individuals were sampled on breeding grounds (amorphous color shading), migratory stopover locations (arrows), and at wintering grounds (pie charts). Genetically distinct breeding populations were discerned (corresponding to colors). DNA collected from migrating and wintering birds was screened to assign individuals to their breeding population of origin. This method allows us to know where it is that breeding populations go for the winter and the route they follow when returning to their breeding grounds (figure modified from Ruegg et al. 2014).



Although much of our research focuses on kestrel biology, we are also investigating how participation in the American Kestrel Partnership influences the understanding, behaviors, and attitudes of our partners and supporters. To effectively conserve species, we must be effective in our education and outreach. To understand our effectiveness, we must evaluate our own strategies. We are currently working with the Idaho Policy Institute at Boise State University who have created and disseminated a survey that will help us better understand the motivations and experiences of our partners and supporters. We will present our findings at the 2017 Raptor Research Foundation meeting in an Education Symposium.

Education & Outreach

Given the species' broad distribution and readiness to use nest boxes, education focused on the American Kestrel is a relevant tool to engage non-scientists across the Americas with issues in

raptor biology and conservation. Therefore, in addition to research, the second pillar of the American Kestrel Partnership is our focus on education and outreach.

Website. We have created an interactive website that is the backbone of the program. The website serves as a discussion forum, kestrel information resource bank, and data entry portal for nest observations. We have received a small grant ($2,500) from the Minnesota Zoo and submitted an application for a Disney Conservation Fund Grant ($50,000) to improve our information technology capabilities. Specifically, we plan to create a mobile app to improve quality of data collection and import and we plan to integrate our database with an ArcGIS server (both detailed in the 'Goals').

Education and Communication. In addition to creating a web-based presence, we make opportunities to meet with partners in person. We have led three symposia around the nation (Idaho in 2012, Texas in 2014, Delaware in 2017) focused on the kestrel decline. For the 2017 Kestrel Symposium, we provided travel scholarships to several of our most dedicated citizen science partners so that they could learn from each other and from renowned kestrel experts. Since May 2016, we have given presentations for, or met with, nearly 1,200 people across thirteen US states and four countries (US, Canada, Costa Rica, Dominican Republic).

A major component of our education programming is our KestrelCam which is live-streamed each breeding season. We encourage engaged viewing by offering an 'Activity Logging' feature and implementing 'Live Chat' sessions with a kestrel expert twice per week. Over the lifetime of the KestrelCam more than 27,000 actions were recorded by viewers, creating one of the largest datasets for a single raptor nest site. From March-May 2017, the KestrelCam was viewed for more than 1.3 million minutes with more than 100,000 views from a global audience. We have produced two publications reporting on discoveries from the KestrelCam.

In working toward our outreach goals of keeping our supporters engaged, we have established a reliable means of communicating with our 5,000+ constituents via a MailChimp account. Currently, our direct contacts receive Quarterly Newsletters as well as other timely announcements. However, about one-third of our contacts (i.e., most registered partners) are not integrated into The Peregrine Fund membership base. Although our method of communications is sufficient for now, we see a future for The Peregrine Fund where all constituents interacting with the organization and its many programs are managed under a single Constituent Relations Management (CRM) program. (Ideally, such a CRM would be strategically designed to allow an individual to hold a single account that is integrated across several of the organization's points of engagement. This will allow The Peregrine Fund to save money and staff time and more efficiently engage supporters.) We also rely on active engagement with daily to weekly posts on Facebook and Twitter accounts. On these social

media platforms, the American Kestrel Partnership has just over 10,000 followers as of June 2017.

We use our fundraising endeavors to engage our audience in topics of kestrel biology and research. For example, in our Adopt-A-Box program, donations of $100 are compensated with attractive mailings that contain engaging updates on each participant's "adopted nest box" monitored by Boise State University's Raptor Research Program. In our crowd-sourcing fundraising campaigns (three to date since 2015), we have raised nearly $40,000 from more than 1,600 supporters through the merchandise sales and small donations. Each of these campaigns is an opportunity to teach people about the kestrel decline and our plans to understand it. Further, our spring merchandise fund-raising activities provide opportunities to develop in our supporters a sense of belonging in a great community of kestrel supporters (Figure 6).

Figure 6. Faces of Kestrel Conservation Science: The 2016 T-shirt fundraiser raised $21,000 for the American Kestrel Partnership. Following the campaign, we asked supporters to send photos in their new kestrel shirt. The "Faces of Kestrel Conservation Science" photo collection attempts to invoke a sense of belonging to a continent-wide community among our supporters. Recognizing the contributions of individuals also serves to show our appreciation and enables supporters to express to their own social network how they are contributing to conservation solutions.

Extension of partnership to Central and South America. Most of our partners reside in North America and speak English. Because the American Kestrel is distributed from the Yukon to Tierra del Fuego, we have taken steps to expand our education efforts to be accessible to Spanish-speaking audiences. Working with Marta Curti (Ridgway's Hawk education

coordinator), we recently completed the first season of a pilot American Kestrel Partnership curriculum for which we received a small grant ($2,500) from the J.R. Simplot Company. The pilot curriculum gives students in the Dominican Republic lessons in raptor biology and the scientific method. We are expanding the program into Panama next season. We will be translating documents and website materials for use by Spanish-speaking audiences.

Need Statement

Research

This project responds to The Peregrine Fund's strategic plan conservation outcome by tackling a landscape level threat affecting the American Kestrel and developing the means to identify the cause of a downward population trend that is troubling for its persistence over decades, rather than its high rate. The American Kestrel Partnership is one of the few Peregrine Fund projects that currently focuses on a widespread, fairly common (though declining) species. Understanding and appropriately conserving such a species requires identifying and addressing threats that may be occurring at the landscape or continent-wide levels. The American Kestrel Partnership fits well within our endeavor to identify and minimize threats that occur at a large scale. Whatever is causing the decline of the American Kestrel may well be affecting multiple species, and maybe even humans. This program may serve as a model as we confront future challenges with other raptor species at a similar scale.

The range-wide decline of the American Kestrel requires a range-wide perspective which is why we are bringing together citizen and professional kestrel biologists across the western hemisphere to monitor breeding populations. Professional scientists provide the promise of scientifically rigorous collaborations and expertise while citizen scientists expand our data collection potential to a geographic scope that would be impossible for a small team of researchers. Collecting data in a standardized manner across the hemisphere will facilitate analysis aimed at understanding population trends across space and time.

Different sources of long-term data, such as migration counts, nest monitoring programs, Breeding Bird Survey data, and Christmas Bird Count often suggest incongruent population trends, perhaps partly because they are undertaken at different times of year, and reflect seasonal changes in the numbers and provenance of birds in particular localities. There is a need to integrate these sources of data into a single population index to more clearly understand the population trends. Therefore, we must create an American Kestrel Population Index which will help us better understand which populations are at greatest risk.

Outreach

To reach our 50-year vision where all people value raptors, we must foster connections between people and raptors across the globe. Research has shown that people that participate in citizen science are more likely to become advocates for conservation and are more likely to donate to environmental non-profits. Participants are also more inclined to become more scientifically literate as a result of their participation. The American Kestrel Partnership will be a critical component of our global engagement efforts. Through our citizen science nest box monitoring program, we engage people across the Americas with birds of prey in their own neighborhoods. While many people love reading about the work of raptor biologists, this program gives people all over the western hemisphere the opportunity to *be* a raptor biologist. By watching the KestrelCam or monitoring nest boxes, people can learn through direct observations about the life cycle, habitat, and dietary needs of this little falcon. By reflecting on their own experiences with wild kestrels, we aim for people to develop a greater appreciation for the important roles of raptors in our ecosystems and the need for science-based management to ensure viable populations.

Goals

Research

Our research goals will advance our understanding of the American Kestrel decline.

We will continue coordinating sample collection during the breeding and wintering seasons for the American Kestrel Genoscape project. If genetics-based migratory maps give clear indication of where the most severely declining breeding populations over-winter and where they migrate, we will initiate surveys in targeted locations to identify possible causes of mortality.

We will analyze nest box observation data contributed by our partners. We will assess how occupancy rates, timing of egg lay dates, and hatch success vary spatially and temporally. To better understand which populations are at greatest risk, we will build a Kestrel Population Index that incorporates nest box monitoring data and Breeding Bird Survey data into a single metric that better describes a population trend. Once we better understand migratory connectivity via genoscape findings, we will incorporate migration count data into the index. Because there is little known about subspecies of American Kestrel outside of North America, we will hire a Latin America Coordinator who will help establish nest box monitoring programs throughout the region (described in greater detail in next section).

We will develop a standardized color-banding protocol in collaboration with HawkWatch International. The protocol will coordinate color-banding efforts across North America to streamline efforts among researchers. This will maximize the utility of color bands in tracking kestrel movements.

We will consider indirect methods such as atlas data or historical accounts to determine how long kestrels have been in decline. Determining historical trends in kestrel populations may allow us to test hypotheses regarding the original causes of decline, and put the current trends into longer-term perspective. We will also analyze causes of mortality from existing databases to determine the patterns in American Kestrel deaths across space and time.

We will continue evaluations on our education and outreach program. We will write up our findings from the 27,000 activities logged by viewers of the KestrelCam and we will investigate the motivations for hosting and outcomes of viewing live-streamed nest cameras for public audiences. We will evaluate the behavior of our partners (do they follow protocol, etc.) and determine factors influencing their level of participation.

Outreach & Education

Our education goals aim to increase partners' understanding of issues of the kestrel biology and decline and the scientific method, while our outreach goals aim to retain and recruit our supporters through maintaining engagement.

We will continue the KestrelCam with Activity Logging and Live Chat, Quarterly Newsletters, regular social media activity, and the Adopt-A-Box program. We will work with the Velma Morrison Interpretive Center staff at The Peregrine Fund to create an exhibit on the American Kestrel Partnership. We will continue to give presentations at both scientific conferences and to non-technical audiences in as many places possible. We will attempt to meet face-to-face with our most committed partners. In 2020, we will host a fourth Kestrel Symposium to be held at the Raptor Research Foundation conference. For this symposium, we will again offer travel scholarships to dedicated citizen science partners so they may present on their nest box programs and interact with professional kestrel researchers.

Because the American Kestrel is distributed across South America, we must make the American Kestrel Partnership accessible to Spanish audiences. We will hire a native-Spanish speaker to be based in Central America and serve as the American Kestrel Partnership's Latin America Coordinator. This person will translate the entire website and all Partnership Documents into Spanish. They will introduce our curriculum to school teachers and also help establish nest box programs in local schools throughout the region. They will recruit partners and will coordinate sample collection for the genoscape project throughout the region.

In addition to a Latin America Coordinator, we will hire a part-time North America Coordinator to be based near the United States' east coast. This person will maintain the discussion board, meet with our many partners east of the Mississippi River, field emails, and assist in getting monitoring datasets that pre-date the program into our database. The current Coordinator

position will become the American Kestrel Partnership Technology Assistant. The Technology Assistant will be responsible for website structure and maintenance, ensuring functionality of incoming technology features, and running the KestrelCam.

We will begin a small grants program for partners (total starting at $2K/year initially and totaling to ~$10K/year by 2020). These funds may be used to start a monitoring program, offset costs of maintaining nest boxes, or serve as completion bonuses for partners that input large datasets that pre-date the American Kestrel Partnership.

We will rearrange our website to make it more accessible to our partners and to be more integrated with The Peregrine Fund's site. In addition, we will work with the IT team and Communications team as they re-organize our Constituent Relations Management platform so that our partners also have a presence within The Peregrine Fund constituent database.

To improve efficiency and accuracy of data being submitted, we will create a mobile data entry app which will simplify the data collection and entry process. This app will reduce errors associated with transcribing data as well as the amount of time required for partners to transfer data to us. The app will also allow the staff to more efficiently disseminate educational material directly to partners. With this app, partners will gain the ability to record all necessary data during a nest check on their mobile device and data will be immediately uploaded into the American Kestrel Partnership's database.

We will integrate our nest box database with an ArcGIS server. We currently have no feature on our site that shows a partner the temporal or spatial patterns in their data, such as showing box occupancy over time. Integrating our database with an ArcGIS server will give partners immediate access to visualize their own data, regardless of data entry method (i.e., website, mobile app, or bulk upload). For example, partners will be able to see a graph of nest box occupancy over the duration of their monitoring program. Data visualization features will enable partners to engage with their data in a way not possible before. With patterns in data more apparent, this feature will facilitate partners in hypothesis formation and testing and thereby engage them more deeply in the process of science.

In addition, the ArcGIS server will also allow for bulk data upload. Currently, partners input data on our website on a per-nest and per-observation basis. We do not have a way to easily and automatically upload large quantities of data (e.g., covering many years or many nest boxes) into our database. Integrating nest box database with an ArcGIS server will give partners the control to automatically and simply upload their bulk data without additional input from staff.

Activities

2017

Research

- Re-analyze data and write-up KestrelCam Activity Logging paper
- Filter, flag, and fix partner data
- 2017-Ongoing: Analyze partner data to determine egg lay dates across space/time
- 2017-Ongoing: Analyze partner data to determine occupancy trends across space/time
- 2017-2021: Coordinate sample collection for Kestrel Genoscape
- Ongoing: Reevaluate research goals for following year

Education & Outreach

- Ongoing: Maintain regular contact with partners via Quarterly Newsletters, Discussion Forums and regular social media interaction, local and national meetings
- Ongoing: Continue Adopt-A-Box and Annual Fundraiser.
- Ongoing: Update website with engaging outreach material to communicate relevant research findings
- Translate AKP curriculum, Box Plan Instructions, and Monitoring Protocol into Spanish
- Build and install boxes for Pilot year #2 for Central America AKP curriculum
- Promote Adopt-A-Box as gift idea during the winter season
- Work with Ginny Carter to recruit partners in Hudson Valley
- Ongoing: Reevaluate outreach goals for following year

2018

- Shift current Coordinator to Technology Assistant (part-time and seasonal, 10 hrs/week late February - June, to coincide with North American breeding season)
- Hire North America Coordinator (part-time, 30 hrs/week)

Research

- Analyze, write-up, and present on pilot participation survey
- Develop color-banding protocol with HawkWatch International
- Investigate and write-up causes of mortality findings
- Conduct survey to evaluate how NestCams affect viewers knowledge, attitudes, and behavior toward animal conservation
- Initiate Kestrel Population Index project: Incorporating BBS and Nest Box Data

Education & Outreach

- Develop mobile app
- Develop of database-ArcGIS server integration
- Prepare and disseminate educational material to ensure smooth roll-out of new features, roll-out in Fall or Winter
- January: Visit Panama to meet classrooms, take blood samples from over-wintering birds
- 2018 - Ongoing: KestrelCam
    - Determine capacity for long-term storage hardware
    - Have at least one other organization stream it, Raptor Resource Project/Cornell/Explore.org
    - Fundraiser: consider NOT running simultaneously as KestrelCam
- Integrate AKP contacts with organization Constituent Relations Management
- Interpretive Center Exhibit
- Initiate small grant program (ongoing hereafter)

2019

- Hire Latin America Coordinator (part-time, 30 hrs/week)

Research

- Examine causes of mortality using data from external databases
- Publish results of Kestrel Breeding Genoscape
- Conduct historical accounts study
- Publish Kestrel Demography paper
- Publish NestCam Survey results
- Finalize Kestrel Population Index Methodology
- Publish Kestrel Population Index Methodology & Initial Results

Education & Outreach

- Latin America Coordinator:
    - Translate remainder of AKP website and Partnership Documents into Spanish
    - Pilot year #2 with Central America AKP curriculum
    - Establish nest box monitoring program
    - Collect samples year round for genoscape project
- Display Kestrel Population Index Results on website and make accessible to public
- Further develop GIS-integration and data visualization tools so partners receive notifications about their boxes

2020

Research

- Ongoing: Update Kestrel Population Index each year

Education & Outreach

- Host Kestrel Symposium as part of RRF 2020, invite and fund Citizen Scientist partners to attend and present

2021

Research

- Publish full genoscape results
- Use Genoscape to identify wintering or migration grounds of most severely declining populations
- Design study compare over-winter survival of several wintering populations based on genoscape results and investigate causes of mortality

2022

Research

- Hire several field technicians to implement over-winter survival study

Partners

Registered AKP Partners: *We have appx. 1500 registered partners. Of these, ~400 have registered boxes and ~250 have ever logged an observation for at least one of their boxes.*

habitat INFO: *Experts in the collection, management, and analysis of spatial data. Will develop the mobile app for nest box monitoring and integrate our database with an ArcGIS-server.*

Dr. Julie Heath of Boise State University: *Principal Investigator of the American Kestrel Genoscape Project. Also, runs the Treasure Valley kestrel monitoring program, which our Adopt-A-Box program is based on.*

Idaho Policy Institute, Boise State University: *Designs and disseminates participation surveys.*

HawkWatch International: *Partner in developing color-banding protocol and coordinates sample collection during migration for genoscape project.*

Evaluation

Research

The American Kestrel Partnership will be evaluated based on the number of publications, and professional presentations we produce. Research into our outreach program will be ongoing with the goal to iteratively improve our efforts and evaluate changes to determine improvements. Given investment in the program and success in achieving our goals outlined, we will achieve our ultimate objective of understanding why American Kestrels are declining and outline management actions that will conserve American Kestrels *across their range*. By then we will have cultivated a community of thousands of informed kestrel enthusiasts that we will call upon to request support for kestrel conservation from government and conservation leaders across the Americas.

Education & Outreach

Our outreach goals will be evaluated by the number of people we engage in issues of kestrel biology and conservation as well as partner recruitment, retention, and protocol adherence. Partner scientific literacy and attitudes towards raptors and conservation will be evaluated on a regular basis through surveys. Another useful long-term measure will be the number of young partners who eventually volunteer, study, or working in conservation.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$215,100	$263,200	$252,200	$244,100	$244,800	$1,219,400

Gyrfalcon and Tundra Conservation Program

Project Personnel

Project Director:	David L. Anderson, Ph.D.
Project Advisor:	Chris McClure, Ph.D.

Project Background

Climate change is one of the leading topics of science in the 21st century and a cause of global concern. Although climatic changes have been noted worldwide, the most rapid and dramatic differences in climate are happening at the highest northern latitudes (ACIA 2005). Climate change is already being cited as cause for disruption of important ecosystem-level processes in the Arctic (Callaghan et al. 2004). Climate models for the Arctic predict changes in the distribution and continuity of whole ecosystems (Bachelet 2011), with drastic consequences for the distributions and populations of vertebrate species (Booms et al. 2011, Liebezeit et al. 2012). The ultimate consequence is predicted to be a reorganization of ecological communities, with the predicted erosion of their diversity, stability, and possibly continued persistence (Post et al. 2009, Post 2013).

Perhaps no species represents the fragile Arctic tundra ecosystem better than the Gyrfalcon. It is widely distributed across the circumpolar Arctic and occurs across parts of eight countries: the United States, Canada, Greenland, Iceland, Norway, Sweden, Finland, and Russia (Watson et al. 2011). Gyrfalcons are uniquely adapted to living in the Arctic. Unlike Golden Eagles, Peregrine Falcons, and other raptors that breed in the Arctic and winter at southern latitudes, Gyrfalcons populations are mostly non-migratory, spending the long Arctic winter at high latitudes. Further, although Gyrfalcons feed on diverse prey species during the summer, they rely almost totally on one to two species of Arctic grouse called ptarmigan (birds in the genus *Lagopus*) for their winter subsistence and to initiate breeding late in the winter, because ptarmigan are the only prey available for most of the Arctic calendar and especially during the early breeding season of

Gyrfalcons in March and April (Nielsen and Cade 2017). One interesting aspect of ptarmigan biology is their regularly occurring population cycles, characterized by dramatic fluctuations in population numbers. Due in part to its northern distribution, restricted habitat use, and narrow diet, the Gyrfalcon is predicted to be the single North American bird species most vulnerable to climate change (Liebezeit et al. 2012).

These facts make the Gyrfalcon particularly relevant to the study of climate change. Trophic interactions in the Arctic are already experiencing disruption due to climate change. One of the most direct ways to detect and measure ecosystem disruption is through trophic interactions. Trophic interactions consist of food chains of predators, their herbivore prey, and the plants upon which the herbivores feed (Schmidt et al. 2012). Trophic relationships are nowhere easier to study than in relatively simple ecosystems such as those occurring in the Arctic (Post et al. 2009, Schmidt et al. 2012). Arctic tundra is one such simple ecosystem with lower species diversity and fewer trophic relationships than occur elsewhere. During a large part of the Arctic year the predator-prey relationship occurring between birds on the tundra consists solely of Gyrfalcons and ptarmigan. Indeed, the predator-prey relationship between Gyrfalcons and ptarmigan may be the driver of population cycles in ptarmigan (Nielsen and Cade 2017). By closely examining the breeding biology of Gyrfalcons in connection with the distribution and abundance of its primary prey ptarmigan, we can detect early disruptions to the function and structure of the Arctic tundra.

Recognizing the vital link between Gyrfalcons, ptarmigan, and climate change, The Peregrine Fund has twice convened international meetings of Arctic biologists. The first was the conference “Gyrfalcons and Ptarmigan in a Changing World” in 2011, and a subsequent meeting to found “The Tundra Conservation Network” held in 2014, both in Boise, Idaho.

These arguments place The Peregrine Fund in a unique position of conservation importance. Under our new 2017 Strategic Plan, Objective 3 prioritizes the conservation of raptors and associated biodiversity at the landscape level: “Identify and prioritize the major landscape-level threats to raptors and develop and execute action plans to mitigate the threats.” By leveraging our reputation as a global authority on raptor biology and conservation, our network of partner biologists across the Arctic, and the major international interest on climate change and its effects on nature, The Peregrine Fund stands to influence the conservation of an ecosystem that spans the Arctic, the many raptors species that depend on it for breeding, and the associated biodiversity at all levels.

Project History

David Anderson was hired by The Peregrine Fund in December 2012 to head the Gyrfalcon program. The two main parts of the program under his direction are fieldwork in Alaska on Gyrfalcon ecology and climate change, and working towards collaborative Gyrfalcon research with partners around the Arctic. In Alaska, we study Gyrfalcon ecology in partnership with Alaska Department of Fish and Game and Boise State University. Alaska Fish and Game helps support aerial surveys for occupancy and productivity of nesting Gyrfalcons, along with advice, data collection and analysis, and general logistical support. Boise State University provides graduate assistantships and graduate advising. Accomplishments in Alaska include:

- 2014 – Bryce Robinson recruited as a M.S. graduate student, co-advised by David Anderson and Marc Bechard of Boise State.
- 2015 – We began annual ptarmigan surveys as a vital component in understanding Gyrfalcon ecology.
- 2016 – We built a field research station in Nome to house the Gyrfalcon crew and visiting researchers and guests. We obtained a lease on a cabin and property in Nome, then installed a second cabin. Annual operation of the field station is cheaper and more reliable than renting apartments in Nome. The field station also makes it possible to host partners, visitors, and even field classes from Boise State University.
- 2016 – Bryce Robinson defended his thesis on Gyrfalcon diet during the nestling period, becoming the first graduate student in the Gyrfalcon program to finish his studies.
- 2016 – Bryce Robinson and coauthors published two short notes on his thesis research in the journals Marine Ornithology and Wilson Journal of Ornithology with David Anderson and multiple coauthors. He is preparing a draft of a major research paper from his thesis.
- 2016 – Michael Henderson was recruited as a M.S. graduate student and is co-advised by David Anderson and Marc Bechard. His thesis is on nest site characteristics, diet, and stress levels in nestling Gyrfalcons.
- 2016 – Adam Eichenwald began M.S. graduate studies at Yale University on Gyrfalcon diet, advised by Oswald Schmitz and with David Anderson serving as a committee member and facilitating fieldwork on the Seward Peninsula.
- 2017 – David Anderson and four coauthors submitted a research paper to Journal of Raptor Research.
- 2017 – Devin Johnson was recruited as a M.S. graduate student to begin in fall 2017 at University of Alaska Fairbanks, advised by Cory Williams with David Anderson serving as a committee member.

Accomplishments in working toward collaborative Gyrfalcon research around the Arctic include:

- 2014 – David recruited partners of diverse scientific disciplines and nationalities to found the Tundra Conservation Network, intended to be a coordinated body of scientists working together to answer questions on climate change and tundra ecology. In 2014 he planned and coordinated an international meeting at the World Center for Birds of Prey attended by >20 partners from seven countries.
- 2014 – David presented a talk on recent Gyrfalcon research by The Peregrine Fund at the international Gyrfalcon workshop held in Ásbyrgi, Iceland.
- 2015 – David presented a talk on the need for coordinated research on Gyrfalcons at the international Gyrfalcon workshop held in Alta, Norway.
- 2017 – Partnering with Habitat Info, Wales, we launched the Polar Raptor Databank as a tool for collaborative data sharing and analysis for all raptors occurring at Arctic latitudes. The PRDB is:
    - An internet-based database for collecting, sharing, and analyzing data from multiple partners around the range of the Gyrfalcon. It also should serve as a tool to build unity or identity around the Tundra Conservation Network.
    - A relational database comprised of multiple tables that are interconnected by key fields, and that are used to synthesize multiple types of data for a given population or study area. The database features a web-based app to digitize individual study areas on a map and enter metadata associated with them; easy data entry and retrieval; multiple permission levels for entering, storing, and retrieving data; and videos that will emphasize the purpose, scale, and importance of the project.
- 2017 – The Peregrine Fund published a user manual on methods for studying raptors, *Applied raptor ecology: lessons from Gyrfalcon research*. The book contains 12 chapters and two appendixes written by 15 coauthors. Each chapter describes research questions suitable for graduate students and citizen scientists, an example data table to help standardize formatting data, fully annotated R code to analyze the data, example output and interpretation of the output. Editors are David Anderson and Chris McClure of The Peregrine Fund, and Alastair Franke of Arctic Raptors and University of Alberta. One chapter and parts of two appendixes are written from material obtained during field research in Alaska.
- 2017 – Six months after the release of the Gyrfalcon manual, The Peregrine Fund launches a companion website where users can download PDF's of book chapters, example data sets, and R code.

Needs Statement

Gyrfalcons are difficult to study. They live in remote locations where logistics are challenging, and harsh winter conditions make field research next to impossible during much of the year. Although the general life history is known, there have been few long-term or in-depth studies (work by O. Nielsen in Iceland being a notable exception), and most research on the species has been descriptive in nature. Research on demography and dispersal, for example, is rare. Further, despite its international range, there is virtually no collaborative research on Gyrfalcons across international borders, rendering comparisons of biology or population trends across the species' range impossible. Our ability to predict any consequences of global climate change on Gyrfalcon populations is limited by a paucity of hypothesis-driven research or data sharing that would allow a more comprehensive understanding of their biology. Given that the Gyrfalcon is expected to be the singular North American bird species most susceptible to climate change, we must seek evidence of behavioral or ecological resilience or vulnerability to climate change to inform meaningful conservation planning. **This project responds to The Peregrine Fund's strategic plan conservation outcome by tackling a landscape-level threat affecting multiple species using Gyrfalcons as sentinels of climate change in the Arctic where warming is occurring at the highest and most readily measurable rate.**

Alaska Field Research

Field research in Alaska will be used to test hypotheses on climate change impacts to Gyrfalcon ecology, and to demonstrate legitimacy of The Peregrine Fund as a leader in research and conservation for the species. We study Gyrfalcons on the Seward Peninsula, Alaska, because this population is found toward their southern range extent in the United States where climate change impacts to Arctic species should occur soonest. Also, we work in Alaska because the relatively easy logistics and low costs (by Arctic standards) and dense population mean that we can obtain the greatest amount of data per investment of cash and time.

Collaborative International Research

To achieve an Arctic-wide understanding of Gyrfalcon ecology and threats, we must:

- Establish a cooperative, international network of partners who can share data and design collaborative research across borders and scientific disciplines.
- Conduct hypothesis-driven research designed to elucidate possible consequences of global climate change on Gyrfalcon biology and populations.
- Disseminate information among project partners, the scientific community, resource-management agencies, and decision-making bodies.

Goals and Objectives

Alaska Field Research

Objective: Conduct hypothesis-driven research on Gyrfalcon ecology and climate change.

It is essential to understand the factors that govern Gyrfalcon occupancy and productivity before we can begin to predict how climate change might affect the species. A paper is in review at the *Journal of Raptor Research* on landscape patterns of Gyrfalcon occupancy in Alaska. We have established methods to assign individual nests to territories so we can identify territories as high-occupancy (occupied more often than expected by chance) or low occupancy (occupied less often than expected by chance). The next step is to elucidate factors that underlie patterns of occupancy and productivity, and to learn how high- and low-occupancy nests and territories differ in their contribution to the population.

a. *Nestling physiological condition.* How does stress level (as measured by corticosterone) or fat level in nestling Gyrfalcons correlate with annual prey surveys, differ by occupancy status, or correlate with nest productivity and survival?
b. *Nestling diet.* In what primary ways does nestling diet vary on an annual basis, and how does diet differ with occupancy status? How does prey composition of the diet compare with prey availability on the landscape?
c. *Prey availability.* Are there detectable, biologically significant differences in prey density (primary and alternative prey) with occupancy status?
d. *Growth analysis.* Does prey limit productivity on the Seward Peninsula? How does individual nestling growth vary between years with high vs. low ptarmigan numbers, or with territory occupancy status?
e. *Nest initiation date and female body condition.* Are high-occupancy territories occupied earlier in the season? Are females at these territories in better breeding condition?
f. *Territory fidelity.* Are experienced breeders faithful to high-occupancy territories? For how long?
g. *Productivity.* What factors govern productivity on the Seward Peninsula? How does the percentage of productive territories, and average production per territory, vary with annual changes in primary prey (ptarmigan and ground squirrel) abundance? Are there notable differences in productivity with occupancy status? Are high-occupancy sites providing a disproportionate number of recruits into the population?
h. *Survival.* How long do individual Gyrfalcons remain in the breeding population? At what average age do they recruit into high-occupancy territories? This question can

be answered by a combination of banding breeding adults, and collecting feathers at occupied nests. Alaska Department of Fish and Game has three years of data. Given this head start, and the attractiveness of research that combines field techniques and high tech DNA analysis, this research should be fundable.

i. *Home range size and habitat use.* How do home range size and habitat correlate with changes in abundance in primary prey, area of shrub cover, or differ with occupancy status?

To answer these questions will require an additional field crew and pickup truck in Alaska. Currently the Alaska field crew consists of two technicians, one pickup, and one ATV. The second crew will allow additional effort: prey surveys; capture and marking adult Gyrfalcons, especially at high-occupancy territories; supplemental feeding as part of growth analysis. The addition of a second crew will allow us to increase the number of nests visits to monitor young from one to two or three per season, which is required to answer some questions (e.g., to obtain sequential blood samples or morphological measurements, or to provide supplemental feeding to young).

Objective: Create an organized system for data storage and retrieval.

Currently all data from Alaska are stored in many "flat" files (i.e., Excel spreadsheets). A relational database is needed for all Alaska data, including historical data from Alaska Fish and Game, and data collected by The Peregrine Fund since 2014: results of occupancy and productivity surveys; nest entries (banding, biological samples); bird IDs (band number, breeding history, natal territory). We are quickly losing control of our data, which is a poor return on investment because we can't analyze the data properly and answer the questions we have set out.

Collaborative International Research

Objective: Serve as a catalyst for collaborative, international research on the effects of climate change on the ecology of Gyrfalcons and the tundra ecosystem.

Background. We formed the Tundra Conservation Network (TCN) in 2014 to function as a body of collaborative partners representing diverse disciplines (e.g., raptor biology, ptarmigan biology, climate modeling). We held the first meeting at the World Center for Birds of Prey February 10–12, 2014 attended by about 20 partners from eight countries. Despite the enthusiasm at and following the meeting, and some collaborative grant writing that followed, the TCN has languished. There is now an Arctic Falcon Specialists Group led by Alastair Franke (Canada) and Knud Falk (Denmark) that has largely excluded The Peregrine Fund and supplanted the TCN. The effort in maintaining international collaboration is vital to our

program but has been neglected in favor of more time-sensitive program components. We must now decide the most fruitful way to maintain our international collaborations, whether or how to invest in TCN, or cede to the Arctic Falcon Specialists Group Further.

Objective: Develop funding sources.

Nearly all project funding comes from the Mohamed Al Bowardi and the Crown Prince of the United Arab Emirates, and is channeled through the Mohamed bin Zayed Species Conservation Fund (MBZ). This funding is unpredictable and irregular, coming at approximately 2-year intervals. Our main contact at MBZ is Frederic Launay.

Objective: Hire staff.

The Gyrfalcon program is currently led by one fulltime employee, two seasonal technicians/grad students in Alaska, and assistance from the Quantitative Ecologist/Director of Global Conservation Science at The Peregrine Fund. There are no other programs at The Peregrine Fund so dependent on a single employee. The two options for the success of the program are to hire an assistant responsible for all outreach and grant writing, or reduce expectations. At current staffing levels the project can expect success with the Alaska field component.

Activities

2017

- Michael Henderson conducts his first of two field seasons for M.S. research at Boise State University on the Seward Peninsula.
- Adam Eichenwald conducts his first and only field season for M.S. research at Yale University on the Seward Peninsula.
- Begin design of a relational database for Alaska project data. Fully functional Polar Raptor Data Bank (PRDB) can serve this purpose. Otherwise new Quantitative Ecologist at The Peregrine Fund can manage this task. Dependent on funding and personnel.
- Conduct concerted outreach to recruit as many Arctic raptor biologists as possible to adopt the PRDB. Outreach to consist of personal emails, Skype calls, meeting biologists at conferences, presenting at conferences.
- Distribute complimentary copies of *Applied Raptor Ecology*. Promote adoption and usage of the book by Arctic raptor biologists and university biology programs.

2018

- Hire staff to achieve the objectives outlined in this five-year plan.

- Michael Henderson conducts his second field season for M.S. research at Boise State University on the Seward Peninsula.
- Devin Johnson conducts his first of two field seasons for M.S. research at University Alaska Fairbanks on the Seward Peninsula.
- Provide further development for the PRDB. The PRDB needs development in its functionality. Currently a user can only see their own data and not search the data of other users. This is an intentional limitation depending development of security permissions. Rob Davies and Habitat info are prepared to develop PRDB, pending additional funding.
- 2018–2022: Develop a stronger relationship with partners in the UAE. One visit annually to UAE to meet with Frederic Launay and Mohamed Al Bowardi.
- 2018–2022: Obtain one VIP visit to the Alaska field project. Potential guests include Mohamed Al Bowardi, Calen Offield, other board members interested in Gyrfalcons and the Arctic.
- Build relationships with partners involved in conservation and research in the Arctic. Advertise our presence; write collaborative research and funding proposals. Target: CAFF (Conservation of Arctic Flora and Fauna), CMBP (Circumpolar Biodiversity Monitoring Program), ALCC (Arctic Landscape Conservation Cooperative), WALCC (Western Alaska Landscape Conservation Cooperative; both of the USFWS), others.

2019

- Michael Henderson defends his thesis at Boise State University
- Devin Johnson conducts his second field season for M.S. research at University Alaska Fairbanks on the Seward Peninsula.
- Ongoing data collection for PRDB and recruitment of partners.
- Publish ≥ 1 scientific paper from collaborative data sharing and research through the PRDB.
- Establish a working relationship with ≥ 1 international organization interested in conservation of Arctic biodiversity.
- Recruit one philanthropist to adopt the Alaska field research project; obtain one annual gift of restricted funding.

2020

- Devin Johnson defends his thesis at University of Alaska Fairbanks.
- Publish one paper from Michael Henderson’s Gyrfalcon research.

2021

- Publish one paper from Devin Johnson's original Gyrfalcon research on the Seward Peninsula.

2022

- Use ongoing PRDB data collection to update predictions for effects of global climate change on distribution, ecology, and population status of Arctic raptors.

Partners Involved

This program could not exist without its dedicated partners. It will not grow without including more partners.

Mohamed bin Zayed Species Conservation Fund

MBZ has provided major funding for the Gyrfalcon program.

Alaska Department of Fish and Game

Travis Booms, Regional Nongame Biologist; Peter Bente, Regional Big Game Biologist (retired). The ADFG office in Nome provides annual logistical support.

Boise State University

BSU provides graduate student assistantships and committee members/graduate advising to M.S. students on the project. David Anderson serves as Committee Chair and Advisor for students sponsored by The Peregrine Fund.

University of Alaska Fairbanks

UAF will be providing a graduate student assistantship beginning Fall 2017 to a M.S. student studying Gyrfalcons in Alaska. David Anderson will serve as a committee member.

Habitat Info, Wales.

Rob Davies is the genius creator of the Polar Raptor Databank.

John Earthman

John Earthman is the District Attorney in Nome and a falconer. He provides logistical assistance and expert knowledge on the Seward Peninsula.

Evaluation

Alaska Field Research

Alaska Field Research will be evaluated by:

- Number of graduate students who defend theses from original research conducted on Gyrfalcons on the Seward Peninsula.

- Number of original publications from the research, and how often these are cited
- Quality of insights gained on Gyrfalcon ecology and the potential for Global climate change to affect Gyrfalcon populations.

Collaborative International Research

Collaborative International Research will be evaluated by:

- Number of requests for *Applied Raptor Ecology*, the number of scientists who adopt its usage, the annual growth in number of visits to the website, and the number of times it is cited.
- Number of scientists who enroll in the PRDB, the number of requests for data, and the number of publications that come from it.

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Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$231,400	$199,200	$196,800	$206,400	$207,100	$1,040,900

Andean Condor Conservation in Ecuador

Personnel

Principal Investigator: Hernan Vargas, Ph.D.

Other personnel: Collaborators of the Andean Condor Working Group

Background

Since 2012, this project has studied foraging behavior, movement and habitat utilization, as well as population productivity, survival and causes of mortality to identify conservation challenges and potential solutions for the Critically Endangered Andean Condor population in Ecuador. Just over a century ago, several thousand Andean Condors were reported living in the Andean region of Ecuador, but now 100 individuals are estimated surviving in the wild, indicating that the population is declining. This small population is threatened by human persecution (conflict with local people due to real or perceived threat that Andean Condors pose to livestock) habitat loss, poisoning and free-roaming dogs competing for food. Within a long-term commitment of The Peregrine Fund´s 2017 Strategic Plan to mitigate vulture declines and prevent raptor extinctions worldwide, the plan for 2018-2022 is to implement seven objectives related to: 1) understanding spatial ecology, 2) population monitoring, 3) breeding biology, 4) health and genetic assessment, 5) training and building local capacity, 6) development of partnerships and engagement to address landscape level species and habitat threats, and 7) dissemination of project outputs and fundraising at national and international levels. The Peregrine Fund is the leading member of the Andean Condor Working Group and has provided project data and scientific advice to the Ministry of Environment of Ecuador to update the Andean Condor Conservation Strategy (2017). This project is providing valuable information to reverse the current population trend from decline to a trend of population growth through the implementation of science-based management and conservation actions. We also have a role in an international condor conservation network with whom we aim to tackle the flagrant abuse and killing of Andean Condors in ritualistic bull-fights put on for tourists in Peru.

Major project achievements 2012-2016

1. Nine Andean Condors were tagged with transmitters and tracked by satellites. This is the first time that satellite telemetry was used in Andean Condor research in Ecuador.
2. Satellite telemetry data and field research indicate that more than 70% of roosting and foraging sites, and 90% of nesting sites are outside the network of Nationally Protected Areas, suggesting that major conservation efforts are needed to protect condors on privately owned land.
3. Satellite tracked condors foraged mainly along private ranches where they feed on naturally dead cattle and occasionally kill calves. This is the main reason for human persecution.
4. Areas of high mortality risk for Andean Condors were identified, and are being utilized to focus environmental education actions.
5. Tracking data are serving to design and create a new protected area of 33,000 ha (81,545 acres) for the conservation of condors in Southern Ecuador.
6. In 2015, the first systematic and most comprehensive census of the Andean Condor population in Ecuador was conducted. This census was based on 70 roost sites revealed by satellite telemetry. A total of 93 condors were counted, and a population between 94 and 102 individuals was estimated.
7. Eleven nest sites were located in Ecuador: two failed during the incubation stage and the others produced fledglings. Six of these nests were intensively monitored, thereby increasing knowledge of the species' breeding biology. Prior to this study, only one nest site was known and monitored in Ecuador.
8. Health parameters, using blood samples from 12 wild and 19 captive condors were studied and found all specimens in good health.
9. Initiated genetic study to assess genetic diversity, gene flow, family groups, and potential inbreeding in this small population.
10. Thousands of photo and video records from camera traps indicated the presence of feral and free-roaming dogs competing for carrion with Andean Condors, and dog sterilization campaigns were carried out in the Antisana region, one of the main strongholds of the Andean Condor population in Ecuador.
11. Documented three instances of condors attacking calves and recommended the incorporation of this new knowledge into environmental education campaigns.
12. Scientific advice and project results were provided to the Ministry of Environment through the Andean Condor Working Group for the revision of the Andean Condor Conservation Strategy in 2017.
13. Partnerships were developed in Ecuador and South America aimed at standardizing research, education and monitoring efforts for condor conservation among Andean

countries. Tagged condors from Ecuador frequently visited the southern part of Colombia, thus the species needs international initiatives to achieve long-term conservation goals in the Andean region.

14. Local capacity in ecological monitoring and research methodologies was enhanced by:
    a. Training 163 people, most of them park rangers from the Ministry of Environment of Ecuador (MAE), in population monitoring and survey techniques.
    b. Providing small grants to three Ecuadorian MSc students to conduct thesis research on genetics, density and distribution of Andean Condors.
    c. Training 27 people in condor capturing, manipulation, and tagging techniques.
    d. Providing hands-on instruction to six parabiologists in population counts and monitoring of breeding behavior.
15. Project progress and results were disseminated at the national and international level through:
    a. Delivering presentations in bimonthly meetings of the Andean Condor Working Group in Ecuador
    b. Presenting results in international conferences held in Peru, Colombia, Ecuador, Chile, Argentina and Costa Rica.
    c. Submitting Google Earth and GIS maps of tagged condors to the Ministry of Environment of Ecuador and The Andean Condor Working Group.
    d. Submitting progress reports to the Ministry of Environment of Ecuador, The Peregrine Fund and project donors.
    e. Publishing the scientific paper “Andean Condor in Ecuador, Geographic distribution, population size and Extinction Risk” published in Journal PLOSone in March 2016.
    f. Participating in TV documentaries for Public Television Programs from Ecuador, Germany and Holland, reaching millions of people worldwide.

Need statement

This project responds to The Peregrine Fund’s strategic conservation outcome to save an endangered species, and potentially tackle landscape level threats affecting multiple species. The extinction of the Andean Condor from Venezuela suggests that the small population remaining in Ecuador could follow the same fate if no remedial conservation actions are taken to eliminate or mitigate threats. Andean Condors are unable to breed until they are eight years old and the reproduce only once every two years. Therefore, the species’ demography is sensitive to each individual lost. Consequently, for the continued existence of the small,

declining Ecuador population, every single individual is vital to the future of this species. To better explain the need of this project, we will answer the following frequently asked questions:

Why should we prevent the extinction of Andean Condors in Ecuador? The Andean Condor is Ecuador´s national bird and a symbol representing power and greatness. In the past, Andean Condors played an important role in the folklore and mythology of native peoples in Andean countries and have been represented in art long before Spanish colonization. Condors are also considered a symbol of health in many Andean cultures, and some people believed that their bones and organs have medicinal benefits, which sometimes has led to the hunting and killing of them for traditional medicine and rituals. Ecologically, Andean Condors, by feeding on carcasses of large dead animals, clean the environment and prevent the spread of diseases and dangerous bacteria, some of them affecting humans, thus fulfilling a vital ecosystem service.

Why is this project important? Preliminary results based on radio tracked condors indicate that these birds use most of the high Andean Mountains of Ecuador (1,800 m to 6,268 m) for foraging and roosting. Thus, by achieving Andean Condor conservation goals, we would also be protecting key watersheds at the landscape level (See PFund, Strategic Plan) in the Andean Condor – *Paramo* – habitat, and this in turn protects the water supply for more than six million people in ten Andean provinces of Ecuador. Water from the *Paramo* also serves to irrigate the banana plantations in the western Coastal plains, an important source of employment and revenue for Ecuador. Streams and rivers originating in the high Andean region also provide water to the Amazon River to maintain the fresh water biodiversity in the Amazon Basin. The Peregrine Fund, by applying the species umbrella concept, conserves the Andean Condor to protect the *Paramo* habitat, associated biodiversity, water supplies and human communities in this and the connected ecosystems. We need to know which threatening factors are limiting the growth of the Andean Condor population in order for environmental authorities to take management actions for species and habitat preservation.

What would happen if this project is not implemented? The Andean Condor likely will be extirpated from Ecuador. Ecuador will lose its national bird and part of the cultural identity. The project is an integral component for conservation of the species. Furthermore, without this project, potential is diminished for making a contribution to conserving biodiversity and resources for humans (e.g., watersheds) of the High Andean region and thus their environmental, social and economic benefits from conservation.

When will this project come to an end? Long lived species require long-term conservation actions. We foresee this project coming to an end when the condor population is growing in the wild and self-sustaining. Among criteria, this project will be evaluated periodically to assess

population size and growth rate. By 2022, The Peregrine Fund would have: 1) acquired ample knowledge on the species´ ecological requirements to take management actions, 2) trained sufficient local people in research, ecological monitoring and education techniques, and 3) developed and strengthened key partnerships in Ecuador to continue implementing conservation actions of this long-lived species.

Goals

Reverse declining trend and increase Andean Condor population size in Ecuador from 100 to 125 individuals in next five years by providing science-based information to: 1) the Ministry of Environment of Ecuador to implement the Andean Condor Conservation Strategy and, 2) other environmental authorities, local partners and communities to engage in conservation actions.

Objectives

- Identify and quantify habitat use, feeding areas, roosting sites, and mortality rates through satellite telemetry and wing-tagging.
- Design methodology and develop monitoring program to estimate local and national population size and trends.
- Locate nest sites and estimate breeding success.
- Assess health and genetic diversity.
- Build local capacity in ecological monitoring, research techniques, environmental education.
- Engage government and private institutions to achieve conservation goals and address landscape level main threats.
- Disseminate project outputs at national and international levels.

Activities

Objective 1: Identify and quantify habitat use, feeding areas, roosting sites, and mortality rates through satellite telemetry and wing-tagging.

- 2018-2020: Measure movement patterns, habitat use, locate nests and roost by radio tagging 12 condors.
- 2018-2021: Identify the most important roosting and foraging areas within the Network of National Protected Areas (SNAP), revealed by satellite telemetry, and assess the efficiency of the SNAP in protecting the species.
- 2018-2022: Provide GPS locations of roosting sites to conduct two national simultaneous censuses (one in 2018 and a second in 2022) and estimate population size and trend.

- 2018-2022. Estimate survivorship and dispersal of 12 additional condors marked with wing tags by re-sighting of wing tags.
- 2018-2022. Identify and prioritize areas where condors are persecuted and management, education, and capacity building can be applied.

Objective 2. Design methodology and develop monitoring program to estimate local and national population size and trends.

- 2018-2022: Measure local population size and changes in abundance at selected roost sites across years.
- 2018-2022: Design methodology to census condors, estimate population size and population trends (declining, stable or increasing) at the national level.

Objective 3. Locate nest sites and estimate breeding success

- 2018-2022: Search and monitor all located nests and compare nesting success among geographic locations.
- 2022: Identify source (self-sustaining) and sink (non-self-sustaining) populations and the habitat conditions that produce such populations.
- 2021-2022: Protection of nesting sites in collaboration with land owners, community leaders and environmental authorities.

Objective 4. Assess health and genetic diversity

- 2018: Develop national and international partnerships to conduct molecular and genetic studies.
- 2018-2020: Collect blood/feather samples from wild and captive condors in Ecuador.
- 2020-2022: Quantify the effects of lead poisoning and exposure of other contaminants.
- 2022: Estimate gene flow and inbreeding and apply results in conservation planning.
- 2021-2022: Estimate genetic diversity in the captive and wild populations of condors in Ecuador and compare it with other Andean country populations.

Objective 5. Train and build local capacity in ecological monitoring, scientific research and environmental education techniques.

- 2018: Train 150 park rangers and volunteers in census, survey and ecological monitoring techniques.
- 2018-2022: Train ten parabiologists from local communities in nest monitoring, condor counts, capturing methods and other field monitoring techniques.
- 2018-2019: Train 50 veterinary students in dog sterilization techniques and animal welfare principles to reduce dogs from becoming free-roaming predators and food competitors with Andean Condors

- 2019-2022: Increase local capacity for research by providing grants to one BSc and one MSc student to conduct thesis research on ecological aspects of Andean Condors such as food competition with free-roaming dogs and natural cattle mortality (as index of food availability).

Objective 6. Engage government and private institutions to achieve conservation goals and address landscape level threats

Threat addressed	Activity	Main partner
Limited food	2018-2022: Work with the Ministry of Environment (MAE) and other ministries of Ecuador to develop a management strategy to ensure cattle and native species as food resources for condors. This activity would consider reintroducing South American camelids (llamas, alpacas, and vicuñas) in protected and private lands, while maintaining minimum stocks of cattle in the Network of Protected Areas of Ecuador.	Ministry of Environment of Ecuador (MAE) and other ministries of Ecuador.
Limited food	2018-2022: Conduct sterilization and vaccination campaigns of free-roaming and domestic dogs at 10 selected communities near the Andean Condor habitat.	Universidad San Francisco de Quito (USFQ)
Habitat loss	2018-2022: Provide our results to the MAE and decision makers and help implement planning that will reduce the negative effects of human development on condors (e.g., electrification routes, mining sites, urban and rural development).	Ministry of Environment of Ecuador (MAE) and other ministries of Ecuador.
Human persecution	2018-2022: Provide project data and assist to launch a pilot education campaign targeted to indigenous and mestizo communities located at or near vulnerable sites for Andean Condors	Aves y Conservacion
Poisoning, inbreeding and low genetic diversity	2018-2022: Identify and develop partnerships with national and international universities, laboratories where poisons could be analyzed and genetic/molecular studies conducted.	Partners to be identified at National and International level.

Objective 7. Disseminate project outputs at national and international levels, and fundraising.

- 2018-2022: Disseminate project outputs through websites at The Peregrine Fund (in English) and in Ecuador (in Spanish project web site) and use them as platforms to request donations.

- 2018-2022: Submit, at least, two funding proposals per year.
- 2018-2022: Submit annual progress reports to the Ministry of Environment of Ecuador, donors, and The Peregrine Fund.
- 2018-2022: Sign cooperation agreements with relevant partners in Ecuador.
- 2018-2022: Participate and deliver presentations on project progress at bimonthly meetings of the Andean Condor Working Group and international conferences.
- 2018-2022: Participate in documentaries for national and international television.
- 2018-2022: Disseminate project results through popular publications, national radio and newspapers.
- 2020-2022: Publish three scientific publications in peer-reviewed journals.

Evaluation

Project design, implementation and outcomes will be evaluated in 2020 (participatory midterm evaluation to identify areas of improvement, measure effectiveness in reaching project goal and objectives, and recommend adjustments) and in 2022 (five-year period evaluation included in progress report). Success of the Andean Condor project in Ecuador will be evaluated on the basis of:

- Decrease in mortality rates from human persecution, breeding pairs successfully producing fledglings, and local surveys and national censuses indicating positive growth of the Andean Condor population.
- Ministry of Environment of Ecuador (MAE), members of the Andean Condor Working Group, private ranchers and local communities committed to addressing landscape level threats and engaged in implementation of the Andean Condor Conservation Strategy.
- Government, private sector, and local communities engaged in conservation action efficiently protect nests, roost sites and feeding areas of Andean Condors.
- Genetic assessment will reveal if the small population of Andean Condors in Ecuador is self-sustaining or if there is a need to import additional individuals from other countries to increase genetic diversity.
- Increased number of trained park rangers, university students and parabiologists from local communities with increase ecological knowledge and enhanced capacity to continue conservation actions after 2022.
- Training and education objectives measured with changes in participant's knowledge, attitudes and behavior.
- Number of the different types of dissemination outputs will indicate success of the dissemination objective at national and international levels.

Partners and Roles

Partner	Role
Ilitío Wildlife Rehabilitation Center – PROFORAN	Field research, hires permanent field personnel, administrative and accounting support.
NOVOPAN	Donor: Provides funds to monitor one nest located at their NOVOPAN property, near the village of Itulcachi, Pichincha Province. It also provides funds to implement an education and dog sterilization campaign around the nest site.
Ministry of Environment of Ecuador (MAE)	Issue research and CITES permits, provides access to protected areas, park rangers to participate in condor counts, national census, and population monitoring, Finances national censuses.
Universidad San Francisco de Quito (USFQ)	Veterinary service and laboratory facilities to store blood, feather, tissue samples. Vet. Andres Ortega and students assist with dog vaccination and sterilization campaigns; Dr. Jaime Chaves and students collaborate in genetic studies.
Fundación Jocotoco	Provides access to Antisanilla Biological Reserve a key condor nesting and roosting site in Ecuador. Provides cows to study population structure using camera traps.
Zoológico Amaru (Amaru zoo)	Andean Condor Monitoring and research in Southern Ecuador.
Aves y Conservación	Environmental Education, awareness and communications
Fundación Zoológica de Ecuador- Quito Zoo	Environmental Education and dog sterilization campaigns in the Pichincha Province (around Quito), captive breeding efforts. Donated funds to pay satellite fees in 2017.
Fundación Galo Plaza Lasso	Photographic recaptures of wing-tagged condors at Hacienda Zuleta, captive breeding efforts. In-kind support.
Fundación Parque Condor	Condor captures and technical advice on husbandry techniques and condor rehabilitation, environmental education.
Naturaleza y Cultura Internacional (NCI)	Field monitoring of condors in Southern Ecuador, support for creation of new protected area in southern Ecuador.
Wildlife Conservation Society	National condor census, advice on GIS techniques.
Universidad de Cuenca	Field monitoring of condors in Southern Ecuador
Municipalities of Nabón, Oña and Saraguro	Field monitoring of condors in Southern Ecuador
The Butler Foundation	Donor: General project expenses
Barbara Butler	Donor: General project expenses
Juan Kohn	Donor: Salaries for field biologist and assistants

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$145,000	$145,700	$149,400	$152,300	$156,500	$748,900

Impact on Andean Condors of Yawar Fiesta in Peru

Personnel

Hernan Vargas, Ph.D.

Renzo Piana, CORDIBI, Peru

Background

The Yawar Fiesta (YF or blood festival) is an indigenous celebration in southern Peru that involves the use of Andean Condors and bulls, representing indigenous and foreign cultures respectively. The ceremony is celebrated by tying a wild condor onto the back of a bull and releasing them to fight to get rid of each other (Fig. 1). YF takes place annually, in July, in remote indigenous communities in southern Peru. There are no reliable statistics to quantify its impact on the condor population. An unknown number of condors used in the celebration are severely injured while tied to the bull and die before or after being released (Figs. 2, 3), therefore, it is not possible to evaluate local or regional population effects over broader geographical scales. As Andean Condors are wide-ranging animals, local mortality from the Yawar Fiesta, could affect other populations over a wide area, including neighboring Andean countries. This would indicate a landscape level threat for the species (see PFund's 2017 Strategic Plan).

Most of the available information comes from the Internet. The exact year when this celebration was initiated is undetermined, but according to historical sources, by 1940 it was already celebrated in a handful of communities. At present, it is estimated that at least 60 wild condors are captured in 60 indigenous communities participating in the celebration. From the information on the web, it can be clearly deduced that there is mistreatment of condors, from the process of capture, maintenance in captivity, and during the festival. Although the celebration is carried out under the government leadership of Municipal Mayors, Police Officers and Catholic priests, the capture and use of condors for this purpose is illegal under Peruvian legislation. Indigenous leaders argue that this is a traditional celebration but we now know that it is not. Driven by economic incentives from tourism, we know that an increasing number of communities are participating in the celebration.

This project aims to eliminate the negative impacts of the YF celebration on the Andean Condor population in Peru. The Peregrine Fund has developed partnerships with *Centro de Ornitología y Biodiversidad* (CORBIDI), NGO devoted to bird conservation in Peru, and with the Peruvian Forestry Service (SERFOR), both organizations already committed to the implementation of this

project. In Peru, The Peregrine Fund has contributed PhD grants (2007-2013) for the academic training of Renzo Piana (who will be the project manager of this project) and of Ursula Valdez. We also contributed to the elaboration of the Andean Condor Conservation Plan (2015), organized the 1st International Andean Condor Workshop in Lima (2015), and we are currently conducting research on condor movement behavior and habitat use through satellite telemetry and GIS technologies (2015-2017).

Need statement

This project responds to The Peregrine Fund's strategic conservation outcome by saving an endangered species. This project is justified because Andean Condors are removed from the wild, which results in mortality with an unknown effect on the species' demography. Conservation effort is urgently needed because: 1) the extent and trend in the number of YF being produced has not been assessed, but both may be on the increase, 2) the mortality rate associated with YF has not been estimated, but might be a significant factor for conservation, 3) YF celebrations cause mistreatment of condors, 4) indigenous communities are naively unaware of that their YF actions affect the condor population, and 5) government agencies are not enforcing existing legislation to stop this illegal celebration**.**

***Extent and trend of the Yawar fiesta*.** To thoroughly evaluate the effect of YF on Andean Condor population biology we must have an accurate estimate of the number and the geographic extent of YFs. Based on the result, we can integrate data from our other studies of condor ecology and demography to assess how YF affects population dynamics at scales of local, regional, and entire species distributions. This is an immediate need because localized removal and mortality can cause a serious population sink that affects areas well beyond the region where Yawar fiestas occur, consequently impacting the continent-wide population. It is urgent to measure and estimate the impact on the Andean Condor population because a serious population sink might exist in and around the region where Yawar fiesta occurs.

Unknown mortality rate: The mortality rate resulting from the Yawar Fiestas is unknown, but it may be high considering that at least 60 individuals are captured annually. Andean Condors are a long-lived species, with a low mortality rate and low reproduction rate, and individuals require seven to eight years to reach sexual maturity. Therefore, the proportion of sexes and age classes of the captured population must be estimated. These life-history traits result in very low rates of recruitment to the adult population and depend on recruitment of breeding age birds, and principally on the survival of adults, to persist in time. A higher frequency of the celebration in the near future will certainly increase the condor mortality rate and affect population structure.

Mistreatment of condors. After capture, condors are in captivity for three to five days in unsuitable cages and then paraded (Fig. 3) through the Yawar Fiesta towns. Next, they are tied to the back of a fighting bull and released in a bullring for approximately 20 minutes. If they survive, individuals are released into the wild with unknown outcomes relative to survival and reproductive performance. These factors also must be estimated and incorporated in the conservation effort.

Local communities and Andean Condors. Andean Condors are revered as sacred creatures all along the Andes, including those places where Yawar Fiesta is conducted. In Peru, most people are not aware that Yawar Fiesta can harm or kill individuals and they assume that the effect of ceremonies on the species survival is nil. Reverence for Andean Condors in Andean communities must be harnessed towards the conservation of the species, and the reduction, and eventual cessation of Yawar Fiesta.

Enforcement of environmental legislation. Although recent legal framework passed by Peruvian congress has banned Yawar Fiesta in Peru, the ceremony is still used by local authorities to maintain power structures and political relationships in towns where ceremonies are conducted. Dissemination of the legal framework and sanctions that protect Andean Condors among authorities in these localities, and the empowerment of regional authorities to enforce them, will help curtail Yawar Fiesta. All these activities should be related to an aggressive conservation education strategy that is centered on Andean Condor conservation and its importance for Andean people. This should discourage the use of Andean Condors in Yawar Fiesta by highlighting the species' vulnerability and the high value they have in the Andean culture. The strategy must reach local authorities and be coordinated with Peru´s wildlife service (SERFOR), as stated by the recently approved Andean Condor Conservation Plan.

Goal

Eliminate negative impacts of Peruvian Yawar Fiesta on Andean Condors

Objectives

1. Assess the extent and trend of Yawar Fiesta in southern Peru.
2. Assess impact of the Yawar Fiesta on the Andean Condor population of southern Peru.
3. Develop and implement a conservation education campaign.
4. Engage government and religious leaders in topics related to ecology, conservation and impacts on the condor population and environmental legislation.

Activities

Objective 1. Assess the extent and trend of the Yawar Fiesta in southern Peru.

Activity 1.1. 2018-2019: Quantify the extent and trend of the Yawar Fiesta in Peru. We will measure the number, geographic distribution and the trend (decreasing, stable, or increasing) of communities celebrating and trend (decreasing, stable, or increasing) of YF in Peru by mapping all the districts and towns where this ceremony is conducted regularly. For this, we will interview SERFOR officials in Lima, Cusco, Apurimac and Huancavelica departments. This information will be used as a baseline to measure the impact of the project and to select towns/communities where objectives 2 and 3 will be implemented. Field visits to these localities will include interviews with local authorities (mayors, police officers, priests, teachers, etc.) to better understand the role they play in organizing YF, their perceptions on the possible impacts of YF on Andean Condor individuals and populations, their awareness of the legal framework that protects Andean Condors in Peru, and possible alternatives to YF. Information collected here will be used as a proxy to estimate the number of individual condors used each year for YF. Additionally we will analyze all videos on YF available on the internet to gain information on communities where festivals are conducted. To estimate the festival trend, we will ask leaders when (first year of celebration) they started celebrating the Yawar Fiesta. We will estimate trends of the celebration in decadal time scales, and assess the effect on the festival trend of recently passed legislation. For this objective, we will hire a social scientist or marketing consultant from Peru. We expect this consultancy to last no more than six months, and include the following specific terms of reference:

- Map all communities where Yawar Fiesta is currently celebrated.
- Determine festival frequency trend in space and time.
- Assess why government officials and indigenous leaders celebrate the festival.
- Assess level of environmental legislation knowledge of government officials and indigenous leaders.
- Select three indigenous communities where this pilot conservation project can be conducted with high probability of success.
- Based on social or marketing science designed to influence human behavior, propose conservation, education/communication and training strategies to eliminate or reduce the impact of the Yawar Fiesta on the condor population in southern Peru while maintaining the importance of condors as cultural icons. These recommendations will be applied in Objective 3

Objective 2. Assess the impact of the Yawar Fiesta on the Andean Condor population of southern Peru.

Activity 2.1. 2018: Determine the population structure of the captured condor population for the Yawar Fiesta and compare it with the structure of the wild population. In long-lived species such as the Andean Condor, survivorship of adult individuals is of paramount importance in maintaining viable populations. Andean Condor populations usually have more males than females so the survivorship of adult females is particularly crucial. We will provide a grant to a BSc. or MSc. student from Peru to study the population structure of the captured condor population during the celebrations that will take place in July 2018 (July 28 is Peru's Independence Day from the Spanish Empire). As the YF is celebrated simultaneously in several communities at the end of July, the student and project coordinator (RP) will recruit several volunteers (particularly university students) who will be allocated to the different communities to gather data. The team will record the number of males and females by age class (juvenile, subadult and adult). If proportionally more adults, particularly females, are captured, it will mean that the negative impact of the Yawar Fiesta on the Andean Condor population is higher than if only juveniles are captured. For comparison, the student will also place cameras near provided carrion where condors are regularly captured for Yawar Fiestas. Birds in photos will be age and sexed for additional data to estimate the population structure in the wild and to test for trapping bias (i.e, captured birds do not represent a random sample of the population structure). Additionally, the student will analyze videos of past celebrations to help quantify the number of Andean Condors used and injured. The student will also assess the handling process of condors from capture, husbandry in captivity, and injuries and mortality rates during the Yawar Fiesta celebrations. Data gathered in 2018 will be used as the baseline to evaluate the success of this project.

Objective 3: Develop and implement a conservation education campaign

Activity 3.1. 2018: Film Yawar Fiesta to provide documentary material for conservation education. We will arrange for students and volunteers to film the entire Yawar Fiesta process in July 2018, beginning with Mayors selecting the condor catchers, the techniques to bait and capture, maintenance in captivity, and the ritual during the actual Yawar Fiesta, condor deaths and condor releases. Filming the process provides documentary evidence of the impact the festival has on condors, and provides the material for a short film about it that might be effective in reaching the hearts and minds of the people involved, and changing their behavior. Filming could be done with cell phones and digital cameras for our own use, but may be better done professionally to convey a strong, professional conservation message. The documentaries could be in English (for fundraising), Spanish (for SERFOR and other authorities) and Quechua (for local communities, native language). Each 15-minute documentary could cost a minimum of $8,000, adding $24,000 for the three films to the budget. Filming costs in Peru may be higher

due to remoteness of communities (travel expenses) and to the simultaneous nature of the celebration

Activity 3.2. 2018: Conduct a pilot conservation education campaign in three selected communities

Based on social or marketing science designed to influence human behavior, we will develop conservation, education/communication and training strategies to eliminate or reduce the impact of the Yawar Fiesta on the condors while maintaining the importance of condors as cultural icons. Following the activities in objectives 1 and 2, and using the knowledge and material gained from them, we will develop a strategy of information, education, and policy to eliminate impact on condors from the Yawar Fiesta. We will begin by recruiting a BSc or MSc student or educator to train local teachers in three communities/towns where YF is conducted. Training sessions will be focused on the importance of Andean Condors in Andean culture and folklore and the protection of the species. We will produce teaching materials (i.e., booklets, videos, radio spots) for students of different ages, including adults. These will be produced in Quechua and Spanish. This activity will be conducted under the leadership of a CORBIDI environmental education team that has ample experience conducting training and environmental education campaigns for bird conservation in Peru. Indicators for measuring the success of this campaign will be designed accordingly, but we anticipate that these will include: (i) a preliminary evaluation of the probable impacts of YF on Andean Condors among target population segments, (ii) alternatives to YF celebration, and (iii) identification of information voids on conservation issues regarding Andean Condor protection in Peru. Evaluations will be conducted before (base line) and after project activities are completed.

Activity 3.3: 2020-2022. Expand conservation education campaign to several communities

Based on results and experience from the pilot education campaign we will expand the education campaign and include a maximum of 10 communities identified as important after implementation of the two years of the project. We will apply same methodology and indicators of success used during the pilot education phase.

Objective 4. Engage government and religious leaders in topics related to ecology, conservation and impacts on the condor population and environmental legislation

Activity 4.1. 2018: Develop and implement material to engage government and religious leaders in ecology, conservation, fiesta impacts on the condor population and environmental legislation in three selected communities. Training of SERFOR and police officials in topics related to ecology and conservation of Andean Condors, possible impacts of YF.

Activity 4. 2. 2018-2019: Training for handling and transporting captive Andean Condors. We will conduct at least three workshops with SERFOR and police officers working in areas where YF is conducted. This will contribute to reducing mortality that results from TF and increase the likelihood the released birds become "fully functional" members of the wild population. We will design a standardized handling and transport protocol to take captive Andean Condors that are injured to authorized rehabilitation centers to be treated and released. This action will be co-financed by SERFOR and implemented with personnel working at SERFOR offices in Cusco, Apurimac and Huancavelica.

Activity 4.3. 2020-2022: Continued engagement with government and religious leaders and expanded engagement in communities as needed.

We will reinforce and carry out this activity only if the Yawar Fiesta continues after the first two years of pilot project implementation by interaction with government and religious leaders involved in the Yawar Fiesta celebration.

Evaluation

The quantitative assement of the Yawar Fiesta pilot project in 2018 will be used as the baseline to measure success in achieving project goal and objectives. By 2022, a reduction of 100% in the number of communities and number of wild condor captured for the Yawar Fiesta will indicate 100% project success. Partial reductions will indicate partial success. On the contrary, an increase of these parameters against 2018 baseline levels will indicate project failure. Project design, implementation and outcomes will be evaluated in 2020 (midterm evaluation to identify areas of improvement, measure effectiveness in reaching project goal and objectives, and recommend adjustments) and in 2022 (5-year period impact evaluation included in final report). Specific indicators will include:

- Yawar Fiesta´s negative impact on the Andean Condor population of Peru eliminated.
- Number of condors by sex and age, injured and released during the YF quantified.
- Mortality rates caused by the YF on Andean Condors estimated.
- Perceptions and role of local authorities on the organization and impacts of YF on Andean Condor survival described and understood, ensuring the maintenance of a positive bond and perception between the species and local people.
- Local authorities and communities with knowledge of the legal framework that protects Andean Condors.
- Committed indigenous communities to end using Andean Condors in their current and future YF celebrations.
- Training and conservation education objectives measured with changes in participant's knowledge, attitudes and behavior.

- Have implemented a successful conservation education campaign in selected towns where YF is celebrated with people aware of the harm this event causes to the species.
- Two Peruvian students with a BSc or MSc degrees in raptor ecology and education, respectively.
- Have trained SERFOR and police officials in Apurimac, Huancavelica and Cusco regions so they can better control YF and handle and dispose Andean Condors that are seized so they are treated properly and returned into the wild (if possible).
- Two papers published in peer-reviewed journals

Partners and Roles

***Centro de Ornitología y Biodiversidad - CORBIDI*:** Peruvian NGO that was founded in 2006 by Peruvian ornithologists and conservationists with the aim of promoting the development of natural sciences in Peru. CORBIDI is mainly focused on the conservation of birds and their habitats in Peru, for which it conducts several conservation projects all along the country (e.g., bird banding stations, research on migratory birds, environmental education for bird conservation). CORBIDI actively promotes bird watching as a form of citizen science and hosts the second largest bird collection in Peru. CORBIDI has ongoing research and collaboration agreements with several universities in Peru and around the world. Renzo Piana is member of CORDIBI. CORDIBI will coordinate project implementation and administer the funds.

***Peruvian Forestry Service - SERFOR*:** Part of the ministry of Agriculture and Irrigation, SERFOR is the national environmental authority in charge of the protection and management of wildlife and plant species in Peru. Previously known as INRENA, SERFOR was created in 2014 and has administrative offices in Lima and all departments within Peru. SERFOR promotes the sound management of forestry and wildlife resources and the sustainable use of ecosystems services to contribute to the welfare of Peruvian citizens. SERFOR will provide park rangers and officials to participate in training workshops. Renzo Piana and Hernan Vargas will approach SERFOR and request some funds for the project (e.g. food, and transportation for SERFOR personnel and if possible other support).

Annex 1: Yawar Fiesta in Peru.

Figure 1. During Yawar Fiestas ceremonies, wild Andean Condors are tied to the back of a bull and released in a bull ring.

Figure 2. Andean Condors can sustain severe injures during Yawar Fiesta; the impact of this in Andean Condor pupulations in Peru is still unknown (picture is a screen capture from a Youtube video).

Figure 3. In towns where Yawar Fiesta is organized, Andean Condors are paraded with the participation of local political and religious authorities.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$107,800	$60,800	$45,300	$49,000	$52,800	$315,700

West Indies - Ridgway's Hawk Conservation Project

Project Personnel

Project Director:	Russell Thorstrom
Project Coordinator:	Thomas Hayes
Research Biologist:	Christine Hayes
Environmental Education Coordinator:	Marta Curti
Philornis Research Coordinator:	Martín Quiroga, Ph.D.
Local Coordinator (Punta Cana region):	Misael Calcaño Silven
Local Field Technician (Team Leaders):	Juan Valentín Cespedes (Valentín), Abrahan De Léon Tejada, Juan Agramonte Vargas (Pondo), Julio Cesar Sierra Rodriguez
Local Field Technicians:	Hilario Jorge Polanco (Nojine), Samuel Cordero Linares (Kilín), Eliseo De Léon Valga, Modesto Balbuena de la Rosa (Samuel), Daniel Rodriguez Hernandez (Pocho), Daniel Alcantara Cespedes (Henri), Pastor De Léon Franco (Chivero), Junior De Los Santos Moreta (Chucho), Alberto De La Cruz Moreta (Jeuri), Kelvin Alejandro Garcia (Jesus), Yuli Manuel Cano Medina, Ariel Ozoria Garcia

Project Background

The Ridgway's Hawk (*Buteo ridgwayi*) is the only diurnal raptor endemic to the island of Hispaniola, which is a Caribbean island divided between Haiti and Dominican Republic (DR). Historically its range extended throughout much of Haiti and DR, as well as a few satellite islands (Wiley and Wiley 1981, Thorstrom et al. 2007). At present, the species has been extirpated from Haiti and its adjacent islands, and is also absent from most of the DR. Ridgway's Hawk is currently listed as critically endangered (BirdLife International 2000, Thorstrom et al. 2007). It is found only in

Los Haitises National Park in north eastern DR and, since we began restoration, it is also now found in Puntacana Resort, eastern DR.

The Peregrine Fund began studying the status of Ridgway's Hawk in 2002 and 2003, when Peregrine Fund staff and local biologists searched for the species in areas of historical record within Los Haitises, Sierra de Bahoruco, and Sierra de Neiba National Parks, as well as in the areas of Cambita and Los Cacaos. We found Ridgway's Hawk only in Los Haitises National Park (LHNP), where today we estimate the entire population to be between 300-400 individuals. In 2005 and 2007, The Peregrine Fund continued surveys within LHNP to locate additional pairs, individuals, and territories.

In 2008, we began a translocation program, shifting young birds from LHNP to Loma Herradura near the town of Pedro Sanchez. This pilot program, with the translocation of only a few birds per year, continued through 2012, with a total of 20 individuals being released. Ultimately, we ended the program in this locality due to relatively high mortality of released hawks compared with birds released in Punta Cana.

In 2009, we expanded our assisted dispersal program to Punta Cana, where the program continues to this day. To date, we have released 128 young Ridgway's Hawk in the area. Initial releases consisted of 3-6 birds per site/year due to low availability of nestlings in LHNP releases. Later we learned that poor productivity in wild pairs was mainly due to high mortality of nestlings that are parasitized by nest flies (*Philornis spp*., also known as bot flies) that cause myiasis (infestation of living tissue by fly larvae). Our efforts to control *Philornis* infestations, with the use of fipronil and more recently permacap, have greatly increased the survival of young hawks to fledging. Treatment has allowed us to increase the number of individuals released each year in Punta Cana while still helping to build up the main population of hawks in LHNP. Since 2014 we have been releasing a minimum of 25 young hawks per year in Punta Cana. In 2013, Punta Cana's first wild pair of Ridgway's Hawk formed as a result of our release effort, and produced young. In 2017 there were at least 16 pairs of hawks in Punta Cana, with 9 pairs breeding and fledging 10 young. Between 2013 and 2017, 22 locally-hatched young fledged in the Punta Cana population, and in 2016 the first second generation hawks were hatched by adults hatched in the wild in Punta Cana.

Since The Peregrine Fund began working with Ridgway's Hawk in 2002, we have learned that this species is in desperate need of conservation attention. Extremely low productivity of pairs in the last stronghold of the species means that the population is not able to self-sustain. The great news is that with nest treatments, environmental education and collaboration with locals, we have been able to reverse the decline of this species. **With our hands-on management, the Ridgway's Hawk is making a comeback!**

Need Statement

This project responds to The Peregrine Fund's strategic conservation outcome to save an endangered species and tackle a landscape-level threat that affects multiple species. The last known Ridgway's Hawk population is very small and isolated. As a result, it is at high risk of extinction. Any major disruption to the population, such as disease, fire, or hurricane, could result in the loss of the species. Other factors, including habitat loss, human persecution, human or natural destruction of nests, wildfires, electrocution, and *Philornis* infestations in nestling hawks, limit the distribution and abundance of the species in today's landscape and likely contributed to the species' decline.

Despite the obstacles that Ridgway's Hawk faces, we believe there exists a great opportunity to save this critically endangered raptor, and at the same time benefit other birds of prey on the island. We have already made significant advances, increasing population numbers and reducing major threats such as human persecution and *Philornis* infestations.

Ridgway's Hawk is an excellent candidate for successful conservation. It has a varied diet, comprising rodents, reptiles, amphibians, bats, and small birds. It also readily adapts to nesting in human settled and edge habitats. The species can reproduce at 1 year old, which means that reproductive pairs form quickly after dispersal from natal territories. In these ways, it contrasts with many other tropical species that have highly specialized diets, need pristine forest in order to survive, nest in one specific type of tree, or do not sexually mature until 5-7 years of age. Ridgway's Hawk is able to reproduce quickly and adapt to an array of circumstances.

To date, our work has stabilized and increased the population, as well as extending its distribution. Our research has shown that without hands-on management of *Philornis* infestations, most Ridgway's Hawk pairs fail to produce young, and the population would continue to decline. We have also reduced human persecution of hawks by working closely with locals. However, much work remains to be done. In order for Ridgway's Hawk populations to be sustainable, we must greatly reduce or eliminate the two main threats: human persecution and *Philornis* infestations. Accomplishing these objectives are two major hurdles in bringing this raptor back from near extinction.

Goals & Objectives

Safeguard the critically endangered Ridgway's Hawk from extinction.

- Monitor a minimum of 120 pairs of Ridgway's Hawk and manage a minimum of 90 accessible nests per breeding season in the extant population of Ridgway's Hawk in LHNP.

- Increase Ridgway's Hawk distribution and abundance by establishing up to three geographically separate self-sustaining populations outside of LHNP. The new population in Punta Cana achieves the objective for one geographically separate population. During the next 10 years we aim to establish a second population separated from the source population in LHNP. However, it is unlikely that we can consider any new Ridgway's Hawk population as self-sustaining until we find long-term solutions for the bot fly myasis problem.

Change human attitudes towards Ridgway's Hawk and other raptors, promoting their ecological role and touristic value.

- Increase the number of people reached through direct and indirect education and outreach programs by at least 10% annually.
- Provide free or at-cost chicken coops to persons suffering loss of poultry to raptor predation in areas where Ridgway's Hawk is present. The number of chicken coops will change annually based on need.
- Expand Ridgway's Hawk Day celebrations to include up to three different communities and/or school groups each year.
- Design, implement, evaluate and modify, as needed, at least one new educational activity/presentation and/or material that can be made available throughout Dominican Republic.
- "Graduate" up to 15 school teachers per year in teacher training workshops that give educators ideas for lesson plans focusing on Ridgway's Hawk and other birds of prey.

Ensure sustainability of the Ridgway's Hawk conservation project.

- Hire/train local biologists, technicians, and volunteers (current numbers change based on need).
- Nurture relationships with local NGOs, Dominican Government, and other partners by sharing information in at least one public presentation each year and encouraging local cooperation in Ridgway's Hawk conservation.
- Improve the livelihoods of humans who share habitat with Ridgway's Hawk by seeking conservation solutions which include them rather than exclude them, for example: Hiring locals in small communities, which improves the economy; resolving conflict between humans and wildlife by providing chicken coops; etc.

Identify and reduce landscape level threats to raptors and other wildlife in DR.

- Collaborate with NGOs, Dominican Government, and power companies as well as other private institutions to increase awareness of the danger of electrocution of birds and other wildlife on power poles in DR and promote positive change through retrofitting of existing lines and construction of safer distribution lines in the future.
- Research the life cycle of Philornis, and search for a long-term solution for reducing mortality in that component of the avifauna which is severely impacted by these parasites.

Activities

Nest Monitoring and Management in LHNP

We have intensively managed Ridgway's Hawk in LHNP since 2011 in an effort to increase productivity of pairs. Nest management is focused on reducing nest failures caused by *Philornis* and repairing nests to keep them from collapsing.

- *Prevention of parasites/short term control* - We have developed treatments to reduce or eliminate *Philornis* in nestling Ridgway's Hawk. We use one of two insecticides, fipronil or permacap, to treat nestlings and/or nests. With the use of fipronil, we must climb each nest 4-5 times during the nestling period and apply topical treatment to nestlings and spray the nest. Recently, we began using permacap which allows us to treat effectively with a single application in the nest just before eggs hatch. We are currently conducting an experiment in collaboration with Christine Hayes, a Masters student at Boise State University, to measure the effectiveness of these treatments. We know from preliminary results that, collectively, treated nests can produce two to three times the number of young than untreated nests.
- *Preventing nests from falling* - Some Ridgway's Hawk nests fail by falling during the incubation or nestling period. Most Ridgway's Hawk in LHNP construct their nests in Royal Palms (*Roystonea borinquena*) directly atop large communal Palmchat (*Dulus dominicus)* nests. As fronds age and shed from the palm, part or all of a Palmchat nest may fall, bringing the hawk nest with it. Since we already climb palms to treat nestling hawks for parasite infestations, we also take the time to trim palm fronds or sometimes use cordage to keep unstable nests from falling.

Nest monitoring and management takes place between January and July each year during Ridgway's Hawk nesting season. The work is currently accomplished by four teams of local Dominicans, each consisting of four paid field technicians (currently all but two are seasonally

paid) and 1-2 volunteers per team. In 2017, the majority of our volunteers were local Dominicans. Each team has a leader responsible for caring for equipment, organizing work to be done with the project coordinator, and turning data sheets in regularly to the field office run by Thomas and Christine Hayes.

The selection process for local field techs and volunteers has been fairly informal. Typically, individuals who show interest in our work are invited to join us in the field. They may work voluntarily and if we need to hire additional field techs, there is usually a volunteer who stands out and receives the available position.

Currently, our four teams monitor Ridgway's Hawk at 3 access points to LHNP: Los Limones (two teams), Laguna Cristal (one team), and Sabana de la Mar (one team). In 2017 we monitored over 120 pairs of Ridgway's Hawk in LHNP, with intensive management of 94 pairs. We anticipate nest management in LHNP will continue at least through the next 5 years.

Nest Monitoring/Management and releases in Punta Cana

The new population of Ridgway's Hawk in Punta Cana marks a milestone for the project. Despite the new population reaching 16 pairs in 2017, there is still much to do before this population can become self-sustaining. Nest monitoring and management takes place during January-July each year, and, along with the releases, is conducted by Misael Calcaño, Marta Curti, Christine Hayes, Thomas Hayes, local field technicians, and volunteers.

- *Management of wild pairs in Punta Cana* - Parasitism by Philornis occurs in Punta Cana, so short term control methods to reduce or prevent infestations are implemented there just as in LHNP. We will monitor as many hawk pairs as possible in Punta Cana and manage nesting pairs to increase their productivity. Ultimately, we need to find a long-term solution for Philornis infestation.
- *Temporary freeze on releases in Punta Cana* - We have relocated from Los Haitises 128 fledgling hawks to Punta Cana over the last 9 years. At least 16 pairs of hawks have formed as a result of released birds as well as 22 fledglings hatched in the area. During the 2017 release season we experienced some conflict between previously released birds and this year's cohort and we observed poorer than usual initial success for 2017 released birds. A high density of previously released hawks is likely a sign that the population is reaching its local limit. For this reason we plan to put a hold on releases in Punta Cana over the next few years so that we can focus our attention where it is most needed (environmental education, power line retrofitting, Philornis work, initiating a new release site in a separate area). We will closely monitor the existing population and re-initiate releases if needed in the future as time and resources become available.

Search for New Location Suitable for Ridgway's Hawk Releases

We need to select the next Ridgway's Hawk release site to remain on track in accomplishing the goal of three geographically dispersed populations of the species outside of LHNP. We will initiate the following activities in order to proceed with our objective.

- *Roundtable discussion with stakeholders* - In 2017/2018 we will initiate a roundtable discussion with Dominican Ministry of the Environment and Natural Resources as well as other stakeholders and NGOs. We will give a synopsis presentation on Ridgway's Hawk and the success of the project to date, followed by a round-table discussion of potential new release sites for the species. We will seek advice from other groups focused on conservation in DR. The ultimate goal of this discussion is to narrow down potential future release sites for in situ scouting as well as to exclude areas of likely human-wildlife conflict.
- *Model predicting Philornis prevalence* - Starting in June 2017 Martín Quiroga, in collaboration with Dr. Pablo Cuervo from the Lab. of Wildlife Diseases (CONICET-Argentina), will begin building a model to predict areas with low and high prevalence of Philornis for Dominican Republic. The model will be constructed from locations with reports of parasitism by Philornis and climate data. The model requires at least 25 data points evenly distributed over the country. We will initially seek reports of parasitism by Philornis within DR. If data on Philornis distribution are lacking, we will fill the void by surveying nests of species commonly parasitized by Philornis. Once the model is ready, we will verify it by visiting sites where Philornis parasitism was/was not predicted in the model and check nests of known host species for Philornis parasitism, e.g. Palmchat. We aim to have the model ready by Dec 2018.
- *Ground checking* - During the 2018 field season we will scout sites of interest for future releases. The focus of these scouting trips will be to examine habitat, prey availability, human habitation and land-use as well as logistics for future releases.
- *Selection of site and construction* - After scouting potential locations for future releases, and establishing contact with local people, we will make a final selection of the next release site. During 2018-2019 we will construct one new release tower and observation blind as well as any necessary construction for logistics of the next release site.
- *Experimental release* - During the 2019 field season we will conduct an experimental release at the new site, involving at least 25 hawks. As many hawks as possible will carry transmitters so that we can monitor them closely. This is essential in any new release site to reveal fatalities and other problems which may need to be addressed before subsequent releases.

Environmental Education

After several reintroduced hawks were found shot in communities around the Punta Cana release site, we began an intensive education program in 2013 in 12 communities. Since the project began, we have reached more than 7,300 individuals and have already seen a positive change in people's attitudes and actions toward the hawks. In fact, we have no evidence of any other hawks being shot in this area since the inception of the program. Expansion into new areas and an increase in number of people reached is imperative in order to continue this positive trend.

- *Expand the environmental education program to include additional communities in areas around Punta Cana* - With newly released hawks and wild-hatched young beginning to disperse farther from the Punta Cana release site, it is important that our educational efforts reach new communities before the hawks do. We will expand the radius of our program around Punta Cana and conduct door to door visits, school presentations, radio messages, television spots, art contests, teacher training workshops, celebration of Ridgway's Hawk Day, live hawk presentations, and other activities , as appropriate, to help disseminate information about the hawks, raptors in general, and their importance in a healthy ecosystem.
- *Expand the environmental education program to include additional communities in areas around newly selected release sites* - Prior to beginning an assisted dispersal program in new areas within Dominican Republic, we will conduct environmental education and outreach activities (as indicated above) to make sure the majority of the nearby human population is aware of our project and is supportive of it prior to its implementation.
- *Build and distribute chicken coops* - In cases where Ridgway's Hawk (or other raptors) are preying on domestic fowl, we will provide free or at-cost chicken coops and provide training to help mitigate human/raptor conflicts. We advise people to keep their chickens and young protected in the chicken coops when they are not there to protect them and until the young chickens are about two to three weeks old. At this age they are large enough that predation from a Ridgway's Hawk is unlikely. Red-tailed Hawks (*Buteo jamaicensis*) can take larger chickens, but they are scarce in Ridgway's Hawk habitat and are also more wary of people.
- *Make the Ridgway's Hawk a household name in DR* - Use media outlets (newspaper, radio, television, etc.), other forms of advertisement, and Ridgway's Hawk Day festivals in the nation's capital, to reach the majority of Dominicans across the country. Reaching individuals throughout DR, even individuals who are unlikely to come into contact with a wild Ridgway's Hawk, is an important way to garner public

support, which can translate to support from government organizations, local grant providers, and others who can help in the conservation of the Ridgway's Hawk.

Community-Based Conservation

Since 2002, our work has helped to improve the livelihoods of several members of communities in and around LHNP. Individuals receive on-the-job training and full-time, part-time, or seasonal employment, allowing them to make their living or supplement their income in conservation and research projects focused on Ridgway's Hawk.

- *Economy-based:* In 2017, a total of 17 local field technicians worked on the Ridgway's Hawk project. In addition to hiring employees to work directly with the conservation effort, other individuals are employed to help with the crew's daily tasks of living in a rural area, including water collection, cooking, sewing, and providing transportation. These small jobs have a significant impact on the local economy of small impoverished communities and are recognized and appreciated by the local people. Hiring residents to work in conservation has also detached at least a few individuals from dependence on subsistence agriculture inside LHNP.
- *Education-based:* We strive to maintain good relationships with community members and address their concerns regarding Ridgway's Hawk as well as provide them with information about raptors and the environment in general, helping to eliminate prejudices towards birds of prey. Farmers are now more cautious about their agricultural activities around nests especially as we are often there monitoring hawks and we explain what they can do to help hawks be successful. Many local farmers now want to have hawks in their agricultural fields understanding that raptors can be helpful for controlling rodents, which damage crops.
- *Training-based:* Field technicians and volunteers are trained in a number of skills which will be useful to them throughout their careers. Skills include nest climbing, leg-banding birds, treating for botfly infestations, recording data, use of GPS, as well as computer data entry and leadership skills.
- *Livelihood Support:* One of the main reasons individuals shoot hawks is because they have lost domestic poultry to predators, including hawks. In the last several years we have addressed this issue by providing free chicken cages to locals who express concerns about the hawks. Chicken caging not only prevents the loss of poultry (and the subsequent loss of income/food supply) to hawks, but also prevents depredation by a number of other predators including: dogs, cats, rats, snakes, and the introduced Indian mongoose (Herpestes javanicus).

Long-term Solution for *Philornis*

In order for Ridgway's Hawk populations to be truly sustainable a long-term solution for *Philornis* is essential. In June 2017, Martin Quiroga, a biologist and *Philornis* expert from Argentina, joined Ridgway's Hawk project staff. Martin's focus is to further our knowledge of the life history of *Philornis* in an effort to find solutions for reducing *Philornis* populations on a broad scale without intensive nest management. Potential control methods identified for this type of parasite include sterile male release, pheromones as bait, and release of native parasitoids. His work will primarily take place in a laboratory provided by Grupo Puntacana Foundation and will be focused on generating key information needed to apply some of the control methods described above (e.g. reproduce *Philornis* in captivity, needed for the sterile male releases). Martin has been contracted to work on the Ridgway's Hawk project for 2.5 years, at which time we will evaluate progress and whether an extension may be necessary.

- *Rear Philornis in captivity:* Captive fly populations will be used for lab trials of chemical repellants, insecticides and biological forms of control. Captive propagation is also the first step to mass produce Philornis for a Sterile Male Release, a possible broad scale solution to reduce overall Philornis population, at least in a given area.

  We will rear Philornis in our lab for the next 2.5 years. TPF crew will collect larvae and pupae from wild nests. Martín Quiroga will help with sample collections in the field and conduct/supervise the lab work. Collected larvae and pupae will be incubated at 25°C. Once adults emerge, they will be transferred to 12x12 inch mesh cages at a temperature of 27°C. There, adults will be fed with a specific diet (hydrolyzed proteins, sugar, orange juice and water) and their survival will be recorded. So far the conditions and diet described above have allowed us to rear more than 300 flies that survived a minimum of 45 days in captivity in 2016.
- *Captive Propagation of Philornis:* For the next 2.5 years Martín Quiroga will attempt to captive-breed Philornis, using adult flies in the lab. We will experiment with different environmental conditions (temperature and humidity), ratios of males to females (i.e.: 1 male - 1 female; 1 male - 2 females; 2 females - 1 male, etc.) and size of cages; observing mating behavior and looking for eggs. We will collaborate with Gwen P. Keller (Director of the Screw Worm Barrier Maintenance Program, COPEG, in Panama) and Guillermo Fadul (Director of rearing protocol at COPEG). Screw worm larvae possess similar habits to subcutaneous Philornis and the sterile fly rearing facility has a method already developed.
- *Seek native biological control agents (parasitoids) of Philornis:* Micro-wasps of the family Chalcididae are known to parasitize and kill Philornis larvae or pupae. As a result, one or several parasitoids may emerge from parasitized pupae instead of a Philornis adult. During the 2018 and 2019 breeding seasons, we will collect Philornis

larvae/pupae from different bird species and rear them in our laboratory. If collected pupae have been parasitized by micro-wasps, we will be able to obtain samples of parasitoids instead of Philornis. We will also use baits (mostly rotten beef/chicken meat) in plastic containers between 50 and 100 meters of active bird nests. This will attract a wide variety of flies (i.e.: Sarcophagidae) to lay their eggs/larvae. We will collect the resulting pupae to learn about the Hispaniolan parasitoid fauna and may find some species already known to parasitize Philornis. We will send samples of parasitic wasps to Dr. Marcelo Teixeira Tavarez (Universidade Federal do Espírito Santo) for species identification. If collected species are not known to be generalist parasitoids, we can assess their host range in collaboration with Dr. George Heimpel (University of Minnesota) to determine whether any of them may be specific parasitoids of Philornis flies and thus potentially useful in biological control. M. Quiroga will oversee this activity over the next 2.5 years starting mid-June 2017.

- *Study of organic repellents:* The use of repellents to control avian parasites is an alternative tool to mitigate infestations of Philornis in Ridgway's Hawk. A recent publication showed that extracts of *Psidium galapageium* (a native tree from the Galapagos) reduced Philornis' larval growth in captivity. *P. galapageium* also seemed to deter adult Philornis. Since 2015 we have been conducting similar studies in our lab. In our experiments Annatto (*Bixa orellana*) repelled 80% of adult flies. This is a promising result but we must increase our sample size and try with other organic compounds. Beginning in June 2017 we plan trials to test organic repellents that may effectively deter Philornis.

  We will expose captive flies to different natural compounds (tobacco, neem, etc.) in a choice arena. Device consists of three 1 ½" PVC pipes connected to form a T. One of the arms (the base of the T) is the flies' entrance which leads to a joint. There the fly has to choose between one arm and the other. One arm will contain pieces of tissue paper embedded in an aromatic compound while the other arm will have the same tissue paper, but soaked in water. Two 40w bulbs are used as attractants at the end of each arm. The activity of the fly is observed remotely on a computer using two cameras which are placed at the end of these two arms. We will be able to assess each fly's preference to test how Philornis reacts to each compound.

These studies will be conducted during 2017, 2018, and possibly 2019 by Martín Quiroga and will be continued until we are able to find an effective repellent.

- *Assess effectiveness of entomopathogenic fungi to control parasitism:* We will test the effectiveness of *Beauveria bassiana*; an entomopathogenic (causing disease or death in insects) fungi, naturally occurring in soils all over the world. We will test the number of hours that it takes *B. bassiana* to kill Philornis' eggs, larvae, pupae, and adults. To do so, we will cover the base of 120cc plastic containers with nest material sprayed with a specific amount of B. bassiana (it is commercially sold as a watery solution so it can be easily sprayed) and a single egg, larvae, pupae, or adult placed there. In the case of adults, food will be placed inside the containers but not in contact with the base. We will record time elapsed from initial exposure to death of the individual and use this to assess effectiveness. Philornis eggs are almost impossible to find in natural nests and we are currently unable to obtain them in the lab. For this reason we will use eggs of other flies as a proxy. We will obtain fly eggs by baiting with rotten meat where other flies usually lay eggs. Martín Quiroga will conduct this study and it should be completed by the end of 2018.
- *Identification of specific pheromones:* We will send samples from Dominican Republic to Professor Stephen Teale (State University of New York College of Environmental Science and Forestry) to run the analyses needed to find specific pheromones. Dr. Quiroga may either extract required samples in DR or send live samples to Dr. Teale (flies can be shipped in the pupal stage, thus adults would emerge in Dr. Teale's lab). We will also look for the possibility of an institution with the capability to conduct these studies in-country.

Mitigating Electrocution of Birds on Power Lines

Distribution lines in Dominican Republic often kill birds, and also snakes. These electrocutions also cause power outages and damage to utility infrastructure, so it is in the best interest of everyone to resolve this problem.

- *Stakeholders meeting with Dominican power companies and Ministry of the Environment:* During 2017-2018 we will plan a stakeholders meeting which will be sponsored by the Ministry of the Environment. The idea of this meeting will be to give a presentation to representatives of the power companies to explain our efforts to date to minimize hawk electrocutions as well as a general discussion of best practices outlined in the APLIC (Avian Power Line Interaction Committee) manual. We will also have a round table discussion about how to resolve this problem in Dominican Republic on a broad scale.

- *Continue retrofitting in Punta Cana release area:* We will work with the power company owned by the Puntacana Resort and Club in order to retrofit power poles in the area. We will actively search for grants specifically to support this effort.
- *Meeting with association of tourism in Punta Cana:* We will deliver a presentation to the Association of Hotels and Tourism in Dominican Republic, Inc. (ASONAHORES) about the project, focusing on possibilities in the Punta Cana area. We will encourage the association to support local power companies to help speed up the process of retrofitting.

Partners Involved

We work with several local partners in Dominican Republic in order to accomplish project objectives. Collaboration with local NGOs and Government entities is considered a vital part of the success and sustainability of the Ridgway's Hawk Project.

1. ***Puntacana Resort and Club and Grupo Puntacana Foundation*** - We are carrying out our assisted dispersal program for Ridgway's Hawk on Puntacana Resort and Club property. The resort, through the Grupo Puntacana Foundation, supports the project primarily through in-kind donations via: room and board for our volunteer hack site attendants, office and laboratory space, printing of informative brochures, and collaboration on educational activities such as teacher training workshops, community/school visits, and Ridgway's Hawk Day celebrations. They have also provided both financial and technical support in order to help retrofit dangerous power lines in the area.

2. ***Fundación Propagas*** - A leader in environmental education in DR, Fundación Propagas is partnering with us on educational activities in communities around LHNP and in Santo Domingo.

3. ***Parque Zoologico Nacional (ZOODOM)*** - The National Zoo also collaborates with us on educational programs. Specifically, they bring a live hawk to community and school presentations. In 2017 we hosted Ridgway's Hawk Day activities on the zoo grounds and plan to continue this celebration there in the future. The zoo is also rearing rats which we use to feed hawks at our release site. In the past, their veterinarians have assisted with caring for sick and injured Ridgway's Hawk, analyzing biological samples, and encouraged us to try the use of fipronil as a potential pesticide to use in controlling *Philornis* larvae in nestlings.

4. ***Ministry of the Environment and Natural Resources, Dominican Republic*** - The Ministry of the Environment provides us with all the permits required for us to carry out our research efforts in the country.

Evaluation

There are several aspects of the project which need to be evaluated and each one will require a different form/method of evaluation:

Treatments to reduce Philornis in nestlings

- *Survival of nestlings* - During the 2015, 2016, and 2017 nesting seasons we conducted an experiment to show the impact that Philornis has on nestlings and evaluate the effectiveness of our current treatment methods. Preliminary results reveal that these treatments can result in a three to four times increase in productivity.

Assisted Dispersal

We will measure the success of this aspect of our project based on four important factors:

- *Rate of survival to independence of young hawks released as part of this program* - There are many factors which can affect the survivability of young hawks including predation, injury, and becoming lost and unable to return to the release site, among many others. Though some losses are inevitable, a high rate of survival to dispersal indicates that the release site and procedures are successful.
- *Rate of re-sighting/band recapture of released hawks after dispersal* - Once young hawks have dispersed from the release site, it becomes harder to keep track of their whereabouts. However, the re-sighting of bands to determine rates of survival, pair formation and future nesting attempts/successes will give us an idea of how well young are able to survive to adulthood in the region.
- *Number of reproductive pairs in the release area* - In 2013 we documented the first nesting pair in Punta Cana. By 2014, two pairs had formed. As of 2017 (only three years later) there were 16 pairs of Ridgway's Hawk in the Punta Cana area. The number and rate of increase or decrease in breeding pairs (both while we are conducting active nest management and after) will help us to know if the project is being successful.
- *Rate of re-sighting/band recapture of hawks which hatched and fledged from wild nests* - Just as there are many factors which can affect the survivability of released hawks, many of these same factors affect wild hatched young. Re-sighting of bands to determine rates of survival, pair formation, and future nesting attempts/successes will give us an idea of how well young are able to survive to adulthood in the region.

Environmental Education

We will use a variety of evaluation methods to measure the program's impact.

Short-term indicators include: Scores from traditional evaluation methods, such as surveys and tests, which will help quantify the number of individuals who have had an increase in awareness and knowledge about the Ridgway's Hawk.

- *Results of non-traditional evaluations* - Interactive activities that allow for the documentation of changes in knowledge and attitude. Some simple non-traditional evaluations include: passing out photos of plants and animals and asking participants to find others in the group with whom their pictures form a complete food chain; or passing out pictures of raptors and non-raptors to each participant. They then must correctly place their photo in a box either labeled "raptors" or "other birds." Both these activities take under 10 minutes and provide the evaluators with immediate feedback as to how well a particular topic was understood.

Long-term indicators include:

- *"Unanticipated Actions"* - These are actions not solicited by TPF but which occur as a result of our program, and may be undertaken by students, teachers, businesses, etc.). This may include such actions as a school adopting the Ridgway's Hawk as its mascot, or a business choosing to feature a Ridgway's Hawk on its logo, or a local baseball team changing its name to "the Ridgway's Hawks".
- *Ridgway's Hawk survivorship* - Indeed, the ultimate measure of the success of the education component of the project will be a reduction or complete cessation of direct human-caused Ridgway's Hawk mortality in areas where we are working.

Study of *Philornis*

- *Rear Philornis in captivity* - Rearing conditions improved so we can increase adult flies' survival to over 100 days.
- *Captive Propagation of Philornis* - Reproducing parasites with this larval behavior (subcutaneous) is hard to achieve since it implies replacing a live host for a non-living substrate. Our highest goal will be to reproduce them in the lab but an intermediate goal may be to obtain eggs in captivity.
- *Seek native biological control agents (parasitoids) of Philornis* - A parameter to positively evaluate this activity will be to obtain parasitoids from Philornis pupae, identify them and seek in literature whether they are generalists or specialists. To

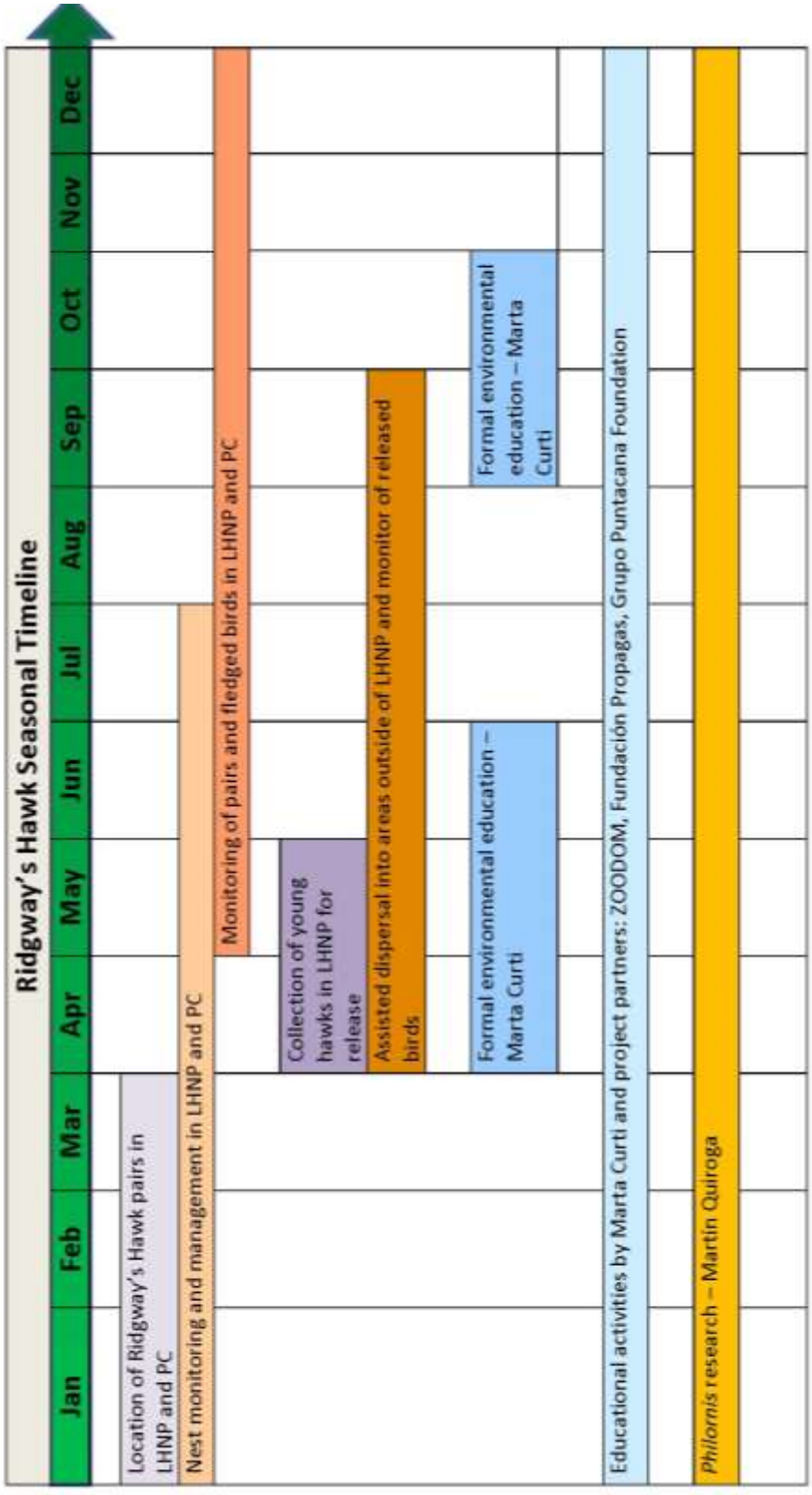
test the specificity of found parasitoids is not a way to evaluate this activity since we are not sure we will get live parasitoids from pupae.

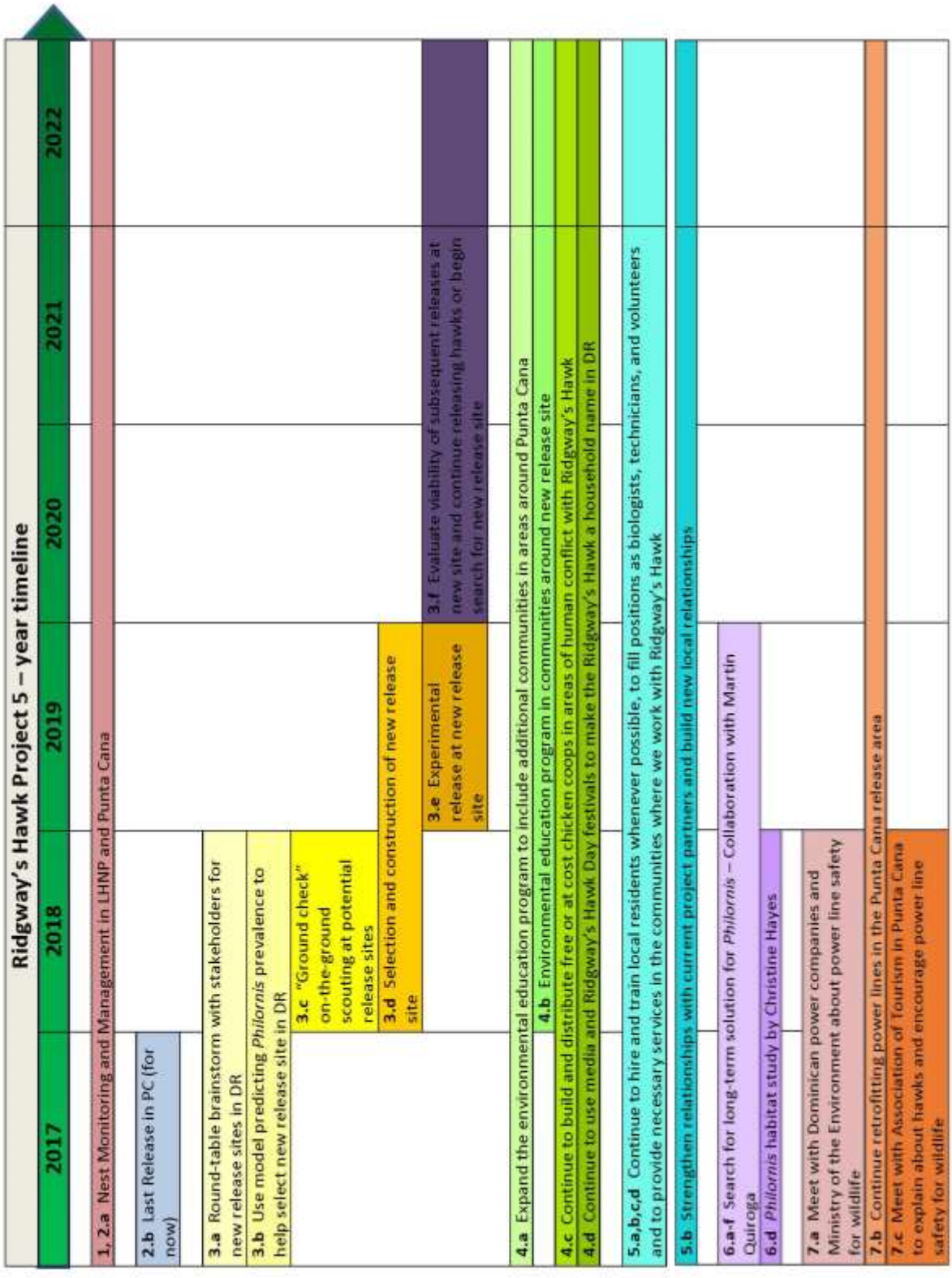
- *Study of organic repellents* - A favorable evaluation will be to test at least another 30 natural compounds that have aromatic properties in the next 2 years.
- *Assess effectiveness of entomopathogenic fungi to control parasitism* - We will be able to consider this successful if we are able to test this fungus in larvae and pupae of Philornis and eggs of Philornis or other dipterans.
- *Identification of specific pheromones* - We may be satisfied here if we are able to establish a successful collaboration and be able to obtain needed samples to be analyzed either in DR or in the states.

See TIMELINES BELOW

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$423,000	$359,000	$325,000	$350,500	$360,500	$1,818,000


Ridgway's Hawk Seasonal Timeline
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Location of Ridgway's Hawk pairs in LHNP and PC
Nest monitoring and management in LHNP and PC
Monitoring of pairs and fledged birds in LHNP and PC
Collection of young hawks in LHNP for release
Assisted dispersal into areas outside of LHNP and monitor of released birds
Formal environmental education – Marta Curti
Formal environmental education – Marta Curti
Educational activities by Marta Curti and project partners: ZOODOM, Fundación Propagas, Grupo Puntacana Foundation
Philornis research – Martin Quiroga


Ridgway's Hawk Project 5 – year timeline
2017
2018
2019
2020
2021
2022
1, 2.a Nest Monitoring and Management in LHNP and Punta Cana
2.b Last Release in PC (for now)
3.a Round-table brainstorm with stakeholders for new release sites in DR
3.b Use model predicting Philornis prevalence to help select new release site in DR
3.c "Ground check" on-the-ground scouting at potential release sites
3.d Selection and construction of new release site
3.e Experimental release at new release site
3.f Evaluate viability of subsequent releases at new site and continue releasing hawks or begin search for new release site
4.a Expand the environmental education program to include additional communities in areas around Punta Cana
4.b Environmental education program in communities around new release site
4.c Continue to build and distribute free or at cost chicken coops in areas of human conflict with Ridgway's Hawk
4.d Continue to use media and Ridgway's Hawk Day festivals to make the Ridgway's Hawk a household name in DR
5.a,b,c,d Continue to hire and train local residents whenever possible, to fill positions as biologists, technicians, and volunteers and to provide necessary services in the communities where we work with Ridgway's Hawk
5.b Strengthen relationships with current project partners and build new local relationships
6.a-f Search for long-term solution for Philornis – Collaboration with Martin Quiroga
6.d Philornis habitat study by Christine Hayes
7.a Meet with Dominican power companies and Ministry of the Environment about power line safety for wildlife
7.b Continue retrofitting power lines in the Punta Cana release area
7.c Meet with Association of Tourism in Punta Cana to explain about hawks and encourage power line safety for wildlife

Puerto Rican Sharp-shinned Hawk Project

Personnel

Project Director:	Russell Thorstrom
Biologist:	Julio Gallardo

Project Background

The Puerto Rican Sharp-shinned Hawk (*accipiter striatus venator*) is an endangered woodland raptor known to inhabit subtropical moist, wet and montane forest life zones of the Cordillera Central. Historical information described them as rare, uncommon and occurring in restricted habitats in small numbers. Population estimate surveys have shown they have declined drastically from a conservative island population of 240+ individuals in 1983 to approximately 150 individuals in 1991. This represents a 40% population decline over an eight-year period, but recent field work and surveys suggests they have been virtually extirpated in several commonwealth forests, and potentially isolated in the rest of their range to a few montane forest reserves. Currently, Puerto Rican Sharp-shinned Hawk is listed as endangered at the federal level and critically endangered by the Department of Natural and Environmental Resources of Puerto Rico (DRNA). Despite legal protection and an approved recovery plan by (United States Fish and Wildlife Service, 1994) the current population status remains unknown and there is a lack of basic information on the distribution, breeding status, habitat use, dispersion and genetic structure of the Puerto Rican Sharp-shinned Hawk.

2015

We surveyed and searched for Puerto Rican Sharp-shinned Hawks (*accipiter striatus venator*) in the Toro Negro, Maricao, Guilarte and Carite Commonwealth Forests of the central mountain range of Puerto Rico from February to July, 2015. We recorded 33 hawks made up of 15 territorial pairs and 3 individuals. We studied their breeding biology with nest building taking place from February to March, egg-laying in April, hatching in May and young fledging in June. We documented eight nesting attempts with a productivity of 1.9 young fledged (n = 15 fledged young) per

nesting attempt. One reproductive failure occurred during the nestling period when the young succumb to bot fly (*Philornis angustifrons?*) parasitism. Based on the mtDNA cytB sequence analysis of several feathers collected around nest sites showed that the Puerto Rican Sharp-shinned Hawk is sister to the continental North American subspecies *A. s. velox*, but the two subspecies were different at 26 nucleotide positions out of 999 base pairs total (or 2.6%). Based on a generalized molecular clock used for cytB in the literature (2% per million years), that divergence estimate would suggest that the two subspecies diverged ~1.3 million years ago. This suggests that the Puerto Rican Sharp-shinned Hawk is unique and it's imperative for conserving this threatened bird.

2016

We continued surveys and searches for Puerto Rican Sharp-shinned Hawks (PRSSH: *accipiter striatus venator*) in several montane forests of the central mountain range of Puerto Rico from February to June in 2015 and February to July in 2016. We recorded 33 hawks made up of 15 territorial pairs and 3 individuals and 53 hawks composed of 20 territorial pairs and 13 individuals in 2015 and 2016, respectively. Courtship and territorial display flights were observed during February and March in the early morning hours from 6:20-9:30 am and no display flights were observed from April to June. We studied their breeding biology with nest building taking place from February to April, egg-laying in April, hatching in May and fledging in June. We documented eight nesting attempts in 2015 and 12 nesting attempts in 2016. In 2016, two pairs that failed in their first nesting attempts re-nested building new nests 112 and 173 m from their first nests. In 2016, 6 nesting pairs built new nests that averaged 37 m from their nests built in 2015. Nesting failures occurred during the egg (n=6) and nestling periods (n=2). In 2015 and 2016, 15 and 12 young fledged successfully, respectively. Overall productivity for both years combined was 1.35 young fledged per nesting attempt.
The project goal is to monitor and protect the breeding populations of Sharp-shinned Hawks in Maricao, Toro Negro, Guillarte and Carite commonwealth forests and to re-establish a breeding population in El Yunque National Forest.

Need Statement

This project responds to The Peregrine Fund's strategic conservation outcome to save endangered species. Despite being identified in the U.S. endangered species list as critically endangered, and despite a Recovery Plan written by the USFWS in 1994, this species' has dwindled to an all-time low of about 55 individuals in 2017. Our investigation into the species status, begun in 2015, has revealed that management **action is now needed urgently to prevent its extinction** and restore the species' population to a state of growth.

Goals

Our goal is to achieve a state of growth in the Puerto Rican Sharp-shinned Hawk population size and distribution.

Objectives

Objective A. Determine population status in Puerto Rico

Activities

- Obtain federal and state research permits by TPF West Indies Director (2018-2022)
- Hire biologist, field supervisor and field assistants by TPF WI Director and (2018-2022)
- Secure housing, transportation logistical support by TPF WI Director and TPF biologist (2018-2022)
- Search the five known historical areas by TPF biologist and field assistants(Toro Negro, Maricao, Guilarte and El Yunque) (2018-2022)
- Search for new territorial and nesting pairs in Toro Negro, Maricao, Guilarte and Carite by TPF biologist and field assistants (2018-2022)
- Monitor past years' known nesting pairs in Toro Negro and Maricao by TPF biologist and field assistants (2018-2022)
- Search other areas with in the central montane forests by TPF biologist and field assistants (2018-2022)
- Determine productivity from number of young fledged per nesting attempts by TPF biologist and field assistants (2018-2022)
- Education material provided to locals to help identify the sharp-shinned hawk by TPF biologist and field assistants (2018-2022)

Objective B. Determine the current threats to the populationActivities

- Habitat loss and structure change identified by TPF biologist and field assistants (2018-2022)
- Pearly-eyed Thrasher (*Margarops fuscatus*) predation documented by nest cameras by TPF biologist and field assistants (2018-2022)
- Monitor nestlings for Bot Fly parasitism (Philornis) remove and treat infected birds by TPF biologist and field assistants (2018-2022)
- Other: Identify extent of inclement weather and other threats by TPF biologist and field assistants (2018-2022)

Objective C. Establish self-sustaining population in El Yunque National Forest

In February 2017, during the courtship display period for Puerto Rican Sharp-shinned Hawks, The Peregrine Fund (Russell Thorstrom and field staff of Thomas Hudson, Jeffrey Grayum, Jason Gregg and Emmanuel Eichholtz) and Julio Gallardo (doctoral student at Mississippi State University) conducted a 5-day survey for Sharp-shinned Hawks throughout El Yunque National Forest. No Sharp-shinned Hawks were detected during the survey period, suggesting the hawks are extremely rare or possibly extirpated from this national forest.

Activities

- Select release area in El Yunque NF by TPF biologist and field assistants (2019-2022)
- Permits secured for release with state/federal agencies by TPF biologist (2019-2022)
- Secure US Forest Service housing and support for hawk release effort by TPF biologist (2019-2022)
- Build release box by TPF biologist, field assistants and US Forest Service personnel (2019)
- Identify nesting pairs in Toro Negro for selection of young to release, by TPF biologist and field assistants (2019-2022)
- Obtain food for release from local source by TPF biologist (2019-2022)
- Release banded and radio-tagged young (n=5) in El Yunque NF using the successful methods to establish Ridgway's Hawk in Dominican Republic, by TPF biologist and field assistants (2019-2022)
- Monitor survival of released young with telemetry by TPF biologist and field assistants (2019-2022)
- Search for nesting pairs by TPF biologist and field assistants (2020-2022)

Partners

- *Puerto Rican Department of Natural Resources and Environment (DRNA)* provides logistical (housing) and personnel support in state forests Toro Negro, Maricao, Guilarte and Carite.
- *United States Forest Service* for logistical support, permits and assistance in El Yunque National Forest for releases.
- *United States Fish and Wildlife Service* for permits for research activities and releases.

Evaluations

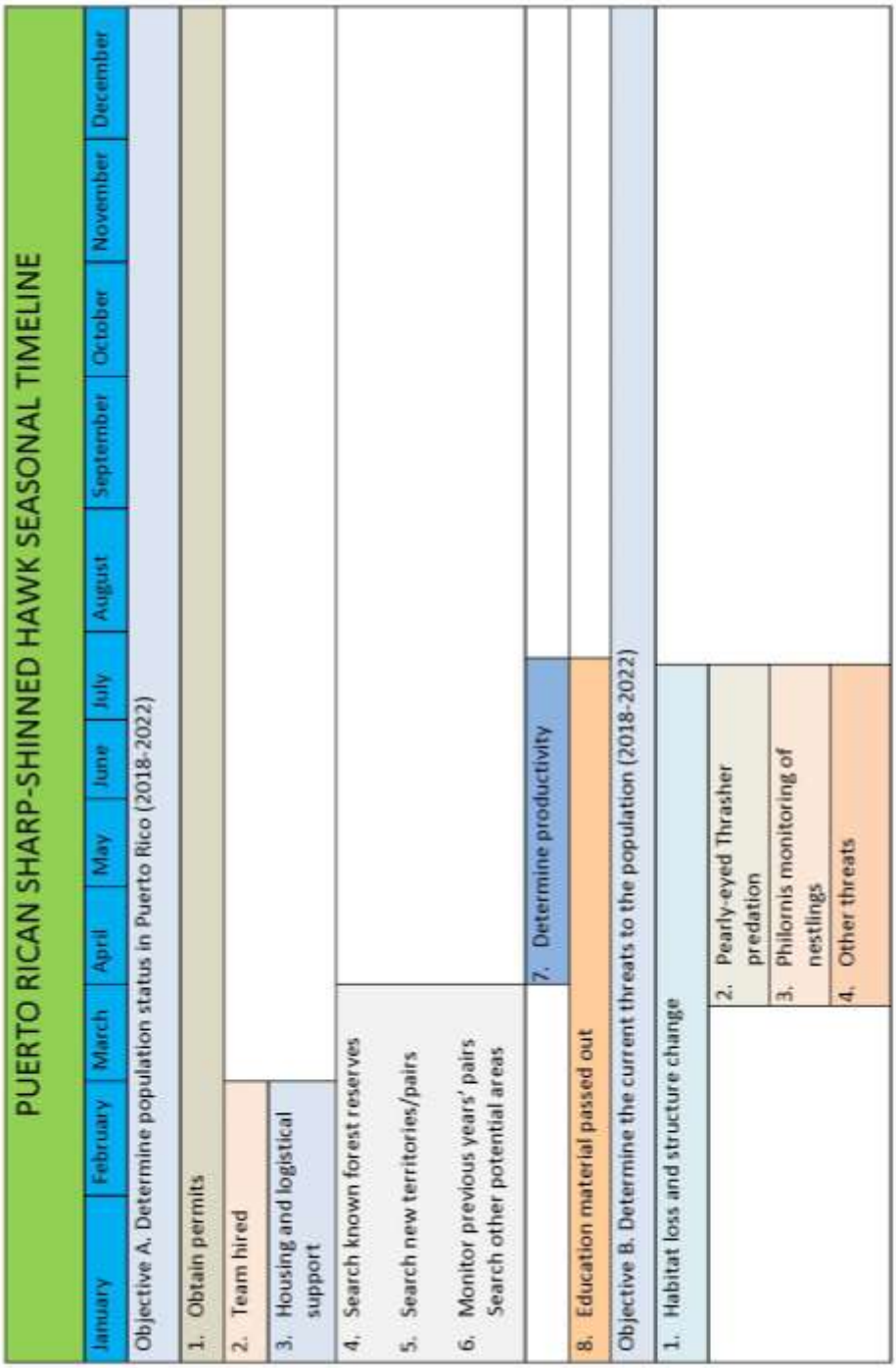
- Objective A determined by success obtaining annual and biannual permits; number of biologist, field supervisor and field assistants hired; logistical support secured; extent of

searches of known forest reserves and other montane forest areas and location of no or new territorial and nesting pairs identified; proportion of known nesting areas visited and monitored; ; proportion of sites visited to estimate productivity at a sample of known nesting pairs; and extent of prepared and distributed education material (flyers and leaflets).

- Objective B measurements of threats determined from surveys and searches to known forests for habitat loss and changes; predation by Pearly-eyed Thrashers documented by nest cameras; bot fly parasitism of nestlings monitored and treated from nest checks and weather and other factors determined from daily activity and observations.
- Objective C measurements determined by the number of: release site(s) selected, success securing permits for release activity, release box(es) built to meet release site objective, nesting pairs selected in Toro Negro for use of young to be collected, transported to release site, placed in release box, fed and monitored daily, and young released and radio tracked for survivability after release and for subsequent annual searches during the following breeding seasons to document locations of hawks and territorial pairs.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$63,300	$71,000	$72,700	$74,600	$76,400	$358,000


PUERTO RICAN SHARP-SHINNED HAWK SEASONAL TIMELINE
January
February
March
April
May
June
July
August
September
October
November
December
Objective A. Determine population status in Puerto Rico (2018-2022)
1. Obtain permits
2. Team hired
3. Housing and logistical support
4. Search known forest reserves
5. Search new territories/pairs
6. Monitor previous years' pairs
Search other potential areas
7. Determine productivity
8. Education material passed out
Objective B. Determine the current threats to the population (2018-2022)
1. Habitat loss and structure change
2. Pearly-eyed Thrasher predation
3. Philornis monitoring of nestlings
4. Other threats

January
February
March
April
May
June
July
August
September
October
November
December
Objective C. Establish population in El Yunque National Forest (2019-2022)
1. Select release site
2. Permits for release
3. Secure housing and support for releases
4. Build release box
5. Identify nesting pairs in Toro Negro
6. Obtain food for release
7. Release young
8. Monitor released young survival
9. Search for pairs from released young (2020-2022)

Cuban Kite Project

Personnel

Project Director:	Russell Thorstrom
Biologists:	Julio Gallardo, Nils Navarro, Ernesto Reyes, Alejandro de Humboldt
National Park personnel:	Gerardo Begué-Quiala and Norvis Hernández Hernándaz and their field staff

Project Background

The last reliable record of the Cuban Kite (*Chondrohierax wilsonii*) was in 2004 when a photograph was taken through binoculars by Ernesto Reyes ((SCZ) near Viento Frio, Guantanamo Province. The goal of project is to determine if the Cuban Kite is extinct or still survives in eastern Cuba.

In 2002, The Peregrine Fund provided $5,000 to Arturo Kirkconnell (Museo National de Historia Natural de Cuba (MNHNC) to collected information and conduct searches for Cuban Kites. Arturo was assisted by Nils Navarro and Carlos Solano (Holguin Province), two forest guards from reserve (Nando, knowledge of the Cuban Kite, and Andres), Orlando Garrido, William Suarez and Luis Diaz (MNHNC), Kike (supervisor for Ministerio de Ciencia, Tecnologia y Medio Ambiente San Anonio del Sur) and he and team made four expeditions to:

- San Rafeal, Yateras, Guantánamo (2/1-13/2002) - an area where the last report was in 1992, but Arturo and team had no observations or local reports of kites;
- San Antonio del Sur Jauco River mouth, Yumuri River, Los Llano, El Dimante, and areas surrounding Baracoa and western La Melba (3/1-12/2002), but they had no kite sightings or reports;
- Novaliches and Jaibo River mouth and south to Baracoa (8/18-30/2002) – they experienced lots of human-modified habitat in this area and observed lots of snails, but had no kite sightings or reports; and
- La Silla de Gibara and La Melba (10/16-28/2002) presumed the kite was present based on good habitat and snails present, but the lowlands were highly degraded. The La Melba area was the most promising for the Cuban Kite with evidence of *Polymita* spp. and *Polydonte*

sp. snails and they found several snails remains that appeared to be from Cuban Kite predation. Five local farmers gave good descriptions of Cuban Kites, with the most recent sighting 6 months ago, and their feeding behavior on snails in Royal Palms (Palma Justa) around a stream called "Arroyo Sucio" where two farmers claimed they have heard the vocalizations after listening to tapes played by Arturo and one farmer named Leyva described well the bill, wings and underpart colors of the kites, and claimed he knew of two nesting in May and June.

In April 2006, Arturo made a trip in for 8 days to the Yumuri River, Guantanamo and found good habitat and snails (*Polymita* and *Polydontes* spp.), with some snails shells suggesting predation by possible Cuban Kites, but no kites were observed.

In 2009, Nils Navarro and Ernesto Reyes published a photo with text on American Birding Association website, but the photo presented on the website as the Cuban Kite was actually a juvenile Gundlach's Hawk.

In May 2010, Arturo Kirkconnell and Gerardo Begué reported two flying birds as Cuban Kites in Humboldt National Park in an inform to BirdLife International, but when asked in July 2017 they weren't positive they were kites or not.

In 2016, The Peregrine Fund provided a small grant of $1,500 to Nils Navarro. Nils, Ernesto Reyes, Carlos Peña (Centro de Investigaciones y Servicios Ambientales y Tecnológicos de Holguín, CISAT Holguín) and Eladio Fernandez (DR) visited Miraflores Hill close to Los Indios and Cananova, about 17 km west of the town of Moa. They spent 9 days with local farmer Roberto Abalos and his family and were with guide Yoelvis Demar Marines "Goyo" who claimed to have seen Cuban Kites several times (he didn't mention when). Nils and team search this area but had no observations of Cuban Kites.

Need Statement

This project responds to The Peregrine Fund's strategic conservation outcome by first working to find, and then conserve, the critically endangered Cuban Kite (*Chondrohierax wilsonii*). The last certain sighting of the Cuban Kite was in 2004. While suitable habitat for the species still remains in the area, the kite has not been positively identified in well over a decade. An exhaustive search is now needed to assess whether the species is extant. Assuming it is found, then further study will be needed to assess population size, distribution and trend and what needs to be done to ensure its survival.

Goal

Our first goal is to determine the current status of the Cuban Kite in its last known range in eastern Cuba.

Objectives

- Involve a local partner(s) and secure research permit (2018-2022)
- Identify historic areas from previous sightings and reports in dry and wet forested habitat in Holguin and Guatanamo Provinces (2018)
- Establish a research/field team of TPF personnel and in-country biologists and trained field technicians from local partners (2018)
- Conduct searches and surveys for Cuban Kites in eastern Cuba (2018-2022)
- Education material (brochure, flyers, leaflets) passed out in priority areas by in-country partners, biologists and trained field technicians (2018-2022)

Activities

Search the dry and wet forests of Holguin and Guatanamo Provinces. Collaborate with local and national partners on priority areas to survey/search for Cuban Kites, obtain permits to visit and survey priority areas, train local personnel as field teams to conduct surveys/searches, identify logistical support for field teams

Partners involved

Local partnership with Alejandro de Humboldt National Park, Centro Oriental de Ecosistemas y Bioversidad (BIOECO) which is based in Santiago de Cuba and/or nationally with Museo National de Historia Natural de Cuba (National Museum of Natural History of Cuba)

Evaluation

Local and national partners on board and collaborating, securing permits and developing a conservation program focused on preserving this critically endangered species. Some forested habitat appears to be still present and intact and arboreal snails, main prey species, appear to still be present. Ultimate measurement is documenting the existence of the Cuban Kite.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$49,300	$52,900	$8,100	$8,100	$8,100	$126,500

CUBAN KITE TIMELINE				
2018	2019	2020	2021	2022
A. Involve local partners and secure research permit				
B. Identify historic areas from previous sightings/reports in wet and dry forests of Holguin and Guatanamo Provinces				
C. Establish research team of TPF personnel and in-country biologists and trained technicians				
D. Conduct searches and surveys in prioritized areas of Holguin and Guatanamo Provinces				
E. Pass out education material on status to locals				

Orange-breasted Falcon Conservation in Belize and Guatemala

Personnel

Program Director, Propagation Specialist:	Robert Berry
Field Study Coordinator–Climbing specialist:	Matthew Allshouse
Field Biologist:	Bryce Robinson
Molecular Biologist:	Jeff Johnson, Ph.D.
Program Advisor:	Scott Newbold

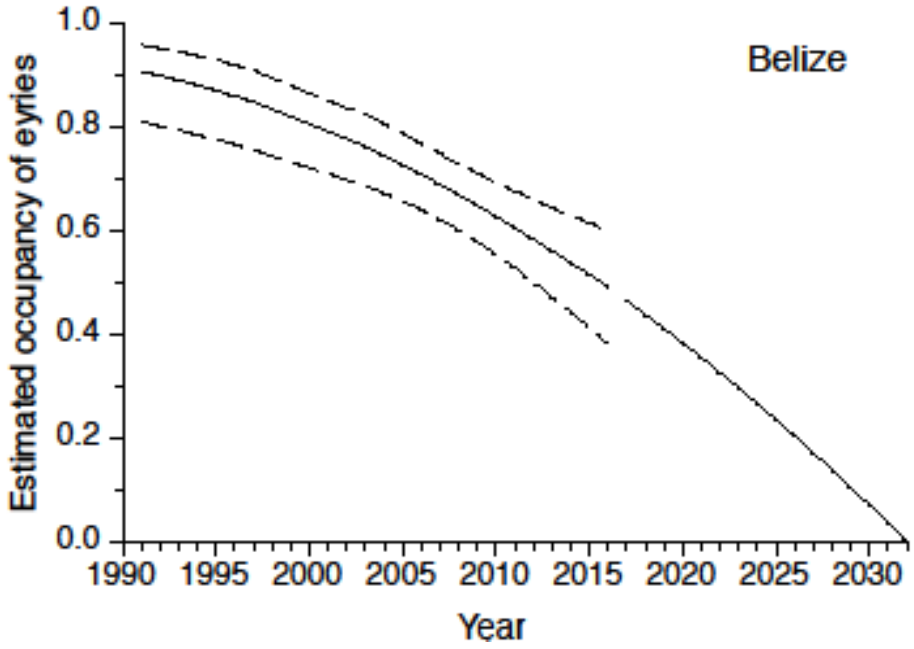
Background

Orange-breasted Falcons in Mesoamerica are known only in Guatemala, Belize, and extreme eastern Panama near the border with Colombia. The species is little known in South America but thought to be rare and widespread, although nearly extirpated in the highly developed Atlantic Forest region of Brazil (G. Dinz, pers. comm.) where the original type specimen was collected at Isla Sao Francisca, Santa Caterina, Brazil in 1825 with the note "nowhere numerous"(Friedmann, H. 1950). The species has probably always been rare because of its specialized selection of remote cliffs in large tracts of intact mature forest, but an analysis of historical records, ground and aerial surveys by The Peregrine Fund (Thorstrom et al. 2002), and records submitted to eBird confirm that the species' current distribution in Central America is limited to the Maya Mountains of Belize and the Mirador Cordillera in Guatemala, only 4% of its historical range. Ground and aerial surveys over the past four decades suggest that the northern population number fewer than thirty territorial pairs with a small number of juveniles and floating unmated adults despite large areas of apparently suitable habitat.

The Peregrine Fund first studied the Orange-breasted Falcon (OBF) in its northern range of Belize and Guatemala during 1992-97 (Baker et al. 2000). We resumed surveys in 2003 in Belize and in 2008 in Guatemala. In 2016, we conducted ground surveys at 21 of the 32 known historic OBF territories in Belize and Guatemala. Two prime nest sites were abandoned in 2016, 13 were occupied, but only three fledged young in Belize, and none in

Guatemala. The Mountain Pine Ridge in Belize and its close environs are the epicenter for the Central American OBF population. We surveyed 15 historic territories in 2016. Eight territories, including one based on an artificial nest box at the hack site, were occupied. Seven of Baker's 12 original territories discovered in the 1990s have been abandoned and none were reoccupied. If recent trends continue, the population in Belize could be extinct by 2032 (Fig. 1).

Figure 1. Occupancy trend of known Orange-breasted Falcon eyries in Belize, P = 0.0001.



Five OBF territories remain in Guatemala mainly located along the limestone cordillera that defines the southern border of El Mirador-Calakmul Cultural and Natural System. One territory is located within Tikal Park with nesting occurring atop of one of two Mayan temples. Productivity per breeding pair has been better than Belize but variable with only two young produced in 2014, increasing to seven in 2015, and none in 2016, blamed on direct human persecution and increasing disturbance from immigrant squatters, subsistence farming, and cattle grazing.

Mortality Rates and Survival Hazards: The Orange-breasted Falcon is thought to be normally long-lived with few adult predators, and with an extended period of parental care of juveniles that was thought to help compensate for low breeding productivity. Our evidence indicates that both first year and adult survival have declined significantly as human impacts have increased, putting the species' at risk of extirpation in Mesoamerica and anywhere else with similar conditions of growing human population.

Northern OBFs are non-migratory and sedentary which should limit their exposure to life-threatening perils associated with migration. We are currently analyzing data from 97 banded birds, 46 captive-bred and hacked birds, and 51 wild fledglings. Initial calculations suggest that annual mortality rate of juvenile (88%) and adult (58%) age-classes is more than double that of the migratory Peregrine Falcon. Life expectancy of adults at 2.57 years is very low compared to the Peregrine.

Once dispersed and independent of parental care, juveniles face the same life-threatening challenges of starvation, predation, and direct human persecution. All OBFs are relatively unafraid of humans and readily approachable. Increasing numbers of OBFs have been reported to eBird wintering in the lowland communities and cities of San Ignacio and Belmopan, presumably attracted by abundant feral pigeons, Eurasian collared doves and grackles. These cities are within 25 km of the Mountain Pine Ridge and OBFs are frequently seen flying or perched on TV antennas or communication towers. A banded juvenile was shot and found dead by a rancher outside San Ignacio, Belize on 12 December 2012. In June 2013, an adult female OBF was shot from a communication tower in the city of San Benito, Guatemala located about 50 km from Tikal Park and 100 km from Mountain Pine Ridge. We suspect many more fatalities are not reported.

Need Statement

This project responds to The Peregrine Fund's strategic conservation outcome to save an endangered species, protect areas of conservation value to raptors and potentially tackle a landscape-level threat affecting multiple species.

The Orange-breasted Falcon (*Falco deiroleucus*) is in steep decline in Mesoamerica with ecosystem-level implications (Berry et al. 2010). Occupancy modeling confirms a decline in the numbers of occupied nesting territories. We believe that the cumulative effect of habitat alteration and fragmentation, human persecution, as well as evidence of predation on fledglings by Black-and-white Hawk Eagles, and the impact of increasing numbers of predatory Black Vultures and bot fly (*Dermatobia hominis*) parasitism on nestlings, have contributed to the species' decline to the current small population size. Now, the effects of the small population with its diminished genetic variation, small range, limited specialized habitat, and low reproductive rate increase the species' extinction risk (Kruger and Radford 2008). Saving this isolated population is consistent with our strategic aim to conserve endangered species and address landscape level threats that affect multiple species. Our plan is to restore the isolated northern population by releasing captive bred birds to subsidize recruitment and increase genetic variance. To counter the effects of human pressure, we will engage the public in building pride and value in raptors generally and Orange-breasted Falcons in particular to help reduce persecution.

Goals and Objectives

Our goal is to ensure the conservation and restoration of the small and isolated population of the Orange-breasted Falcon in Belize and Guatemala by identifying and mitigating the most significant causes of decline, and reversing the species' declining population trend by augmenting the population with captive raised and released young. We also aim to understand the distribution and abundance of the Orange-breasted Falcon in its South American range using eBird records and ground-truth surveys to evaluate and update (as needed) the species' IUCN conservation status.

Objectives

(1) survey and monitor trends in occupancy and productivity in the northern population building upon data from 1992-97, and collected since 2003 in Belize and since 2008 in Guatemala,

(2) search for new territorial pairs in Mesoamerica,

(3) sustain a captive colony of OBF for breeding and release to restore the Belize population and to counteract population decline, and develop a plan for the future of this strategy considering the species has proven to be among the most difficult raptor species to breed,

(4) monitor known breeding pairs in Darien of Panama,

(5) partner with Cornell Lab of Ornithology's eBird to map and monitor populations throughout Latin America,

(6) analyze DNA collected from South America, Panama, Belize and Guatemala to measure relatedness and fitness (Audrey Martin, master's student at University of Wyoming),

(7) expand research into South America by using eBird reports to create a habitat suitability model, map potentially suitable habitat, and identify potential new OBF locations. Then use the map to decide whether and where field surveys are warranted,

(8) employ the OBF as a charismatic icon to promote raptor conservation and education in Central and South America.

Activities

- Improve captive breeding protocol (paper in planning) - a potential model for breeding and restoration of other raptor species where limited genetics is likely to limit numbers in the captive colony.
- Restore occupancy and productivity in Belize to historic levels by introducing unrelated genes to increase adaptive variation and fitness.
- Examine microsatellite data from blood samples collected from wild and captive OBF populations to determine connectivity and gene flow and explore how inbreeding might be impacting population dynamics.
- Complete a Population Viability Analysis.
- Continue restoration with captive bred unrelated progeny.
- Expand partnerships in South America.
- Support and expand local raptor education activities spearheaded by Belize Raptor Center. Distribute widely a high quality 30 x 40 inch "Please Help Save the Orange-breasted Falcon" poster throughout Belize (Spanish version in progress); how you the public can help and what we are doing to save the species.

Field Research

- Re-install trail camera at the hack site artificial nest box to record nesting behavior of new wild banded O 47 sub-adult female from Tikal Park.
- Monitor accessible OBF pairs in Belize, Guatemala, and Panama to confirm occupancy and productivity.
- Search for new OBF pairs/nests/winter range in Belize.

- Conduct helicopter surveys of remote eyries in the southern Maya mountains and southern Mirador Cordillera of Guatemala, last accomplished in 2009-10 to determine occupancy and estimate productivity.
- Band wild OBFs and survey for banded OBFs as a measure of species' survival.
- Banding wintering birds in cities could be tested as a strategy to estimate population size, and if continued year to year, it could give independent estimates of survival. Satellite tagging might lead to previously unknown nest sites.

Partners

George and Melina Headley, owners of Bull Run Overseas Ltd.

Trevor Roe and the Roe family, and the Hidden Valley Inn.

Dr. Wilbur Sabido, Chief Forest Officer, and Wildlife Program Manager, Edgar Correa, Belize Forest Department.

Dr. Miguel DePaz, Director, and Dr. Edward Tesecum of the Belize Agricultural Health Authority.

Cameron Boyd and Giovanni Fernandez, Black Rock Lodge.

Edson Flores and Julio Madrid of CONAP.

Javier Rivas, Professor at the School of Biology, Universidad de San Carlos de Guatemala.

Eduardo Iñigo-Elias, Senior Research Associate at the Cornell Lab of Ornithology.

Lopez family of La Cruce dos Aquados village, Petén.

Sarah Mann, Director Belize Raptor Center.

Wolf Creek Charitable Foundation.

Evaluation

Success will be measured:

- Signs of increasing population size in the Belize/Guatemala population such as improved productivity, occupancy, and survival.
- Completion of a plan to ensure the future of the captive breeding program.
- Completion and ground-truth of a range-wide GIS habitat model.

References

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Berry, R.B., W. Benkman, A. Muela, Y. Seminario, and M. Curti. 2010. Isolation and decline of a population of the Orange-breasted Falcon. Condor, Vol. 112, No. 3: 479-487.

Kruger, O., and A. N. Radford. 2008. Doomed to die? Predicting extinction risk in the true hawks Accipitridae. Animal Conservation 11: 83-59.

Thorstrom, R., R. Watson, A. Baker, S Ayers, and D. L. Anderson. 2002. Preliminary ground and aerial surveys of Orange-breasted Falcons in Central America. Journal of Raptor Research 36: 39-44.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$165,700	$166,000	$166,400	$166,800	$167,300	$832,200

Harpy Eagle Research and Conservation

Personnel

Project Director:	F. Hernán Vargas, Ph.D.
Project Advisor:	David Anderson, Ph.D.
Project Coordinator/Research Biologist:	José de J. Vargas González
Technicians:	Darisnel Carpio, Arilio Ismare, Indalecio Mecheche, David Bejerano, Nercio Flaco, Rutilio Calderón and Gabriel Minguisama
Volunteers:	Cristino Flaco, Bernardino Saline, Exciquio Cabezón, Raúl Salina, Eduardo Calderón, Indalecio Mecheche Jr., Carmen Pedroza and Roderick Alejandro Vargas González

Project Background

One of the most powerful eagles in the world - the Harpy Eagle - shares its habitat and prey with hundreds of indigenous communities in Central and South America. The biodiversity-rich forest habitat of the Harpy Eagle is being rapidly altered and destroyed by mostly non-native human actions including deforestation, forest fires, illegal hunting, road construction, and mining. Although the Harpy Eagle still maintains healthy populations in South America, its conservation status is not favorable in Central America where the populations in most countries are listed as Critically Endangered. The largest current population of Harpy Eagles in Central America occurs in the province of Darién, Republic of Panama, where the largest track of forest in Central America is located. In Darién, the Harpy Eagle coexists with Embera and Wounaan indigenous communities and, more recently, with invading *campesinos* of Hispanic origin and Afro-Antilleans. During past two decades, the forest continues to be destroyed in favor of pasture and cattle, by both invading *campesinos* and indigenous communities. Over the past 16 years, The Peregrine Fund has managed to develop trust with communities, empower them, and increase their understanding of the natural history and conservation of Harpy Eagles. This knowledge is important because the

long-life and slow reproduction of Harpy Eagles can create extreme sensitivity to even small changes in mortality due to human activity. Understanding the population's sensitivities and points of resilience is essential for effective management under habitat fragmentation and climate change. To date, these are the most important project discoveries and achievements:

- Located 39 territorial pairs and monitored breeding success.
- Annual nest occupancy was low (3%).
- Nesting density was estimate at 4-6 nests/100 km^2.
- Observed 76 breeding attempts and 48 young were produced.
- Landscape and microhabitat analysis indicate that Harpy Eagles prefer pristine mature forest for successful reproduction.
- Studied movements, dispersal and habitat use of eight dependent juvenile Harpy Eagles.
- GIS analysis show the relative importance of different areas of the Darien forest for Harpy Eagle Conservation.
- Diet of the Harpy Eagle included the following species in order of importance, from principal to minor: kinkajou, sloths, howler monkey, and opossum.
- Identified causes of mortality: 54.4% natural and 45.6% anthropogenic.
- The main cause of anthropogenic mortality was hunting, due either to fear of this species as a predator or for consumption by humans.
- Developed relationship with and empowered 10 Emberá and Wounaan communities.
- Participated in 20 national and international conferences and published 5 and 25 scientific and popular papers, respectively.

For the next five years, addressing The Peregrine Fund Strategic Plan Objective 1 (managing Critically Endangered species), our plan is to complete the most comprehensive population ecology study of the Harpy Eagle to date. We believe that this project can be replicated in other Neotropical countries where local human communities share biodiversity and ecosystem services with the Harpy Eagle.

Need Statement

Conservation — In the past decades human populations in Central and South America have expanded with consequent widespread deforestation, habitat fragmentation, and pressure on natural resources. The heightened rates of environmental degradation and natural resource exploitation have caused the disappearance of local populations of many species of wildlife, some of which are now endangered. As a top predator, the Harpy Eagle has a relatively low reproductive rate and its populations are rapidly reduced by human persecution. The recovery of decimated populations of long-lived raptors such as the Harpy eagle can take many years. To

be viable, Harpy Eagle populations need large areas of forest and the species is therefore sensitive to deforestation. It is endangered in Mesoamerica, and South American populations may become threatened or lost in the future as forest cover diminishes. Efforts to protect large pristine areas of Neotropical lowland forests will secure the persistence of only a few individuals. Large tracts of forest and proper connectivity are needed to secure the long-term conservation of the Harpy Eagle and other species of raptors.

The Harpy Eagle is a flagship species for the conservation of tropical forests, and efforts to study and conserve such a well-known and charismatic species could significantly increase local environmental motivation. The need to preserve large segments of forests for the conservation of Harpy Eagles will also represent a significant contribution to the protection of Neotropical lowland forests, among the most species-rich environments of the planet. The Harpy Eagle would therefore act as an umbrella species: by conserving it, we are conserving biodiversity.

Habitat Importance – The province of Darien in Panama supports one of the richest and largest forests of Central America made up of lowland coastal forest, moist tropical rain forest, and mountains in the Chocó-Darién ecoregion. This area also holds the largest known population of Harpy Eagles in Central America, an indicator of intact lowland forest. Darién province (1,189,650 ha) combined with the indigenous Comarca Emberá-Wounaan (438,360 ha) covers over 1.6 million ha (~4 million acres) of the Chocó-Darién ecoregion ranging from sea level to 2,280 meters in elevation. A combination of Emberá and Wounaan indigenous communities and Spanish-origin *colono-campesino* groups inhabit Darien and are influencing the ecosystem.

Science - Between 2000 and 2017 we investigated several aspects of Harpy Eagle population ecology including tolerance to human activity, survival rate, movement and dispersal, breeding behavior, feeding habits, and habitat requirements. Results of this research have helped us to identify the problems and threats that the species is facing in this region and have also provided the baseline data for the formulation of a new program based on practical conservation and community-based management: "Project: Darien Conservation Initiative". At present, we are still working on some hypotheses related to human tolerance, and movement and habitat use of independent juveniles and adults. Over the next five years, our efforts will focus on: 1) synthesizing data to formally answer the hypotheses we set out in the first phase of the project, and 2) answering new research hypothesis to fully understand the population ecology of the Harpy Eagle under different levels of human disturbance. By increasing knowledge, we will specifically influence long-term conservation efforts of Harpy Eagles in Panama increasing the potential for replication elsewhere.

Goals and Objectives

Goal

- Conserve Harpy Eagles and associated habitat through basic research aimed at testing scientific hypotheses about population ecology in an environment increasingly influenced by human activities.

Objectives

- Estimate size and structure of the Harpy Eagle population.
- Evaluate disturbance of mining activity on the reproduction of the Harpy Eagle.
- Evaluate habitat use and movement of independent juvenile and adult Harpy Eagles.
- Estimate diet composition and prey abundance in Harpy Eagle territories with different levels of human disturbance (i.e., deforestation).
- Measure the effect of human disturbance on the breeding habitat of the Harpy Eagle.
- Publish results on movement and dispersal of wild juveniles and on other long-term monitoring data while continuing to collect new information on the species.
- Coordinate project activities with different institutions operating in Darien.
- Conduct an environmental education program to increase knowledge and empowerment of the local people on the importance of the conservation of the Harpy Eagle, its habitat and associated biodiversity.

Activities

2018-2020

- Survey and monitor nest occupancy and breeding productivity *(Ob. 1).*
- Monitor Harpy Eagle nest at Minera Panama site *(Ob. 2).*
- Tag with PTT-transmitters four independent juveniles and four adults *(Ob. 3).*
- Conduct surveys of prey abundance and diversity at active breeding territories with different levels of human disturbance (considering size of the human community and habitat fragmentation) and correlate these parameters with frequency of prey delivered by adults to nests during the same period *(Ob. 4)*.
- Collect data on breeding behavior in two Harpy Eagle nests located in suboptimal habitat for comparison with optimal habitat to detect the effect of disturbance *(Ob. 5).*
- Collect microhabitat data in three unused and three used Harpy Eagle nests to identify patterns that predict the level of tolerance of human disturbances of the species *(Ob. 5).*

- Measure the fragmentation of the breeding habitat using GIS tools *(Obj. 5).*
- Analyze complete project data set and organize logical sequence for publication *(Ob. 6).*
- Submit and publish one scientific paper *(Obj. 6).*
- Submit one progress report and deliver one presentation to MiAMBIENTE *(Ob. 7).*
- Submit four progress reports to Minera Panama and deliver one presentation *(Ob. 7).*
- Submit a progress report and deliver a presentation to the local communities *(Ob. 7).*
- Conduct environmental activities in selected communities *(Ob. 8).*
- Participate and develop Harpy Eagle festivals in Panama City and Darien *(Ob. 8).*
- Conduct a round-table workshop for different institutions (local NGO and government agencies) to discuss Harpy Eagle problems and solution in Darien *(Ob. 8).*
- Publish a biannual bulletin *(Ob. 8).*

2021-2022

- Survey and monitor nest occupancy and breeding productivity *(Ob. 1).*
- Monitor Harpy Eagle nest at Minera Panama site *(Ob. 2).*
- Monitor with PTT-transmitters two independent juveniles and two adult Harpy Eagles *(Ob. 3).*
- Analyze historical data collected to organize a logical sequence for publications *(Ob. 5).*
- Submit and publish one scientific paper *(Obj. 5).*
- Submit one progress report and deliver one presentation to MiAMBIENTE *(Ob. 6).*
- Submit four progress reports to Minera Panama and deliver presentation *(Ob. 6).*
- Submit a progress report and deliver a presentation to the local communities *(Ob. 6).*
- Conduct environmental activities in selected communities *(Ob. 7).*
- Participate and develop Harpy Eagle festivals in Panama City and Darien *(Ob. 7).*
- Conduct a round-table workshop for different institutions (local NGO and government agencies) to discuss Harpy Eagle problems and solution in Darien *(Ob. 7).*
- Publish a biannual bulletin *(Ob. 7).*

Partners involved

- Ministry of the Environment of Panama (MiAMBIENTE): *Logistic and permit support.*
- Sociedad Mastozoológica de Panamá (SOMASPA): *Science advice and logistic support.*
- Universidad Autónoma de Chiriquí (UNACHI): *Students and volunteers for the project.*

- Universidad de Panamá (UP): *Student and volunteers for the project.*
- Ministry of Education (MEDUCA): *Educational advice.*
- Local Embera and Wounaan Communities: *Logistics, permit and field support.*
- Local Embera and Wounaan Organizations: *Logistics, permit and field support.*
- Environmental Leadership & Training Initiative (ELTI): *Scientific advice.*
- Minera Panamá S.A.: *Financial support.*

Evaluation

Success of the Harpy Eagle Conservation and Research Project will be evaluated based on:

1. Fifty-four Harpy Eagle nests in 39 territories monitored to answer questions about the breeding cycle and population ecology, and evaluate the success of our conservation actions.
2. Breeding success at Minera Panama site evaluated, and recommendations for nest management implemented at the mine and published in a scientific journal.
3. Eight Harpy Eagles tagged with satellite transmitters; data analyzed and published on home range size and habitat selection.
4. Diet composition and prey abundance in active Harpy Eagle territories with different levels of disturbance estimated to evaluate if prey available could be a limiting factor affecting breeding success.
5. Factors that limit the Harpy Eagle population size (e.g., reduction in abundance of prey species, habitat loss, habitat fragmentation, anthropogenic mortality, breeding success, tourism activity, distances to communities, agriculture area and road, or a combination of them) identified and proportionally quantified.
6. Six scientific papers published that improve our ability to manage the species, its habitat, and interaction with humans.
7. Improved knowledge of the species shared with partners through technical reports and oral presentations.
8. Thirty environmental campaign events in 10 local communities conducted annually.
9. Information delivered to over 2,500 people that annually participate in two Harpy Eagle Festivals: one in Darien and one in Panama City.
10. 80% of the agencies or institutions that work in Darien understand our initiative and become partners.
11. Publication and distribution of biannual program bulletin.

12. Three popular publications are published annually as a means to build enthusiasm and appreciation for the species.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$219,200	$198,100	$190,200	$61,500	$62,000	$731,000

Darien Landscape Conservation Initiative

Personnel

Panama Director:	José de Jesus Vargas González
Neotropical Science:	F. Hernan Vargas, Ph.D.
Project Executive:	David L. Anderson, Ph.D.
Director of Global Conservation Science:	Chris McClure, Ph.D.
GIS specialist:	TBD

Project Background

The Chocó-Darién ecoregion of Panama is home to one of the world's most diverse assemblages of lowland plants (>8,000 species) and animals, with exceptional richness, uniqueness, and endemism in plants, birds, reptiles, amphibians, and butterflies. It has been identified as a global priority biodiversity hotspot by Conservation International. Darien province supports one of the richest and largest intact forests of Central America, comprised of lowland coastal forest, moist tropical rain forest, and mountains in the Chocó-Darién ecoregion. This area also holds 68 raptor species and the largest known population of Harpy Eagles in Central America, an indicator of intact lowland forest. Darien province (1,189,650 ha) and the indigenous Comarca Emberá-Wounaan (438,360 ha) together cover over 1.6 million ha (~4 million acres), ranging from sea level to 2,280 meters in elevation. Darien is also home to Spanish-origin *colono-campesinos*, afroantillian groups, and indigenous communities (Emberá, Wounaan) which, because of population growth, local migration, chaotic community development, and an increasing demand for economic resources, currently pose a growing threat to biodiversity.

Despite its global importance as a refuge for biodiversity, the Darien ecoregion is facing an array of threats. Changing land values and recent access by expansion of the Pan American Highway are fueling a *colono-*

campesino land invasion, agricultural encroachment, and uncontrolled cattle ranching. These activities drive increased extraction of bush meat and incidence of anthropogenic forest fires. At the same time, indigenous communities are increasingly entering the 21st century cash economy and replacing sustainable cultural traditions with non-sustainable agricultural practices like forest clearing for cattle ranching. The Panamanian government has not established a clear strategy for the management of Darien, as there is disagreement among ministries over whether Darien should be developed or maintained in its natural state.

The drivers of these threats are complex. First, the lack of concrete management plans and inadequate legislation allows or even fosters forest destruction. Uncertain governmental authority or presence creates a vacuum in a region with low human population density; poor Panamanians then flood to this region in search of economic opportunities, while land speculation fuels a land grab by wealthy Panamanians. Second, a widespread cultural tradition in Latin America is to undervalue forests and view them as an impediment to economic gain. In a developing country like Panama where poor people struggle to survive, forest clearing and resource exploitation is one the shortest and quickest routes to personal gain. Alternative economic models that take a long view and preserve forest cover while fostering community wellbeing are lacking. Finally, there are insufficient technical and financial resources to change perceptions in favor of forest protection, and to develop, promote, and sustain alternative economic models.

Since 2000, The Peregrine Fund has conducted research and monitoring of the Harpy Eagle (*Harpia harpyja*) population in Darien with direct participation of local communities, who help find breeding pairs and annually monitor their breeding success. Over the past 16 years, The Peregrine Fund has:

- Built a deep trusting relationship with local communities through direct participation in project activities and signing/renewal of cooperation agreements.
- Empowered local communities to feel that their future wellbeing is in their hands, given sufficient support from their collaborators.
- Increased our knowledge of the natural history of predator-prey relationships, population biology of Harpy Eagles, and the limiting factors on Harpy Eagle populations in the wild.
- Included twenty-five Emberá and Wounaan Technicians on the project, providing great insight into Harpy Eagle biology and financial incentives for raptor conservation.
- Participated in 20 national and international congresses and published five scientific and 25 popular papers, respectively.

In 2017, we submitted a proposal to the US Fish and Wildlife Service for a two-year pilot project that emphasizes community-based conservation initiatives modeled on our very successful Madagascar Community-Based Conservation Project. This pilot project, if funded, is the basis and the opening for The Peregrine Fund's Darien Conservation Initiative.

Needs Statement

This plan addresses The Peregrine Fund's strategic conservation outcome to identify and prioritize landscapes of global conservation value to raptors, and initiate protection in the first of the top five sites.

The drivers of deforestation and economic upheaval in Darien are complex, and the level of threat to biodiversity in the region is severe. The enactment of lasting and sustainable conservation measures is needed for the benefit of Harpy Eagles and other raptors, local communities, and forest biodiversity at large. Given the complexity of the environmental situation, enacting durable conservation measures will require novel approaches that:

- Provide economic alternatives to deforestation by creating a productive landscape that preserves forest cover and associated biodiversity;
- Empower local communities to act as land stewards;
- Produce a cultural shift in Panama that favors the appreciation of nature over its destruction;
- Recruit diverse partners at all levels and across international boundaries: governmental agencies and ministries, philanthropic and non-governmental organizations, for-profit enterprises, local communities.

We will use our successful community-based conservation model from Madagascar as the basis for achieving sustainable conservation in Darien.

Goals and Objectives

Goal

Restore and conserve the forest in Darien by engaging local communities, government agencies and national and international organizations in sustainable economic and environmental actions.

Objective 1: Launch proposed pilot project for community-based conservation.

The Peregrine Fund has submitted a proposal to the US Fish and Wildlife Service for community-based conservation in Darien that has the primary four objectives listed under this plan's Needs Statement, above. The pilot project is directed at 12 families in two indigenous

communities, Cemaco and La Marea. By launching the pilot project, we will test our proof of concept in community-based conservation, establish legitimacy in the international conservation community, and gain momentum for a larger project. If successful, the program will be funded for two years by USFWS. The pilot project will be directed by Jose Vargas of The Peregrine Fund, based on his 16 years of experience working with local Darien communities and the deep trust he has built with local Emberá and Wounaan people.

Objective 2: Formulate Darien´s sustainable development plan with a unified conservation and economic strategy ratified and implemented by Panamanian ministries.

Formulate a sustainable development Plan for Darien with economic and conservation strategies to be ratified by the Panamanian government. Having no consensual development plan, there is currently disagreement among Panamanian ministries whether Darien should be protected or developed. Without a legal basis Darien remains unprotected, and as such there is massive speculation in land values resulting in a land grab and a push to deforest the landscape. We have a good working relationship with the Ministry of the Environment in Panama through which we can access other governmental ministries to achieve our stated objectives

Objective 3: Develop community-based conservation initiatives tailored to diverse human populations throughout Darien and directed at creating a productive landscape of alternative economic lifestyles.

The proposal submitted to USFWS is directed at two indigenous communities out of ~ 150 communities of diverse ethnic and cultural backgrounds that differ in duration of existence in Darien and in their views on natural resource conservation. The pilot project serves as a test of effectiveness of our proposed measures at small scale, from which we can learn and refine our program to larger scale. Lessons learned used to develop community-based conservation initiatives that will be effective in other communities with differing needs and histories, because no singular plan will work for all communities. The end objective of such initiatives must be to provide viable economic alternatives to forest clearing and wildlife exploitation.

Objective 4: Develop a robust funding strategy and recruit diverse partners.

The major conservation vision we propose will require many partners who can share expertise in diverse fields. Together we can pursue major funding sources from national and international origins. Writing and delivering this strategy will need to be both intensive in effort and comprehensive in scope. Conservation of the Maya Biosphere Reserve in Guatemala has been accomplished by a rich consortium of national and international organizations, a few of which include: The Nature Conservancy, Rainforest Alliance, Defensores de la Naturaleza, el

Consejo Nacional de Áreas Protegidas de Guatemala, the Forest Stewardship Council, and others. This model can be replicated in Darien.

Objective 5: Promote natural resource conservation as a vehicle for economic benefit.

The cultural and socioeconomic landscape of Darien is complex and there is no one cultural viewpoint on natural resource conservation. Indigenous communities generally value forest preservation, but without economic alternatives are clearing the landscape. Although in the minority in Darien they are gatekeepers to vast amounts of forest. *Colono-campesinos* live in poverty and see forest clearing as a path to economic wellbeing. Wealthy Panamanians speculate in land values; they purchase and deforest land for financial gain. This complex situation requires multiple approaches, including changes in law (Objective 2), offering economic alternatives to deforestation (Objective 3), economic incentives for forest protection (Objective 6) and promoting a cultural shift toward an appreciation of natural resources as a source of wellbeing in their own right (Objective 5). Many examples exist in Latin America and the Caribbean where nature conservation provides direct and indirect economic benefits to society. Costa Rica is a prime example of a country where people at all levels of society value and understand the economic benefits of nature conservation. The slogan "Pura vida!" is used sincerely everywhere and is a source of cultural pride. The cultural norm in Costa Rica of valuing nature comes has been ingrained in part from financial benefits derived from nature. The successful implementation of alternative, sustainable economic models will be the strongest tool to help shift national attitudes toward nature appreciation and conservation. Some alternative economic models that we have begun to consider include: reforestation of cattle pastures with shade-based agricultural systems (e.g., coffee and cacao); small-scale animal husbandry to replace bushmeat extraction; reforestation of cattle pastures with native trees for future timber extraction; improving current agricultural systems to be more productive and sustainable; creation of national and international markets for locally produced artwork (baskets, jewelry, and others; creation of small farmer associations to sell agricultural products in Panamanian cities; economic incentives for forest preservation as a carbon banks. Other alternative livelihoods will be developed as the program progresses. At the same time, a major public outreach campaign will be needed to shift cultural norms in favor of new, economical alternatives, and conservation in its own right.

Objective 6: Catalyze changes to legislation, land use norms, and management categories of protected areas to improve the conservation status of Darien. Focus on creating incentives for conservation and elevating the status of environmentally-friendly policies and banking practices for natural areas.

The areas that are important for conservation of the Harpy Eagle, jaguar, tapir, peccary, and many flora and fauna species are found in protected or natural areas with management plans that allow or even encourage extractive forest practices, including deforestation. Further, federal politics must orient in favor of incentives to support conservation, and banking entities should be encouraged to support land management practices that preserve natural areas.

Objective 7: Develop partnerships to obtain financial backing and promote the protection of Darien as a carbon reserve to mitigate effects of global climate change.

Darien contains the largest tract of intact forests remaining in Central America and thus act as an important global carbon sink. We will develop partnerships with national (Ministry of Environment) and international conservation organizations addressing climate change (Red+, Green Climate Fund, CAF Development Bank of Latin America) to leverage additional funding and technical support for the conservation of Darien forests.

Activities

2018

- The pilot program will commence in two local communities:
    - 2018–2019: Begin a program of reforestation with native trees and shade-grown coffee plantations as a replicable model of economic incentives from conservation.
    - 2018–2019: Provide funding, feed, and technical advice for raising domestic and other animals as an alternative source of protein and income.
    - 2018–2019: Provide training in administration and management to community partners involved in the pilot project as a means to develop local capacity for conservation action.
    - 2018–2019: Create a grant incentive program to educate youth from families participating in the reforestation initiative.
    - Create two local community associations and one national NGO to execute the Darien Initiative.
- Work with a consultant to identify regional, national, and international stakeholders and funding channels for community-based conservation strategies in Darien.

- Begin a public relation campaign with regular radio broadcasts and community-based strategies to increase the appreciation of natural resources and their benefits to humans.
- Recruit core partners to develop Darien-wide conservation initiatives and a comprehensive funding strategy.
- Provide technical assistance and lobby the Panamanian government to write and ratify a unified conservation and economic strategy for Darien.
- Develop partnerships with selected stakeholders and plan next step actions towards long-term goal.

2019

- Based on the first year's activities, successes, and lessons:
    - Begin recruiting major funding and technical partners for the Darien Initiative.
    - In collaboration with these partners, develop an intensive and comprehensive strategy for a productive landscape that features viable economic alternatives to deforestation and economies that are naturally unsustainable.
- 2019–2022: In collaboration with partners, begin designing and implementing a national campaign that will ultimately shift attitudes in favor of nature conservation.

2020

- 2020–2022: Expand the pilot project to 5–10 new native and *campesino* communities annually, improving the model and adding new or improved economic alternatives with each year.
- Work with partners and the Panamanian government on delineation of use and protected zones in Darien that permit the development of a productive landscape while preserving forest cover for biodiversity and alternative economic lifestyles.
- Dedicate full force to acquiring funding and support to spread the community-based conservation initiative across Darien.

2021

- 2020–2022: Perform annual audits in collaboration with key partners on successes and needed improvements of the Darien Initiative.
- Publicize the successes of the Darien Initiative as a way to further national support and acceptance of the program, and to garner further international support.

2022

- Use ongoing efforts to refine and spread Darien Initiative model across Darien, Panama, and elsewhere in Latin America.

Partners Involved

- US Fish and Wildlife Service
- Ministry of the Environment (MiAMBIENTE)
- Ministry of Education (MEDUCA)
- Local Emberá and Wounaan communities and community organizations
- Native communities of Cemaco and La Marea, Darien
- Universidad Autónoma de Chiriquí (UNACHI)
- University of Panama
- Minera Panamá S.A.
- Mark Johnstad
- Rainforest Foundation, USA
- Additional partners to be added annually as directed by the evolution of the Darien Initiative.

Evaluation

Success of the Darien Initiative will be evaluated on the basis of:

- Ratification by the Panamanian government of a unified sustainable plan with a clear conservation strategy for Darien.
- Number of laws, norms, and management categories changed to improve the viability of long-term, community-based conservation in Darien.
- Number of hectares of land reforested with native trees and shade-tree plantations (e.g., coffee, cacao).
- Number of native and non-native families and communities enrolled in alternative economic programs.
- Net reduction in deforestation rate after first five years.
- Net reduction in bush meat extraction.
- Net increase in the conservation-compatible economy measured in $US.
- Measureable and significant cultural shift in Darien and Panama toward nature appreciation as an important path that improves the quality of living for Panamanians.
- Stability of the Harpy Eagle population, with a net decrease in mortality from human persecution, and no net loss of breeding territories.

- Official recognition of Darien as a carbon reserve of global importance awarded to the Panamanian government.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$133,100	$114,700	$178,800	$304,000	$332,100	$1,062,700

Saving Africa's Vultures from the Scourge of Poisoning

Personnel

Assistant Director Africa Program:	Darcy Ogada, Ph.D.
Vice President of Global Conservation Strategy:	Munir Virani, Ph.D.
Field Biologist	Martin Odino

Project Background

Vultures are arguably nature's most important scavengers, yet they are currently among the most threatened group of birds worldwide. The situation in Africa is particularly dire. In just three generations, the populations of seven species of African vulture collectively declined by at least 80%, and in 2015 four species were up listed to critically endangered and three species to endangered status (Table 1). In East Africa, half of the eight species are now critically endangered. Even in relatively pristine areas in northern Kenya, vulture populations declined by 70% in just three years. In the Masai Mara National Reserve, a world-renowned wildlife destination, vulture populations have halved since the 1970s.

Over the past decade, reports of vulture poisonings in East Africa widely confirm that poisoning events have arisen from conflict between livestock farmers/pastoralists and terrestrial carnivores (mainly lions, leoaprds and hyeanas). Communities living in and around the vicinity of wildlife-rich areas are not compensated for livestock losses from predator attacks and thus have a low tolerance for them. Poisoning is one of the most common and effective methods. Vultures are often inadvertent victims when farmers bait carcasses with poisons to kill lions and hyenas that have attacked their livestock. Poisoning in areas adjacent to the Masai Mara National Reserve has resulted in a 25% annual vulture mortality rate, a virtual death sentence for such a long-lived and slowly reproducing bird. And due to the gregarious foraging of vultures, substantial fatalities often occurs when even a single carcass is baited with poison.

Table 1. The current conservation status of vultures in Africa along with their IUCN conservation status

Vulture Species	IUCN Status
White-backed Vulture *Gyps africanus*	Critically endangered
Rüppell's Vulture *Gyps ruppellii*	Critically endangered
White-headed Vulture *Trigonoceps occipitalis*	Critically endangered
Hooded Vulture *Necrosyrtes monachus*	Critically endangered
Lappet-faced Vulture *Torgos tracheliotus*	Endangered
Egyptian Vulture *Neophron percopterus*	Endangered
Cape Vulture *Gyps coprotheres*	Endangered
Bearded Vulture *Gypaetus barbatus*	Near-threatened
Black Vulture *Aegypius monachus*	Least concern
Palm-nut Vulture *Gypohierax angolensis*	Least concern

Tackling the landscape-level threat of vulture poisoning and increasing populations in Kenya is a target of The Peregrine Fund's Five-year Strategic Plan for Africa. Our long-term goal is to scale up efforts in Kenya to the wider East African region.

The Peregrine Fund's Africa Program focusing on vultures began in 2001 primarily in response to the Asian Vulture Crisis. Field studies commenced in the Masai Mara in 2003 and subsequently expanded to northern Kenya (Laikipia, Samburu, Meru and Marsabit counties) in 2013. Activities in the Mara have included conducting year-to-year road surveys to record relative abundance of vultures as well as numbers of occupied nests as a means to establish population trends, GPS-GSM telemetry to determine critical foraging and breeding areas with a view to identifying where poisoning hotspots occur, investing in training future conservation leaders from within the Maasai community to achieve conservation impact and a community outreach program to increase awareness about the need to conserve vultures for their role in providing vital ecosystem services. In addition, the Mara Vulture Project also conducted a pilot study to establish whether "predator entry deterrents" such as solar powered flashing lights deployed around livestock corrals (bomas) were effective in preventing livestock depradation. Our studies confirmed that:

- Wildlife poisoning was rampant in the Masai Mara, across Kenya and beyond its borders and that vultures comprised the vast majority of victims.
- As a result of the ubiquitous poisoning, vulture populations declined by more than 60% across the Masai Mara as well as East Africa.
- Because vultures travel vast distances beyond political boundaries, the challenges for vulture conservation were complex and required "out of the box" thinking and a

combined, integrated and community engaging approach in collaboration with other conservation organizations working on human-wildlife conflicts such as Lion Projects for example the Mara Predator Project.

- If we were to achieve our conservation goal, then there was an urgent need to build conservation alliances with other conservation organizations as well as further engage with government authorities and develop and enhance local capacity via conservation leaders for effective community participation and commitment.

Our work on vultures in Kenya has shown that the main driver of wildlife poisoning in Kenya is in response to "perceived injustice" i.e. an individual from a pastoral community or livestock farmer loses his cow to a lion, is not compensated and therefore feels a "perceived injustice" and subsequently takes the law into his own hands by lacing his or her dead cow with a lethal poison. However there may be other drivers of wildlife poisoning that we know very little about and therefore a critical first step is to establish the evidence base for why people poison and what it will take to stop them. In addition to perceived injustices, we list below four other potential drivers of wildlife poisoning:

- ***Perceived Injustices:*** this could be revenge for a cow lost to a predator, or a development company not living up to its word after promising a development project (e.g. wind farm) with associated financial benefits; or a hate crime or act for not being part of an economic incentive for example those who financially benefit from leasing land for conservancies and those that have not. The argument being “Why should so-and-so get financial benefits for having land on a conservancy and my family doesn't?”
- ***To meet basic needs (subsistence)****:* Martin Odino’s study in Bunyala Rice Scheme showed that people deliberately poison to meet their basic hunger needs. We don't know the extent of this across the country and/or in the Mara where people deliberately poison water drinking holes for poaching animals for bushmeat.
- ***To generate income above and beyond basic needs (commercial)***: Over the last decade, and concomitant with the decline in vulture populations, East Africa has experienced a surge of Chinese immigrants and workers some of whom have an insatiable appetite for animal products, thus driving demand. Bushmeat hunting and poaching elephant for ivory are additional incentives to increase income and are easily done via poisoning.
- ***To maintain cultural traditions*****:** In early 2017, nearly 100 decapitated vultures were found in Maswa, Tanzania, across the border from the Masai Mara, and there have been reports for a demand for vulture body parts for the witchcraft market in southern Tanzania. We don't know the extent of whether this "muthi" belief has crept up into Kenya - it is certainly pervasive with the trade in owl eggs. People poison to get animal skins, claws, vulture feathers (for arrows and head gear), warthog and hippo tusks etc.

- ***In response to political influence***: Knowing the extent to which local people want or need access to protected resources, politicians promise access in an attempt to gain popularity and votes (Kenya is facing an election year in August 2017) leading to encroachment and incursion in protected areas where poisoning of predators is an easy way to protect your livestock. This is happening in Laikipia (Northern Kenya) currently.

A critical first step to tackle the drivers of poisoning will be to document the evidence base of what the specific drivers of poisoning are for different areas in Kenya and in East Africa. This will need to be done in combination with scientifcally sound research on vultures, local capacity development, conservation education and outreach, partnerships with other NGOs and influencing policy and government at local levels. In early 2017, The Peregrine Fund developed a partnership with Birdlife International, Nature Kenya and the Kenya Wildlife Trust (Mara Lion and Mara Cheetah Projects) to work in the Greater Masai Mara Ecosystem. This combined approach recognized that each organization posseses different skill sets to tackle wildlife poisoning and included five key components:

1. Establish the structure, local capacity and funding required for an effective rapid response strategy to wildlife poisoning incidents in Kenya.
2. Engage with local communities in and around Masai Mara and other high risk areas to understand and combat the threat of poisoning.
3. Measure the impact of rapid response strategies in Kenya by evaluating annual mortality rates of vultures.
4. Influence policy changes at government, NGO and local level on wildlife poisoning that would include developing and implementing a set of protocols to ensure effective law enforcement and prosecution.
5. Compile and share the lessons learned from rapid response actions as well as social surveys to derive a spatial map of high risk poison use areas, understand community attitudes on poisoning to and from other African countries. For example, we will conduct a study to model the relationship between poison use and environmental (e.g. density of predators in the area, density of game species in the area, relative abundance of vultures in the area) as well as social (e.g. type of livestock farmed, wealth of farmer, size of the farm) variables, in order to further our understanding regarding the use of poison. This will enable us to focus targeted interventions in those high risk areas ensuring effective use of resources and personnel.

In northern Kenya our work has focused on research, training and awareness activities. These have included:

- GPS tracking 15 individual vultures comprising three species in order to identify critical foraging habitat and where this overlaps with poisoning hotspots, to identify breeding cliffs of Rüppell's Vultures, and to assess annual rates of mortality
- Conducting anti-poisoning trainings with rangers throughout the region. To date we have conducted six trainings that have trained 112 rangers from 11 organisations.
- Held one International Vulture Awareness Day in the region and visited two local schools in order to increase awareness about vultures and poisoning.
- Conducted annual road surveys since 2011 and conducted one two-week road survey of the far northern reaches of Kenya where no raptor work has ever been done.

Need Statement

This project responds to The Peregrine Fund's strategic conservation outcome by tackling landscape-level threat affecting multiple species and save critically endangered species.

Vultures are without a doubt one of the most highly threatened group of vertebrates on earth. There are several inherent ecological traits that likely contribute to vultures' extinction risk, including their large body masses, slow reproductive rates and scavenging diets. The greatest external threat to vultures, however, is poisoning – lead in California Condors, pesticides in African Vultures and non-steroidal anti-inflammatory drugs in Asian Vultures.

Our planet has entered an era of mass extinction unparalleled since the dinosaurs died out 65 million years ago. According to a 2015 study co-authored by Paul Ehrlich and colleagues, this specter of extinction hangs over about 41% of all amphibian species and 26% of all mammals, according to the International Union for Conservation of Nature (IUCN). This global disaster scene has the fingerprints of habitat loss, overexploitation, invasive organisms, pollution, poisoning and climate change. This study highlighted that 56% of the species in Africa have lost 80% of their historical range. Why does the loss of populations and biological diversity matter? Aside from being a prelude to species extinction, the losses rob us of crucial ecosystem services such as honeybees' crop pollination, pest control and wetlands' water purification. We also lose intricate ecological networks involving animals, plants and microorganisms – leading to less resilient ecosystems and pools of genetic information that may prove vital to species' survival in a rapidly changing global environment. The overall scope of population losses makes clear that we cannot wait to address biodiversity damage. The authors of the study have called for curbs on the basic drivers of extinction – human overpopulation and overconsumption – and challenge society to move away from "the fiction that perpetual growth can occur on a finite planet." The Peregrine Fund and partners will take on this challenge to curb the rampant poisoning affecting Africa's vultures to prevent their extinction across the planet while inspiring people to value them and take positive action to ensure their survival.

The Peregrine Fund's work along with our partners over the last decade has unequivocally shown that vultures in Africa are rapidly declining. Poisoning is rampant across Africa and due to its indiscriminate nature, vultures and many other species of raptors and scavengers are being extirpated. Without urgent intervention, Africa's threatened vultures face imminent extinction. The time for action is now! Vultures play a vital role in Africa's savannah landscapes by rapidly consuming carcasses, which could otherwise spread pathogenic organisms via feral dogs and other mammalian scavengers. Loss of vultures results in a loss in effective nutrient cycling, causing ecosystem imbalance. Already in places like the Mara North Conservancy, numbers of feral dogs have increased heightening the threat of a rabies outbreak. Furthermore, the growth of the wind energy industry in Africa further threatens an already declining population.

Goals & Objectives

Goals

1. Reduce poisoning-related fatalities and the number of incidents in poisoning hotspots in Kenya by between 20-40% over the next five years. With the help of the Endangered Wildlife Trust, The Peregrine Fund is currently documenting all reported poisoning incidents in Kenya. Therefore through our efforts, we will be able to detect a decrease in poisoning-related mortality and in the number of incidents should this occur as a result of this project.
2. By decreasing poisoning incidences, we will increase breeding populations of Rüppell's Vultures in Kenya by 3-5% over the next five years at two main breeding cliffs in northern Kenya. Given the slow reproductive rate of vultures, the earliest we would expect to see a substantial increase in breeding populations is within 8-10 years.
3. Increase scientific knowledge about African Vultures through targeted ecological and population-level studies, and conduct annual monitoring to assess long-term population changes. Both of these activities will strengthen local capacity in raptor identification and help to develop research and monitoring skills among East Africans, essential for developing teams of committed and passionate people on the ground as well as for changing people's attitudes towards vultures.
4. Increase and expand local capacity in the form of graduate student and conservation leaders in East Africa as well as other parts of Africa such as Mozambique, Ethiopia and Botswana where our partners conduct vulture research, monitoring and inspire conservation efforts at government and grass roots-level.
5. Understand and document the socio-ecological correlates on why people poison and what solutions (e.g. economic incentives) are available to mitigate poisoning.

6. Where poisoning hotspots are identified, focus efforts on raising awareness about vultures and their threats within Kenya which can be upscaled across Africa through our Rapid Response trainings, community engagement, school visits and media visibility.
7. Build and strengthen alliances with "on the ground" NGOs such as Mara Lion and Cheetah project , Ewaso Lions, Big Life Foundation and others to help pay for rangers and field scouts to ensure effective patrols and be the informants following livestock attacks by carnivores.
8. Develop a strategy with in-country partners who have the expertise to engage with the National Government and specifically with the police and judiciary system starting with Narok County where the Masai Mara National Reserve is located, to stress that wildlife poisoning is a crime and that it should have the maximum penalties. To date there has NOT been a single successful prosecution for poisoning. We will scale up to other counties as feasible.

Objectives

1. Over the next four years, we will increase the coverage and frequency of our Rapid Response Training Programs in Kenya and focus specifically on areas of high risk. Through this process, we will train a minimum of 500 field scouts, rangers and vets to rapidly respond to poisoning incidents in order to decrease fatalities of vultures and other affected species, and to ensure successful prosecutions of perpetrators. These “Rapid Response” trainings will also increase communication between The Peregrine Fund (and partners) and scouts and other field personnel in remote areas, particularly in northern Kenya where phone network is limited. Any increase in communication between us and scouts/rangers is easily measured. For example, after a half-day training session about vultures and poisoning, within the next four months we received two phone calls from different participants asking us for help in rescuing injured and sick birds.
2. Conduct annual raptor road surveys in both northern and southern Kenya to track population trends of vultures. As funding allows, conduct helicopter surveys of at least two main breeding cliffs of Rüppell’s Vultures in northern Kenya at least once, but preferably twice, during the breeding season. This will allow us to measure any changes in breeding population size at these cliffs.
3. Determine locations of vulture breeding and foraging, as well as mortality levels using tracked individuals. Increase the number of tracked individuals to at least 5 individuals per the six main species of vulture found in Kenya. Produce a map of foraging locations overlapped with locations of poisoning incidents.
4. Map the locations of all reported poisoning incidents in Kenya to develop a dynamic “heat map” of poisoning, which will continually updated via the African Wildlife Poisoning

Database. The heat map will illustrate the relative frequency or density of poisoning events as aggregate patterns of intensity on a map. Heat maps will be useful in rapidly perceiving spatial poisoning patterns in record distribution, enabling The Peregrine Fund and partners to identify areas with greater or lesser density, examine degrees of variation based on spatial factors, and explore relationships among particular facets and aggregate patterns of poisoning distribution and density across a given spatial area.

5. Actively participate by contributing data to the Global Raptor Data Bank in order to assess range-wide populations of Africa's vultures and key areas for their conservation.
6. Produce a map of important breeding locations and population estimates for Rüppell's Vultures in Kenya.
7. Develop and execute 1-2 new graduate research projects for East African students on aspects of vulture ecology, population biology and/or social surveys such as documenting the extent and socio-ecological correlates of illegal poisoning in southern Kenya and its implications for targeted conservation actions for Gyps vultures.
8. Provide support to Ugandan partners at Makerere University to conduct annual road surveys and research projects on critically endangered vultures.
9. Provide supervision, guidance and resources to our complementary project "Investing in tomorrow's African Conservation Leadership" by developing and strengthening local capacity in vulture conservation for four Kenyan graduate students and at least one student each in Uganda, Ethiopia, Botswana, Rwanda, Mozambique and Tanzania in collaboration with local and international partners.
10. Increase our visibility and presence by raising local and international awareness through writing of 2-5 annual blogs, articles or other media. Raise local awareness through 1-2 Vulture Awareness Day celebrations and 1-5 annual school visits and local talks as opportunities arise.

Activities

Ongoing and Long-term Activities

2017-2020: Anti-poisoning Training

Trainings are conducted by Martin Odino and Darcy Ogada. These one-day trainings involve 15-25 participants from conservancies, reserves or other conservation-related groups. The trainings have been concentrated in northern Kenya, but will be done in other areas as time, demand and funding allows. We have been working with local partners to identify participants, e.g. Northern Rangelands Trust, various lion NGOs and others. The trainings teach participants on how to respond to poisoning incidents as well as about the effects of poisoning on vulture

and other scavenger populations. At the end of each training, the group is given a Poison Response Kit, which is basically a toolbox of the supplies and equipment they will need when responding to a poisoning incident. We expect to average 1-5 trainings per month over the next 3-4 years depending on demand, logistics and available funding.

2017-ongoing: Raptor Road Surveys

Annual road surveys are conducted over 5 days usually in February each year. Two teams of 3-4 drivers and observers count all raptors seen while driving a standardized road transect in both northern and southern Kenya. The northern transect averages 730 km, while the southern transect averages 950 km. Transects cover important protected areas in both regions. Participants are Martin Odino, Darcy Ogada and local raptor enthusiasts who volunteer their time and skills. The northern team hires a vehicle and a driver each year. The southern team uses Munir Virani's vehicle. These surveys formally began in 2011.

2017-ongoing: Helicopter Surveys

Surveys will be conducted at least once in 2017 and will cover the two largest Rüppell's breeding cliffs that are within a couple hours flying time from Nanyuki in central Kenya. As feasible, we will survey these cliffs twice per year, and then we will expand to other important breeding cliffs that cannot be surveyed from the ground due to their height. Martin Odino and Darcy Ogada will conduct surveys from a helicopter, which will be rented for this purpose.

2017-ongoing: Vulture Research

Research on vulture movements and mortality will be conducted using tracking devices. In northern Kenya these data are being used to identify critical areas of vulture foraging and where these overlap with poisoning hotspots. In the Masai Mara these data are being used to test the effectiveness of anti-poisoning initiatives and tagging is being used chiefly as a means to measure rates of vulture mortality. Vulture tagging is done by Darcy Ogada, Martin Odino, Munir Virani and other qualified individuals as needed. Vulture tagging in northern Kenya is focused on Rüppell's Vultures, and to a lesser extent White-backed Vultures. Vulture tagging in the Masai Mara is focused on resident White-backed Vultures. Tagging occurs year-round when tracking devices are available. We currently have 13 active tagged vultures in northern Kenya. We anticipate tagging 10 vultures in the Masai Mara later in 2017. Tagging is currently highly dependent on project funding, but the aim is to eventually track all species of vultures and other avian scavengers such as Tawny Eagles, Bateleurs as well as Wahlberg's Eagles.

Annual Activities

2017

- Ethiopian PhD student Alazar Daka finishes coursework at University of Addis Ababa. Co-advisors are Evan Buechley and Darcy Ogada.
- Deploy 10 satellite transmitters on African White-backed Vultures in the Masai Mara to evaluate annual mortality.
- Kenyan MSc student Martin Odino begins project on identifying critical areas for vultures in relation to poisoning hotspots in Northern Kenya at University of Exeter.
- African Wildlife Poisoning Database (managed by The Peregrine Fund and the Endangered Wildlife Trust) website and app officially launched.
- National Geographic article on Wildlife Poisoning, focusing on Kenya published
- A pilot survey conducted by our collaborators Kenya Wildlife Trust to understand Masai attitudes and perceptions on the drivers of poisoning in the Greater Mara Ecosystem.
- Develop a plan to register The Peregrine Fund as a branch/field office in Kenya.

2018

- Hire Martin Odino as full-time staff upon completion of his MSc. Degree.
- Purchase one project vehicle as funds become available.
- Become a registered organization in Kenya.
- Alazar Daka begins project on human-vulture interactions in Ethiopia.
- Uganda raptor road surveys conducted by our partners at Nature Uganda and Makerere University.
- Publish raptor road survey data in Ethiopia.
- Eric Ole Reson commences a PhD study on documenting the extent and socio-ecological correlates of illegal poisoning in southern Kenya and its implications for targeted conservation actions for threatened vultures.

2019

- Publish results of vulture movements in relation to poisoning incidents.

2020

- Uganda raptor road surveys conducted by partners at Nature Uganda and Makerere University.
- Ethiopian raptor road survey conducted by partners.

2021

- Publish results of 10 years of raptor road surveys in Kenya.

2022

- Uganda raptor road surveys conducted by partners at Nature Uganda and Makerere University.

Key Partners Involved

African Raptor Data Bank – gathering, storing and analyzing observational and other data throughout Africa. Producing maps and models of vulture ranges, important habitats and threats.

Northern Rangelands Trust – providing logistical assistance with vulture tagging in northern Kenya

Ewaso Lions – providing local assistance with work in the Samburu region, particularly involving the Samburu and Buffalo Springs National Reserves

Ol Pejeta Conservancy – providing logistical support for vulture tagging in northern Kenya

San Diego Zoo Global – providing sustained financial support for work in northern Kenya, raising awareness about vultures through zoos, providing important links among the zoo network

Makerere University – undertaking vulture monitoring, research and student training in Uganda

Birdlife International Africa Secretariat – assisting with policy level engagement with Kenyan Government and authorities

Nature Kenya – working with local communities in the Masai Mara and assisting with developing wildlife poisoning protocols

Kenya Wildlife Trust – Conducting community questionnaires in the Greater Mara ecosystem to understand the main drivers of poisoning

Wageningen University Research – Dr Ralph Buij is a collaborator

Endangered Wildlife Trust – Andre Botha assisted with initial training of First Responders at a Poisoning

Hawk Conservancy Trust (U.K) – providing Rapid Response Kits

Kenya Bird of Prey Trust – assisting with trapping, community education, and rehabilitation of injured vultures and other raptors

University of Helsinki, Finland – Dr Andrea Santangeli is a collaborator for social surveys

University of Maryland – Dr William Bowerman is a collaborator

Evaluation

1) Long-term monitoring of vulture distribution and abundance using road surveys. This is most relevant to non-*Gyps* species that have smaller home ranges and that are solitary.
2) Monitoring of breeding abundance and productivity of Rüppell's Vultures. We will begin to monitor annual breeding in northern Kenya as a means of evaluating the success of our conservation efforts, particularly our anti-poisoning initiatives.
3) Measuring annual mortality rates of White-backed Vultures through the use of tracking devices in the Masai Mara will be done to evaluate the success of anti-poisoning efforts implemented by TPF and our partners in the region.
4) Measure anti-poisoning efforts implemented by TPF and our partners in the region by number of training events, geographic area covered by trained teams, and response time to poisoning incidents.
5) Annual production of scientific papers and reports, as well as the number of presentations, media articles and blogs.
6) Successful completion of academic programs by our students and the subsequent publication of their results as well as career tracking.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$339,500	$159,000	$159,400	$157,400	$157,600	$972,900

Madagascar Conservation Project

Personnel

Project Director:	Russell Thorstrom
National Director:	Lily-Arison Rene de Roland, Ph.D.
Scientist:	Marius Rakotondratsima
Administrator:	Jeannette Rajesy, Andrianarijaona Razafy
Biologists:	Gilbert Razafimanjato, Tolojanahary Andriamalala, Donatien Randrianjafiniasa, and Juliot Ramamonjisoa
Field Managers:	Eugene Ladoany and Jules Mampiandra
Field Technicians:	Kalavah Loukman, Eloi Fanameha, Gaston Raoelison, Nöel A. Bonhomme, Adrien Batou, Gilbert Tohaky, Joseph Razafindrasolo, Berthin Be, Möise, Monesse, Iavilahy, Tongamoelinakily, Jaomizara, Mbohonavy Fanambina, Razafindrakotovahoaka Jela, Mahasitra Bienvenu Chellon, Lovasoa Nambena Samson Prosper
Support Staff:	Andry Hiankinantsoa, Berthine Fafarasoa (Rafarasoa), Lova Razanakoto, Charles Rabearivola, Bruno Randrianarimanana, Rarovaniaina, Nomenjanahary Christophe

Project Background

The Peregrine Fund (TPF) began the Madagascar Project in 1990 to conserve threatened endemic species, in particular birds of prey, waterbirds and other biodiversity by preventing their extinctions and preserving their habitats, and to build national capacity for biodiversity conservation through training of staff, students, and local communities.

The most important results to date for the Madagascar Project have been: rediscovery of three assumed-to-be extinct species, the Madagascar Red Owl Tyto soumagnei, the Madagascar Serpent Eagle Eutriorchus astur, and the Madagascar Pochard Aythya innotata; 23-years monitoring of

a population of Madagascar Fish Eagles Haliaeetus vociferoides; 15 years monitoring of waterbirds. TPF has created four new protected areas and through a participatory approach management plans developed for each protected area are being implemented in collaboration with local communities and local associations as co-managers of the PAs.

Madagascar designated 94 new protected areas in 2015, many of which used The Peregrine Fund's community-based conservation model developed in four of these protected areas that total nearly 500,000 acres : (1) Tsimembo-Manambolomaty at 155,050 acres (62,745 ha) and (2) Mandrozo Lake at 37,424 acres (15,145 ha) are in western Madagascar, whereas (3) Bemanevika at 87,982 acres (35,605 ha) and (4) Mahimborondro at 185,732 acres (75,163 ha) are in northern Madagascar. These four protected areas (PAs) were decreed in April 2015 and they cover 466,184 acres (188,658 ha). All four sites provide habitat for many endemic and threatened species. Around 75% of the threatened bird species of Madagascar are found in Bemanevika. More than 15% of the global population of the critically endangered Madagascar Fish Eagle occur in Tsimembo-Manambolomaty PA. Mandrozo PA is the second known location of the endangered Sakalava Rail. In addition, these PAs host four endangered species of reptiles: Calumma hafahafa, Phelsuma klemmeri, Scaphiophryne boribory and Madagascar big-headed turtle (Erymnochelys madagascariensis), and 10% of the existing lemurs listed in Madagascar.

Tsimembo- Manambolomaty Complex is composed of mangroves, lakes, savanna, marshes, and important dry and deciduous forests. The wetland part of Manambolomaty including four lakes (7,491 ha) Ankerika, Befotaka, Soamalipo and Antsamaka and surrounding forest has been a Ramsar site since 1998. While Mandrozo PA was designated as a Ramsar site in 2012, because of its richness in biodiversity, its attractive natural landscape and it's specific traditional culture still intact. It is also characterized by different habitat types such as lakes, marshes, savanna, dry deciduous and palm forests which cover two-thirds of the total area. Bemanevika PA is a mosaic of ecosystems composed of rainforest, lakes, marshes and savannah, and a part of which was designated as a Ramsar wetland site of international importance in 2017.

The four PAs contain 11 rural communities (Masoarivo, Trangahy, Antsalova, Andranovao, Tambohorano, Veromanga, Antananivo-Haut, Beandrarezona, Ambararatabe-nord and Mangindrano), in 35 rural villages. The source of income of the local people living around the PAs is not diversified, and subsequently they depend heavily on natural resources, such as forest products and fisheries from the lakes. This threatens forest and wetland habitats with degradation and loss of biodiversity due to various pressures and disturbances, which justify one of the main challenges of the Madagascar Project related to habitat protection and the sustainable use of the local natural resources.

Need Statement

This project addresses The Peregrine Fund's strategic conservation outcome to conserve critically endangered species by protecting areas of conservation value to raptors and tackling landscape-level threats to multiple species.

The Madagascar Project is protecting critical habitat, biodiversity and natural resources while building national and local capacity for livelihoods and future conservationists. Madagascar has a high degree of endemic birds, including raptors, many of which are poorly known. There is a great dependency by local communities on their natural resources which causes habitat destruction, and the political landscape is tenuous and lacks stability.

The Madagascar Project strengthens local communities' capacity as co-managers of Protected Areas and sustainable utilization of natural resources through ecological training, conservation activity implementation, and providing alternative livelihoods with improved well-being so that they reduce their dependency on the natural resources.

At the species level, rare and unique biodiversity needs special attention in terms of improving their knowledge and conservation actions and we plan to understand their needs.

Goals and Objectives

The Madagascar Project will conserve the most threatened endemic species, in particular birds of prey, water birds, and other biodiversity, to prevent extinction of these species and to preserve their habitats, and will help national capacity building for biodiversity conservation through training of staff, students and the local communities. The project is preventing raptor extinctions by: involving local communities and authorities in resource and biodiversity monitoring; developing conservation leadership through training and education; and supporting local associations and university students.

Goal I - Prevent raptor extinctions

Objective A. Threatened and data deficient species identified.

1. Identify threaten raptor species from IUCN red list and BirdLife list.
2. Conduct research, support university students, academic supervisors and site managers in studies and research projects to determine status and gather information on threatened raptor species (year 2018-2022)

Objective B. Involve local communities and authorities in conservation actions.

1. Surveillance and control of habitat by TPF technicians, local associations and forest officers (year 2018-2022)
2. Ecological monitoring by TPF technicians and participatory involvement of managers from other reserves and protected areas (year 2018-2022)

Goal II - Identify areas of conservation value to raptors in Madagascar

Objective A. Makira, Masoala, Tsaratanana, Marojejy and Ambatovaky PAs are areas of raptor interest identified by the Madagascar Project.

1. Inventory surveys conducted at these sites by TPF researchers and site managers (year 2018-2019)
2. Establish a 5-year conservation plan at these sites that are of interest to TPF staff and site managers (year 2021-2022)
3. Monitoring of those sites of interest by TPF researchers and site managers (year 2020-2022)

Objective B. Locate new areas of conservation value for raptor diversity and threatened species.

1. Conduct surveys in new areas that may have interest for raptors and other biodiversity by TPF staff (2018-2022)
2. Threatened bird species and other taxa (lemurs, bats, reptiles, amphibians) by TPF researchers, students, academic supervisors (year 2018-2022)
3. At new sites establish a conservation plan by TPF staff and potential site managers (year 2021-2022)

Goal III – Develop partners and collaborators for species conservation and conduct information exchange between TPF and all PA/Reserve managers

Objective A. Ensuring the conservation of the Madagascar Serpent Eagle and Madagascar Marsh Harrier throughout their range.

1. Develop a conservation action plan for these two species by TPF staff, other PA managers and local communities (year 2018-2019)

Objective B. Draft and finalize conservation action plans to be implemented by the network of partners.

1. Identify and contact potential partners by TPF staff (year 2018)
2. Create conservation network by TPF staff and other PA managers (year 2018-2019)

Goal IV – Managing threatened raptor populations and habitat in and around PAs and reserves

Objective A. Managing the Madagascar Marsh Harrier *Circus macrosceles* at Bemanevika PA.

1. Training by TPF researchers, students and PA managers (year 2018-2019)
2. Raptor Monitoring by TPF researchers, students and PA managers (year 2020-2022)

Objective B. Managing the Madagascar Marsh Harrier *Circus macrosceles* at Ambohitantely Special Reserve.

1. Training by TPF researchers, students and PA/Reserve managers (year 2018-2019)
2. Raptor monitoring by TPF researchers, students and PA/Reserve managers (year 2020-2022)

Objective C. Habitat restoration and management in and around PAs.

1. Conduct reforestation in selected cleared forested area by identify forest gaps and areas to be restored by TPF researchers, forestry students, local communities (year 2018, 2020, 2022)
2. Nurseries and plantation of native species by TPF technicians, local communities (year 2018-2022)
3. Maintain firebreaks by TPF technicians, local communities (year 2018-2022)
4. Support the use of alternative and renewable energy, by managing the hydroelectric power plant at Amberivery and by promoting community plantation of fast growing tree species (year 2018-2022)
5. Organize and co-manage the hydroelectric power plant at Amberivery to ensure contribution to Bemanevika-Mahimborondro PA management funds and expenditures (year 2018-2022)
6. Prevent important habitat conversion especially the wetland areas by valuing the three Ramsar sites managed by TPF (year 2018-2022)
7. Make conservation plans with specific management actions by updating the existing management plans or developing new management plans in accordance to the proposed secure “protection” (or conservation status) option of areas (year 2018-2022)
8. Reinforce the PA local management structures of the PA and those of the community-based natural resource management system (year 2018-2022)
9. Review or update business plans and implement of the Tsimembo-Manambolomaty and Mandrozo PAs (year 2018-2022)
10. Translate the current business plans of Bemanevika-Mahimborondro PAs into an implementation plan (year 2018-2022)

11. Conduct control and surveillance of the PAs and natural resources. This includes monthly community patrols carried out by the local associations and joint missions with local authorities, forest officers and gendarmes (year 2018-2022)
12. Install and maintain the conservation infrastructure of the four PAs, including the limit and zoning demarcation, information panels and public awareness (year 2018-2022)
13. Carry out forest fire prevention and control programs. This includes the setup of fire breaks, the control of agricultural fire, monitoring forest fires through satellite firecast, authority field mission for law enforcement, and public awareness (year 2018-2022)

Goal V. Raise funds sufficient to succeed in our plan and set a trajectory for future funding

1. Maintain at least the current level of annual funding from FAPBM (year 2018 to 2022)
2. Management of the funds of Helmsley Charitable Trust (year 2018 to 2019
3. Ensure funding from IUCN/SOS Lemurs (year 2018 to 2020)
4. Management of the funds from CEPF/Tany Meva (year 2018 to 2019)
5. Ensure the funds from UNEP (year 2018 to 2021)
6. Explore other funding opportunities for Madagascar country-wide projects and other potential donors (year 2018 to 2022)

Capacity Outcomes

Goal 1 - Developing partnership with PA managers and community-based local associations for species conservation

Objective A. Continue partnership with PA managers on Madagascar Fish Eagle.

1. Monitoring Madagascar Fish Eagle status and productivity conducted by TPF staff and PA managers (year 2018-2022)
2. Conduct evaluation of vulnerability to climate change of the MFE, and propose adaptation options and measures for its conservation.

Objective B. Partner with other PA managers throughout country on Madagascar Marsh Harrier and Madagascar Serpent Eagle conservation and monitoring

1. Identify potential partners and sites by TFP staff (year 2018)
2. Collaboration and MOU signatures by TPF staff and PA managers (year 2018)
3. Training by TFP staff, PA managers and local associations (year 2018-2019)
4. Monitoring by TFP staff, PA managers and local associations (year 2018-2022)

Goal 2 - Meeting human needs while preserving raptors, biodiversity and habit

Objective A. Fishing activities are sustainable.

1. Monitor fishing yields and activity at Tsimembo- Manambolomaty and Mandrozo Lake PAs by TPF technicians, local communities (year 2018-2022)
2. Consultants recruited and conduct fish stock assessments (year 2018-2022)
3. Fish species identification by consultants and fisheries officers (year 2018-2020)
4. Fish stocking by governmental fisheries personnel, consultants and TPF technicians (when determined from fish stock assessment reports) (2018-2022)
5. Involve stakeholders (local associations, local communities, local authorities, regional forestry and fishery officers) in the conservation actions through the development and the implementation of a common accountability charter (*Charte de responsabilité*) per site.
6. Promote energy efficient practices by improving the stove called 'KAMADO' for fish drying for the local communities surrounding Tsimembo-Manambolomaty and Mandrozo Lake PAs.

Objective B. Meet timber and firewood needs without damaging habitat.

1. Maintain plantations for timber and firewood outside PAs (year 2018 -2022)
2. Nurseries and plantation of by TPF technicians, local communities (year 2018-2022)

Objective C. Develop environmental education.

1. Strengthen the management structures through partnership, training, equipment, communication and experience exchange between PA sites.
2. Support local education by TFP staff and local associations (year 2018-2022)
3. Production of videos on site and threatened species by consultants for international, national and local public awareness of project activities (2019-2020)
4. On the job training for the staff biologists and leadership training for staff and Malagasy students to improve their performances and for the future of conservation in Madagascar (year 2018-2022)
5. Ensure that TPF's Madagascar Project is properly staffed and uses appropriate information technology.

Goal 3 - Local income generating activities are diversified to meet needs of communities

Objective A. Develop an ecotourism program for Bemanevika and Tsimembo-Manambolomaty PAs.

1. Establish a 5-year ecotourism plan (year 2018)
2. Recruit consultants to initiate ecotourism (year 2018-2022)

Objective B. Develop alternative livelihoods (fisheries and agricultural equipment).

1. Develop livelihood alternatives and perform community development support in order to improve the local well-being and to reduce dependency to the nearby natural resources (year 2018-2022)
2. Identification of local needs by TPF, local associations (year 2018)
3. Monitoring by TPF, local associations (year 2019-2022)

Objective C. Agricultural value programs at PAs and possible markets for products.

1. Study conducted by a consultant (year 2018-2022)

Partners involved

- Ministry of Environment, Ecology and Forests; Ministry of Fishery; Ministry of Land Tenure; Technical Services of Forests and Fisheries: for administration support, permits and control.
- Regional and communal authorities: for support in law enforcement and in conflict resolution.
- Local associations: local co-managers.
- Local communities: as local partner in reforestation, local partners in fishery activity, and target community as natural resource users.
- Universities: providing students and research studies.
- NGOs working on environmental issues, PA managers or training partners.

Evaluation

1. Each local association conducts 8 patrols yearly.
2. Community surveillance and participatory ecological monitoring with an annual report per each PA site.
3. Conduct ecological studies on five raptor species at PAs.
4. At least five dissertations on Malagasy raptors, and five corresponding scientific articles.
5. At least five sites surveyed for raptors and other important avian species.
6. Raptor monitoring plan elaborated for the five selected sites.
7. Several protected areas, reserves and managed sites adopt conservation plans for the Madagascar Marsh Harrier and Madagascar Serpent Eagle.
8. Database created on the distribution of the Madagascar Marsh Harriers.

9. Current population status of the Madagascar Fish Eagle determined and a strategy for its conservation is implemented in protected areas.
10. Ecological information on poorly known endemic and threatened biodiversity is collected at the four PA sites for a better understanding of their needs and population status.
11. Defined areas reforested with native forest trees.
12. The trend of fish stocks is known and managed.
13. A percent of the local people benefiting from the fisheries activities, and an increase in the family income generated from alternative incomes.
14. A percent number of villages and number of local people targeted by the conservation awareness activities.
15. Ecotourism plan document validated.
16. A percent of families adopting alternative livelihood activities.
17. A number of masters and doctoral students defend and graduate from universities in Madagascar.
18. Annual funding activities and conventions with FAPBM, UNEP and other conservation organizations.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$454,400	$514,900	$455,900	$463,700	$476,300	$2,365,200

Philippine Eagle Conservation Project

Personnel

Rick Watson, Ph.D. and Staff of the Philippine Eagle Foundation

Project Background

The goal of this project is to conserve the critically endangered Philippine Eagle and its rainforest habitat. We work in partnership with the Philippine Eagle Foundation (PEF) by providing guidance at the Board of Directors level and critical assistance with funding conservation effort in the field. Together with PEF, we accomplish 1) research to understand eagle home range and habitat use, 2) conservation action that engages local communities, 3) education and outreach that changes behavior, and 4) policy advocacy by providing scientific information to all levels of government.

PEF's main strategy is community-based conservation underpinned by sound science (natural and social) and pragmatic policies. High eagle death rates, deforestation, and forest degradation are the main threats to eagle survival in a forest habitat that is barely 10% of the country's land area. Much of this habitat overlaps with indigenous estates or ancestral domains. PEF therefore helps develop models of community-based conservation that focus on protecting the ecological integrity of nesting territories that eagles use across generations. Today, nearly 600 locals voluntarily protect 14 nesting territories on Mindanao.

As a result of a series of population surveys in less explored islands, Philippine eagles were re-discovered recently on Leyte Island. The last confirmed sighting of the species on the island was 30 years ago. In Samar, two nesting sites were re-confirmed. Pioneer expeditions in 2015 in northern Luzon also located the first active eagle nest on the island which extended the geographic distribution of the species to the northern Cordillera region.

This five-year project strengthens our conservation facilitation across all four islands of the archipelago where the eagle is now known to be found. The PEF program's conservation foothold is on Mindanao Island; we will expand to Leyte, Samar and Luzon Islands where eagles are also found. Over the next five years this project will lead to: (i) Community-based conservation in at least an

additional 10 nesting territories across the archipelago (30 % of what is currently accounted for), (ii) Local Conservation Area and/or Community Co-management status for these nesting territories, (iii) greater local awareness and appreciation among households in six Key Biodiversity Areas where efforts to conserve forests and eagles are yet minimal, and (iv) updated data on eagle home range and habitat use and juvenile dispersal across the islands.

Need Statement

This project addresses The Peregrine Fund's strategic conservation outcome to save endangered species by protecting the species and its critical habitat.

The Philippines' incredible biodiversity is seriously threatened by the country's burgeoning population and resulting loss of forest and general environmental deterioration. The Philippine Eagle is the conservation symbol for the country. Many Filipinos feel that if the eagle is lost, so is the hope for their natural heritage. The Philippine Eagle is one of the largest eagles in the world, one of the most spectacular of all birds of prey and a global symbol for biodiversity and the rainforest. At most, only a few hundred eagles may remain. Considerable research has been accomplished on the eagle but many needs remain, especially regarding the species' status in the wild and environmental needs.

Persecution (hunting, shooting and trapping) and habitat loss and degradation limits the population of the Philippine Eagle, an IUCN "critically endangered" species that is endemic to the Philippines where it is the national bird. We achieve conservation through community-based protection of critical nesting territories, by changing human behavior, and by influencing land-use and forest management policies both at the local and national level. Our work results in clear socio-economic and cultural benefits to communities as well, which in turn build local commitment to biodiversity conservation goals.

Goals & Objectives

Our goal is to address human persecution of wild eagles through hunting, shooting and trapping, and the deforestation and degradation of its forest habitat. We aim to increase survivorship by reducing all of these threats within as many habitats as possible across the archipelago. Our specific objectives are to:

- Strengthen knowledge and capabilities of local communities in protecting resident Philippine eagles and their young in functionally "unprotected" eagle habitats.
- Assist local communities with implementing their rural development plans and address poverty issues as incentives for doing clear conservation work.
- Install mechanisms that ensure project sustainability through knowledge management and innovative conservation financing schemes.

Activities

a) **Strengthen local knowledge and capacities.** We follow the principle of "incentivizing" to facilitate clear conservation and development outcomes. As E.F. Schumacher, we believe that "small is beautiful".

(i) ***Formal declaration of at least ten new functionally "unprotected" sites as local conservation areas (LCAs) or Community Conservation Co-Management Areas***. An LCA declaration seals land use goals within the site as purely for biodiversity conservation and subsistence. As such, extractive commercial uses of lands and resources are effectively ruled out. Such LCAs take the form of municipal watersheds or communal forests, environmental critical areas, critical habitats (LGU-led) or Indigenous and Community Conserved Areas (ICCAs), which draws legitimacy from the 1991 Local Government Code (RA 7160), Indigenous Peoples Rights Act (RA 8371), Philippine Wildlife Conservation Act (RA 9147) and the Convention on Biological Diversity (CBD) and UN Declaration on the Rights of Indigenous Peoples (UNDRIP), respectively.

LCAs are viable alternatives (or interim designation prior) to a national protected area (NIPAS) designation. Declaring biodiversity-rich areas as LCAs uses fewer resources and takes shorter time than through the NIPAS. It also supports bottoms-up decision making, which further democratizes conservation. Not surprisingly, the LCA-approach is being rolled-out by the government through its pilot projects across the country and it has become popular in many locally initiated conservation projects.

For areas within protected areas but are not under strong protection measures (except paper protection), a co-management agreement between the communities People's Organization and the government will be facilitated. Such agreements are supported in the law especially if the parcel of area within the protected area overlaps with Indigenous estates or ancestral domains.

(ii) **Forest guard training, deputation and engagement.** Engaging Indigenous forest guards results to clear biodiversity outcomes: (i) protection of forest habitats against agricultural threats and resource overuse (*size of habitat protected*), (ii) rehabilitation of degraded areas (*size of habitat restored*), (iii) improved survival rate of focal species as a result of anti-poaching, shooting and trapping patrols (*survival rate increased*), and (iv) enhanced breeding success, and survival of young as human activities get regulated because of foot patrols and monitoring *(breeding success increased*).

We will train at least 20 local forest guards from ten host communities and have them deputized by the national government as ENROs (Environment and Natural Resource Officers). Training topics include (i) environmental laws, (ii) principles of biodiversity conservation, (iii) basic wildlife and threat monitoring techniques, and (iv) basic law enforcement, among others.

We will also teach them how to use the SMART-LAWIN (Spatial Monitoring and Reporting Tool/Landscape and Wildlife Indicators) application for monitoring species and threats. Each of the 10 groups will receive a computer tablet where monitoring data will be encoded and stored during foot patrols. We will assist in the analyses and reporting of monitoring data to the LGUs and government authorities. We have pioneered the use of the SMART-LAWIN application in one of our pilot communities in partnership with USAID, B+WISER and FFI and we got successful results. Food allowances, and patrolling gears and equipment will be provided too.

b) **Assist partner villages with their rural development.** The project uses a *human-in-nature* lens whereby humans and the ecosystem they occupy are seen as an inextricably linked system. This outlook is also informed by historical and socio-political contexts. Many of remote, upland villages are comprised by Indigenous peoples pushed to marginal areas in the mountains. They were 'collateral damages' of flawed state policies on resource uses in the past (e.g. commercial logging and agriculture). As *bona fide* citizens, they have rights and entitlements to livelihood and a decent life. Thus, evicting them out of biodiversity habitats and denying them access to livelihood are clear violations of their human rights. Their needs must be equally prioritized too.

This output aims to build social-ecological *resilience*, or the capacity of the community (and its members) to be adaptable and flexible when dealing with sudden changes to their socio-economic and ecological environment. We will help build resilience by helping diversify rural sustainable livelihoods capitals (i.e. financial, social, physical, natural and human capital, see Scoones 1998) so that villages can quickly adapt to new circumstances as well as respond to new opportunities.

(i) **Community-development planning.** Our CBC approach is anchored in community development planning (CDP) with each of the ten host communities. The CDP is a five-year plan which reflects the goals, objectives, and community

actions for economic, social, and environmental development. The CDP will become the basis for future interventions, including designing projects for external funding. The planning is through a village-based Indigenous planning model which PEF has refined for the last three years (Ibanez et al 2014).

Our planning model covers a broad development viewpoint. Its underlying perspective is adaptation and holism. The ancestral land is the planning unit but it covers facets of social, economic, ecological, and cultural aspirations, including spiritual values, as consistent with the holism and inter-connectedness that characterize rural/local worldviews. As for planning principles, the approach is "ground-up" whereby theory and science are used in the service of the community. Delivery is at the village-level where democracy can be maximized. Thus, planning is highly accessible, inclusive and equitable; everyone in the community can participate any time. Developing the CDP involves several workshops namely participatory resource assessment (PRA), participatory community mapping (PCM), threat analysis, and action planning. The PRA will focus on an inventory of land, forest and water resources, among others. Social, resource and spatial data will be mapped using a combination of traditional and modern techniques (i.e. global positioning system [GPS] and global information systems [GIS]).

(ii) **Brokering support from regular service providers.** The project team and community leaders will popularize the CDPs and seek support to each prioritized development outcome from government and private institutions who can deliver such services. In one community who desired a farm-to-market road in their plan for example, we actively lobbied with the provincial government for the provision of this infrastructure. A referral has been successfully issued directing the municipal government to construct a pilot road leading to the community.

There are various government agencies that provide health, education, livelihood support and other basic social services. The PEF will tap into its social network to facilitate the delivery of the desired services to our partner communities.

c) **Installing mechanisms for project sustainability.** We will enhance and sustain local commitment to conservation goals through incentives, innovative conservation financing and knowledge management.

(i) **Negotiating "Conservation Agreements" with development partners.** Fund

raising is through innovative Public-Private-Community Partnerships (PPCP). In a nutshell, PEF negotiates the provision of 'incentives' to community managers and forest guards by funding agencies and the corporate sector. Besides meeting basic needs, our approach achieves clear biodiversity outcomes. Incentives are provided for performing 'green' services (e.g. forest patrols, reforestation). Such Payments for Environmental Services-like scheme is through voluntary Conservation Agreements (CAs), which PEF has been piloting. KNCF funds will be used for active networking with potential grant-giving and corporate partners.

(ii) **Implement other fund sourcing schemes.** PEF will also access charity 'crowdfunding" platforms to raise funds for small projects that address immediate needs (e.g. foot bridge for kids, day care centers, etc.). Such crowd-funding platform includes Indiegogo (www.indiegogo.com) and Gofundme (www.gofundme.com). Facebook, Twitter and Instagram are also good social media platforms for charity crowdfunding.

(iii) **Documentation and sharing of conservation "best practices."** Knowledge management will be implemented using "codification" and "personalization" strategies, following Hansen *et al* 1999. Codification focuses on collecting and storing knowledge in electronic databases and publications to make it accessible to team, partners, and the whole professional community. Personalization strategy, aims at encouraging individuals to share knowledge directly.

We will codify and store relevant project information into a computer database. Methods to gather knowledge include writing reports, proceedings and transcripts of project activities, meetings and planning; photo and video-documentation; and distilling "best practices" and reporting and sharing them through CDs, progress reports, published papers, social media, conference presentations, brochures, and other media.

Partners involved

Philippine Eagle Foundation

Evaluation

Output 1: Strengthen local knowledge and capabilities

- Children who attend campaigns come up with their own school project to help conserve biodiversity.

- At least fifty percent of children who attend campaigns participate in school or community activities that conserve biodiversity.
- Adults adopt a biodiversity-friendly lifestyle as a result of the campaigns, planning and other conservation activities.
- The respective local government units of each community create policies (resolutions and ordinances) for their respective Local Conservation Area (LCAs) or Co-managed Conservation Areas and allot funding for its management.
- Fifty percent reduction in occurrence of threats within the LCAs as a result of foot patrols.
- Improved knowledge in the location and status of resident Philippine eagles.

Output 2: Partner communities assisted with their sustainable rural development

- Communities implement at least a quarter of their development activities after the first year of CDP implementation.
- Fifty percent increase in the number of organizations or agencies assisting the community with their development goals.
- Greater appreciation of Philippine eagles and their contribution to rural development as revealed by a perception study a year after project implementation.

Output 3: Mechanisms for project sustainability installed

- Each of the eight communities sign a three-year Conservation Agreement with at least one corporation or one grant-giving institution by the end of the project.
- Community being assisted by other development organizations with their development aspirations as a result of the project.
- At least 50 % of small projects in the CDP getting funded through innovative funding such as crowd-funding or voluntary (individual) pledges.
- Publication of project results in popular and peer-reviewed journals.
- Other conservation practitioners adopting “best practices” tested and shared by the project.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$35,300	$35,300	$35,300	$35,300	$35,300	$176,500

Monitoring Breeding and Abundance of Critically Endangered Vultures in Central India

Personnel

Vice President/Global Director Conservation Strategy	Munir Virani, Ph.D.
Director of Global Conservation Science	Chris McClure, Ph.D.
Director of Global Conservation	Chris Parish

Project Background

For millennia, vultures have played an important ecological and cultural role among the diverse people of the Indian subcontinent. From deity portrayals in Hindu mythology to efficient facilitators of traditional Parsi and Tibetan sky burials, vultures have helped sanitize the landscape of one of the most livestock-populated regions in the world. As scavengers and carrion eaters, vultures play an important role in the Indian subcontinent's landscape. By consuming animal carcasses that would otherwise be left to rot and spread disease vultures keep the number of feral dogs down and in turn prevent the spread of life-threatening diseases such as rabies and anthrax among animals and humans.

From the mid-1990s onwards, populations of three species of *Gyps* vultures on the Indian subcontinent were reduced to less than 1% of their previous size. Prior to this catastrophic collapse, numbers were so high in the 1980s that the birds were considered a risk to aircraft, and the Oriental white-backed vulture *Gyps bengalensis* (OWBV) was thought to be the most abundant large bird of prey in the world. Populations of OWBV, long-billed vulture *Gyps indicus* (LBV) and slender-billed vulture *Gyps tenuirostris* (SBV) numbered tens of millions and were supported by a large cattle population the slaughter of which for human consumption is constrained by religious rules in most parts of the Indian subcontinent: either prohibited (Hinduism) or done according to strict rules (*Halaal* in Islam). India has approximately 400 million cattle, of which around 65 million head die each year producing vast amounts of carrion because most of the meat is not acceptable to humans as food. Prior to the catastrophic collapse of South Asia's vulture populations,

these keystone species consumed and disposed of this bio-hazardous waste. Today, this vital ecosystem service is almost entirely lost.

In 2000, The Peregrine Fund began field and diagnostic investigations in Pakistan, India and Nepal with the primary goal of understanding the main cause of the vulture population declines. The bulk of our work was conducted in the Punjab Province of Pakistan where we focused mainly on OWBV. In 2001, we collected nearly 1700 dead vultures and unequivocally demonstrated that declines in their population were due to high rates of mortality. Nearly 80% of these birds were found to have a condition called visceral gout, which is a non-specific condition that follows kidney failure. In 2003, our diagnostic investigation confirmed that the pharmaceutical drug diclofenac is the agent responsible for the vulture crisis in south Asia. Vultures are highly sensitive to the toxic effects of this drug, which causes kidney failure and visceral gout. Diclofenac was widely used in the region in the veterinary treatment of domestic livestock, which are the vultures' primary food source. Inexpensive off-patent diclofenac was introduced first in India as a veterinary drug, probably sometime in the 1990s and subsequently in Pakistan. Cattle are considered valuable assets as draught animals and to provide milk and dung for fuel, and are kept until they die naturally. Old animals, or those that were sick or near death, were likely to be treated with diclofenac and other common, inexpensive drugs like analgesics or antibiotics. Legal restrictions on euthanasia as a means of reducing the pain and suffering of dying animals also encouraged palliative use of diclofenac.

In February 2004, The Peregrine Fund organized a high-level summit meeting in Kathmandu, Nepal, to disseminate results and make conservation recommendations to government authorities from Pakistan, India and Nepal. As a result, in 2006, the governments of India and Pakistan banned the manufacture of veterinary diclofenac, while manufacturers in Nepal voluntarily withdrew the drug from the market. From 2006 onwards, The Peregrine Fund has been evaluating the efficacy of the ban on veterinary diclofenac by measuring breeding populations of critically endangered LBV in southeast Pakistan and central Indian states of Rajasthan and Madhya Pradesh. Results of monitoring work showed their populations started to stabilize and at some sites even increased slightly but numbers still remain at extremely low levels. In Pakistan's Punjab province however, populations of OWBV have been extirpated.

Need Statement

Until the early part of 2000, the documented effects of pharmaceuticals in the environment on non-target biota were largely from freshwater systems. The Peregrine Fund's discovery that diclofenac is responsible for the decline in *Gyps* vulture populations represents, for the first time, that a pharmaceutical can have such widespread and devastating consequences for wild species. This finding highlights a new global threat to ecosystems and biodiversity, and our

ongoing studies will act as a model in developing scientifically sound conservation strategies to counteract this new form of environmental contamination. Our work in South Asia has undeniably shown that vulture populations are particularly vulnerable to the impacts of the region's veterinary pharmaceutical industry and have already suffered a significant loss in numbers. Our partners in the region (SAVE – Saving Asia's Vultures from Extinction) continue to play a very important role in creating vulture safe zones, identifying "vulture safe" drugs for the veterinary market, developing captive breeding facilities and working closely with governments to regulate the distribution of the human form of diclofenac. Because vultures are not charismatic in a region where tigers, elephants and rhinos get conservation and resource priority, the future survival of vultures is fraught with challenges. For example, the human form of diclofenac continues to be administered ubiquitously on livestock while up to seven veterinary non-steroidal anti-inflammatory drugs currently sold on the market such as flunixin, ketoprofen, and aceclofenac have been identified as potentially toxic to vultures. In addition, in 2012, the state of Rajasthan introduced a free human and veterinary drug distribution scheme that correlated with a significant decline in the number of breeding LBV in the state. India is also the world's 5th largest producer of wind energy and virtually nothing is known about what impacts wind farms are having on an already depressed vulture population.

This project responds to The Peregrine Fund's strategic conservation outcome by addressing a landscape level threat (veterinary diclofenac poisoning) that affects multiple species and conserving critically endangered species. Because vultures are generally long-lived and slow reproducing, their survival is key to a healthy functioning ecosystem, and the ability to gather scientifically sound information on these critically endangered species, including presence, abundance, movements and population trends, is critical to their management, and long term conservation. Vulture population monitoring, development of local capacity, and public awareness will be our strategy for achieving conservation outcomes.

Goals & Objectives

- The goal of this project is to evaluate whether the 2006 ban on veterinary diclofenac by the government of India is having a positive impact on the recovery of vulture populations in Central India, using the number of "occupied nests" of the critically endangered Long-billed Vulture as an index of population size.
- Secondly, add conservation value by providing TPF expertise to ongoing vulture conservation efforts by SAVE partners in India.

Objectives

- Measure and track population trends of surviving Long-billed Vultures in the central Indian states of Rajasthan and Madhya Pradesh as an indicator of how effective the ban on veterinary diclofenac has been since 2006 when it came into effect.
- Work closely with SAVE partners to identify the cause of downward population trends of Long-billed Vultures in Rajasthan as well as identify solutions to prevent exposure of diclofenac and other NSAIDs to vultures.
- Provide technical support and advice on vulture restoration to our SAVE partners. This includes husbandry and release techniques.

Activities

2018 – 2022

Between November 26th and December 15th 2017 and each subsequent year for five years, Munir Virani will visit LBV sites in Rajasthan and Madhya Pradesh to record numbers of occupied nests of LBV.

2018

Munir Virani to identify an individual or an in-country organization to “take over” the monitoring work after five years.

2018

Publish results of our work in a peer-reviewed journal.

Partners involved

- SAVE (Saving Asia’s Vultures from Extinction) – coordinate vulture conservation efforts in South Asia.
- Forest Departments of Rajasthan and Madhya Pradesh – provide permits to collect data inside Protected Areas.
- Nature Safari Ltd – provides subsidized accommodation in Bandhavgarh national Park and helps arrange travel logistics.
- Balendu Singh (Dev Villas) – provides free accommodation at Ranthambhore National Park, Sawai Madhopur.
- Dr Satish Pande Ela Foundation – ongoing discussions on the value of deploying six GPS-GSM transmitters on LBV in Maharashtra State to evaluate mortality and movements of LBV.

Evaluation

This project is a tool in adaptive conservation management of endangered vultures in Central India that provides an evaluation of the ban on veterinary diclofenac in India and an indicator of success of the value of vulture safe zones in India. A Vulture Safe Zone (VSZ) is a geographical area, the natural habitat of wild vultures, of at least 100 km radius designated free of the drug diclofenac in animal carcasses, the major food of vultures.

We have observed a downward trend in the population of LBV in Rajasthan since 2012. Observing an upward trend in Rajasthan over the next five years will be an indicator of success of conservation efforts by our partners. We will share our results annually with SAVE partners, publish our results in a peer-reviewed journal and then after five years we will publish an updated version.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$42,500	$29,700	$29,700	$30,600	$29,700	$162,200

Raptor Safe Initiative

Project Personnel

Rick Watson, Ph.D.

Additional Personnel - TBD

Project Background

Renewable energy is developing rapidly across the globe with increasing investment in energy generation and distribution. Wind energy production worldwide has increased rapidly in the last decade; wind power was the leading source of new power generating capacity in Europe and the United States in 2015 and the second largest in China. Globally, a record 63 Gigawatts (GW) of wind energy production was added in 2015 for a total of about 433 GW (REN21 2016). China currently leads the world with 145 GW of installed capacity, about a third of the world's total wind power (Davidson et al. 2016), followed by the United States (74 GW), Germany (45 GW), India (25 GW), Spain (23 GW), Italy (9 GW) and Japan (3 GW) (REN 21 2016). The potential for wind power generation globally is vast, potentially supplying >40 times the current worldwide consumption of electricity, and >5 times the total global use of energy in all forms (Lu et al. 2009).

Attempts to measure and mitigate the effects of wind turbines on wildlife have been an integral part of wind energy development. Raptors are among the species known to be most strongly affected by wind turbines, mostly through direct mortality and secondarily through habitat alteration and loss. In the United States, eagle mortality and mitigation strategies have received most attention because of their legal status under the Bald and Golden Eagle Protection Act. The negative effects of wind turbines on other raptor species are less well understood, and corresponding mitigation responses less well developed. Avoiding or mitigating impacts of wind energy infrastructure elsewhere in the world is less well developed and a potentially significant risk for many raptor species, especially those that are already rare and endangered (Watson et al. 2017). The large variability of experience with farms between countries strongly suggests the need for global standards in wind farm placement, monitoring and impact mitigation, and

likewise for other energy infrastructure (Watson et al. 2017).

Investors in renewable energy and its distribution are very aware of negative environmental impacts of the developments they invest in, especially in the US and Europe, but increasingly elsewhere in the world also. They are sensitive to bad press and are risk averse. They seek to invest in developments that meet at least minimal standards of impact established by the World Bank and others. In many situations, developers have choices to make in design and placement of energy infrastructure to make it safe for raptors and other wildlife but sometimes at a cost to profit or convenience. Investors need to know that the right choices have been made to minimize risk before they are willing to make an investment.

Our "Raptor Safe Initiative" (RSI) proposal aims to use market forces (risk aversion among investors) to influence energy infrastructure development to minimize or even eliminate negative impacts on raptors. The RSI proposal is consistent with our strategic plan's conservation outcome to tackle landscape-level threats that affect multiple raptor species.

Need Statement

This project addresses The Peregrine Fund's strategic conservation outcome to tackle landscape-level threats to multiple species.

The Peregrine Fund is considering helping investors with their risk assessments by offering a "Raptor Safe Initiative" (RSI) accreditation of new and existing energy infrastructure. Energy developments with our accreditation will be recognized as a low risk for negative environmental impact. We anticipate that investors will seek RSI accredited developments preferentially over non-accredited developments, creating a demand for accreditation. We are using market forces to achieve our mission to conserve raptors and their habitats.

Our business model is based on development companies paying a fairly small (e.g., $5,000) annual fee to The Peregrine Fund to be members of the Raptor Safe Initiative "in good standing" with the right to use the RSI logo in their marketing. Independent auditors will do the actual audit of the development to standards set by the World Bank and others (that we combine into a single, user-friendly source) and we provide the official accreditation based on the audit results. This achieves The Peregrine Fund's mission to reduce the global impact of energy developments on raptors, like wind farms, power lines, and others. It also generates annual income for The Peregrine Fund, while minimizing our workload, staffing needs and costs. The concept could be expanded to include RSI accreditation of any product that has the potential to negatively impact raptor populations that could be ameliorated by using

alternative designs, materials, locations, etc., such as oil and gas installations, bullet manufacturers, agricultural and forestry developments.

Goals & Objectives

Our goal over the next five years is to conserve raptors worldwide by setting the gold standard in energy infrastructure design, materials and placement using standards that result in no net loss to raptor populations. Our objectives are to:

1. Design and trade-mark a RSI logo (year 1)
2. Write a business plan with professional help (year 1)
3. Evaluate the business plan (year 2)
4. If the plan is found to be likely to succeed, then implement the plan with feedback loops and evaluation mechanisms to verify that it is economically sound and provides the desired outcome of raptor safe developments in energy structure (years 3-5).
5. By year 5, reach annual revenue in the order of $1-2 million (i.e. 200-400 subscribers), expenses of $500,000, and a net gain for conservation actions of up to $1.5 million.

Activities

The Peregrine Fund has no experience with this kind of business model but has used publicly available information on the “Sustainable Forestry Initiative” website to conceive a model that might work to benefit raptors in the face of fatalities caused by energy development. Our first task, therefore, is to reach out to members of our Board of Directors for help with recruiting a professional with experience in business start-up, business design, risk analysis, and/or the renewable energy sector.

In this person’s first year, s/he would develop the business model and write the plan. This person would then contract an independent evaluation of the business model during the second year. Assuming that the model is found to be sustainable, the same person would recruit staff as needed to implement the model in year three to five.
We aim to run the business as a non-profit project of The Peregrine Fund, with any surplus income used to fund Peregrine Fund support programs first, such as research and administration, followed by other conservation projects as funding allows.

Partners involved

Partners would include industry standard-setting groups, such as APLIC – Avian Power Line Interaction Committee and The World Bank, and consultants (such as Rick Harness at EDM) and audit companies (such as Price-Waterhouse perhaps).

Evaluation

Evaluation in the start-up phase will depend on hitting the following benchmarks:

1) With help/advice from the Board write a job description, advertise, and hire the project director.
2) Director researches and writes a final business plan with detailed description of the business model.
3) Director hires a professional evaluation of the business plan.
4) If demonstrated to be feasible, then begin implementation.
5) By end of year-five, sufficient businesses have bought into the RSI accreditation model to generate revenue in excess of expense.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$90,500	$135,000	$127,900	$127,900	$127,900	$609,200

ENGAGEMENT STRATEGIES

Global Engagement Strategic Plan

Personnel

Director of Global Engagement:	Erin Katzner
Marketing Manager:	Vacant
Education Curriculum Manager:	Vacant
In-country Engagement Managers:	Vacant
Director of the World Center for Birds of Prey:	Tate Mason
Biologist:	Marta Curti
Director of Technology, Senior Software Developer:	Paul Spurling
VP of Global Partnerships and External Affairs:	Geoff Pampush
VP and Global Director of Conservation Strategy:	Munir Virani, Ph.D.
Interpretive Center Staff:	Curtis Evans, Monica Pittman, Becky West, Jessica Gordon, Mike Garets
Project Directors:	David Anderson, Ph.D., Thomas Hayes, Chris McClure, Ph.D., Brian Mutch, Darcy Ogada, Ph.D., Chris Parish, Lily-Arison Rene de Roland, Ph.D., Sarah Schulwitz, Ph.D., Russell Thorstrom, Hernan Vargas, Ph.D., Jose de Jesus Vargas González, Munir Virani, Ph.D.
Communications Team:	Linda Behrman, Joell Brown, Marilyn Eagleton, Tate Mason, Travis Rosenberry, Amy Siedenstrang
Volunteer Team:	TBD

Project Background

Although The Peregrine Fund has been involved in engagement with the public, communities where we work, collaborators, governments, and more since our inception, we are now forming a new, formal, and intentional project focused on global engagement. From our marketing and education efforts based in Boise, Idaho to our interactions with

communities and partners around the globe, The Peregrine Fund is constantly engaging with people.

We were on the cutting edge of the conservation field when we developed our program in Madagascar that focuses on working with local communities, students, other NGOs, and government agencies. That program continues today, stronger than ever, because of the ownership local communities feel as custodians of their lands and the increased economic opportunities that have arisen for them. Today, we unite with local communities through education, economic development, and incentive programs in every country where we work.

We have developed multiple methods of communication to educate people about the value of raptors. Every day we reach thousands of people through our social media messages. Our followership over our social media channels is now over 100,000 people and results in our message disseminating from Bangkok to Santiago and every country in between. We also communicate rich stories from our projects in our bi-weekly newsletter and through our education programs at our headquarters, the World Center for Birds of Prey. These communication efforts are critical for people to value raptors, they can serve as a catalyst for change, and they contribute to our fundraising successes.

Today, our overarching goal is to replicate the success of our community engagement program in Madagascar, build a larger and stronger communication network that enables quick access to ready-to-mobilize communities worldwide, and scale up our communications to inspire all people to value birds of prey and their habitats worldwide. By investing in global engagement The Peregrine Fund has and will continue to change the future for nature and humanity.

Need Statement

This project addresses The Peregrine Fund's strategic engagement outcome by inspiring people to value raptors and take action, be the catalyst for change, and invest in tomorrow's conservation leaders.

As an organization, we know that people are critical to successful conservation work. According to the U.N. Population Survey, the total population of Planet Earth was 7.3 billion people in July 2015 and the number of humans added to our planet every year continues to rise at a remarkable rate. If we care about protecting species and habitats, we must begin thinking creatively and collaboratively now to solve the inevitable increasing conflicts between the needs of humanity and the needs of the wildlife that share our planet.

The way people interact with our environment is often the direct cause of species and habitat decline. The good news is that, because we are the cause, we can also be the solution. To do

this, we must address the needs and values of the humans directly impacting the environment. If we can provide a better way of life for people who protect wild animals and wild places, we will be successful in our conservation efforts.

Our mission is to conserve birds of prey worldwide and the reason we do that is to change the future to benefit nature and humanity in the process. Because humans are such an important factor in our success, as an organization, we have made the intentional decision to include engagement outcomes as one third of our overall organizational strategic plan and develop a formal Global Engagement project. This increased and more strategic focus on engaging with people will ensure a better future for nature and humanity.

Goals and Objectives

1. Goal: Inspire people to value raptors and take action.

   Objectives:

   a. Communicate to the public about our project successes and needs. Provide information on the status of species and what needs to be done to conserve them and their habitats. Help others to understand the important role of science in successful conservation efforts.
   b. Educate the next generation about raptors and the ecosystem services they provide. Teach students about their connection to the environment and how they can make a positive impact.
   c. Work with local communities and governments to take an active role in our conservation programs. Demonstrate the economic and social value of maintaining healthy, balanced ecosystems.

2. Goal: Be the catalyst for change.

   Objectives:

   a. Engage communication networks to actively participate in conservation efforts around the globe.
   b. Mobilize communities and governments to protect their lands and natural resources.
   c. Partner with organizations to provide expertise and services in areas The Peregrine Fund does not work (i.e. land acquisition, human health, government advocacy)

3. Goal: Invest in tomorrow's conservation leaders.

   Objectives:

a. Support and train graduate students in the countries where we work.
b. Identify and/or develop a raptor biologist in every country worldwide.
c. Maintain regular communication with every student and biologist with which The Peregrine Fund has worked to provide timely and accurate information on conservation issues within their country and assist in quick response to conservation needs.

Activities

1. Goal: Inspire people to value raptors and take action.

   Objectives:

   a. Communicate to the public about our project successes and needs. Provide information on the status of species and what needs to be done to conserve them and their habitats. Help others to understand the important role of science in successful conservation efforts.

   FY 2018 Activities

   - Working with the Communications Team and Executive Team, hire a Marketing Manager to aid in developing and carrying out the marketing strategic plans.
   - Working directly with FFW (website contractors), Paul Spurling, and Amy Siedenstrang, with the input of all project/program managers, and under advisement of the assigned engagement mentors from the board of directors, we will develop a new, engaging website that will increase public use for obtaining general information on projects and increase online donations and sales. This site will also serve to solve current database communication problems and will create a platform for development of scientific communications and the Global Raptor Database project.
   - Working with the Communications Team and Project Directors, we will identify and reach out to all Peregrine Fund "alumni." Alumni are defined as anyone who has worked with, partnered with, been trained by, or otherwise engaged with The Peregrine Fund as well as those who are currently engaging with us at a deeper "champion" level. Working with Linda Behrman, Paul Spurling and Project Directors, we will develop a user friendly online forum and database (using Blackbaud) to track and easily communicate with Peregrine Fund alumni.
   - Work with the Communications Team and Project Directors to develop formal, strategic marketing plans for each country in which we work.
   - Work with the Communications Team and Executive Team to evaluate and consider revising and strengthening all formal communications that disseminate

from The Peregrine Fund (i.e. Annual Report, thank you letters). Include actual data-driven results of our investments in each project.
- Work with the Communications Team and Executive Team to begin planning 50th anniversary celebrations including Raptor Research Foundation Conference.
- Work with the Communications Team, Education Staff, and Volunteer Team through marketing and communications to support Chris Parish's work with Raptor Safe and Western States Lead Reduction programs.

FY 2019 Activities

- Develop and carry out a formal communications strategy to all alumni of The Peregrine Fund.
- Raise funding for and carry out marketing plans for each country in which we work.
- Fundraise for and develop more multi-media communications telling the stories of each project.
- Produce any new communications materials based on 2018 evaluation of current materials.
- Work with the Communications Team and Executive Team to plan 50th anniversary celebrations including Raptor Research Foundation Conference.

FY 2020 Activities

- Carry out 50th anniversary celebrations including Raptor Research Foundation Conference.
- Continue alumni outreach activities and country specific marketing plans.

FY 2021-22 Activities

- Sustain alumni outreach activities and country specific marketing plans.

b. Educate the next generation about raptors and the ecosystem services they provide. Teach students about their connection to the environment and how they can make a positive impact.

FY 2018 Activities

- Working with Tate Mason, Marta Curti, and Curtis Evans, hire an Education Curriculum Manager to aid in developing programming for educating students around the world. Identify ways to provide cross-over programming between multiple countries.
- Working with Tate Mason, Marta Curti, Sarah Schulwitz, Curtis Evans, and the Communications Team, and with review from Munir Virani, develop a structured

grade school education program for the Dominican Republic and Panama that can be scaled to other countries in which we work.
- Work with Tate Mason, Curtis Evans, and Monica Pittman to develop more structured, STEM based, action based, and evaluation based education programs that span multiple age groups at the World Center for Birds of Prey.

FY 2019 Activities

- Carry out education programs in D.R. and Panama and evaluate effectiveness and areas of opportunity.
- Begin to scale education programs to other countries, while working with Program Directors in those countries.
- Carry out education programs at the World Center for Birds of Prey and evaluate effectiveness and areas of opportunity.

FY 2020 Activities

- Begin to carry out education programs in other countries and evaluate for effectiveness and areas of opportunity.
- Continue to carry out, evaluate, and adjust established programming.

FY 2021-22 Activities

- Carry out, evaluate, and adjust established programming.

c. Work with local communities and governments to take an active role in our conservation programs. Demonstrate the economic and social value of maintaining healthy, balanced ecosystems.

FY 2018 Activities

- Work with Project Directors to define the role and responsibilities of In-country Engagement Managers and begin identifying people who are positioned to be successful at this role.
- Work with Geoff Pampush and the Development staff to begin fundraising for In-country Engagement Manager positions.
- Work with Project Directors to identify key communities, stakeholders, and needs.
- Work with Project Directors to identify key collaborators already working in the area.

FY 2019 Activities

- Begin hiring In-country Engagement Managers to carry out the activities to achieve this objective.
- Work with Project Directors and collaborators to identify opportunities to improve economic and social welfare that will also achieve conservation goals.
- Begin working with collaborators to provide improved economic and social welfare in collaboration with conservation goals. Evaluate impact each year and make adjustments to insure substantial positive progress.

FY 2020-22 Activities

- Hire In-country Engagement Managers to carry out the activities to achieve this objective.
- Work with collaborators to provide improved economic and social welfare in collaboration with conservation goals. Evaluate impact each year and make adjustments to insure substantial positive progress.

1. Goal: Be the catalyst for change.

   Objectives:

   a. Engage communication networks to actively participate in conservation efforts around the globe.

   FY 2018 Activities

   - Working with the Communications Team and Project Directors, we will identify and reach out to all Peregrine Fund "alumni." Alumni are defined as anyone who has worked with, partnered with, been trained by, or otherwise engaged with The Peregrine Fund as well as those who are currently engaging with us at a deeper "champion" level. Working with Linda Behrman, Paul Spurling and Project Directors, we will develop a user friendly online forum and database (using Blackbaud) to track and easily communicate with Peregrine Fund alumni.
   - Work with Education Staff to identify actions people can carry out wherever they live and include these calls to action in marketing plans.
   - Work with Education Staff, the Communications Team, and Project Directors to identify ways to track and evaluate changes in conservation participation in countries where a marketing program is being implemented.

   FY 2019-22 Activities

   - Develop and carry out a formal communications strategy to all alumni of The Peregrine Fund.

- Track and evaluate changes in conservation participation in countries where a marketing program is being implemented.

b. Mobilize communities and governments to protect their lands and natural resources.

FY 2018 Activities

- Work with Project Directors to identify key stakeholders, communities, and collaborators with an interest in protecting the area lands and resources or other common goal.
- Develop a plan to bring these key individuals and groups together into a formal partnership.

FY 2019-22 Activities

- Carry out development of formal partnerships.
- Mobilize partnership identifying activities and processes for achieving the goal.
- Identify and use feedback mechanisms to evaluate success and progress.

c. Partner with organizations to provide expertise and services in areas The Peregrine Fund does not work (i.e. – land acquisition, human health, government advocacy)

FY 2018 Activities

- Working with Project Directors, Paul Spurling, Linda Behrman, and the Communications Team, begin to identify and build a database of all current partner organizations, the partnership goals, and their role in the partnership.
- Working with Project Directors and the Communications Team, begin to identify areas outside of The Peregrine Fund's expertise or scope of work that need support and pinpoint potential new partners to aide in accomplishing these Global Engagement activities.
- Work with Project Directors, the Communications Team, and the Executive Team to develop perimeters and guidelines for forming formal partnership agreements.

FY 2019-22 Activities

- Working with Project Directors and the Communications Team, identify areas outside of The Peregrine Fund's expertise or scope of work that need support and pinpoint potential new partners to aide in accomplishing these Global Engagement activities.

- Working with Project Directors and the Communications Team, reach out to potential new partners and begin to develop working relationships, common goals, and strategies to achieve those goals.

2. Goal: Invest in tomorrow's conservation leaders.

   Objectives:

   a. Support and train graduate students in the countries where we work.

   FY 2018 Activities

   - Work with Project Directors to identify all current students under Peregrine Fund support and training programs.
   - Work with Project Directors, and specifically Chris McClure, to define the training students receive from The Peregrine Fund, evaluate and identify any weaknesses in the programs that provide opportunities for improvement.
   - Work with Project Directors to identify any countries in which we work but are not supporting local graduate students. Develop a plan to identify and recruit students to fill those gaps. Work with the Development team to fund additional students.
   - Work with Project Directors to identify partnerships with universities, professors, and other NGOs that are working to support and train the same students or that have an interest in the goal of developing conservation capacity through training of local graduate students.

   FY 2019 Activities

   - Work with the Communication Team to develop a Peregrine Fund orientation process that all students receive to ensure continuity in messaging and incorporation of the student into the organization as a whole.
   - Work with Project Directors, the Communications Team, and students to develop pathways of communication between Peregrine Fund headquarters and the students we support. In particular, develop regular communications from students to donors who are supporting these students.
   - Work with Project Directors to identify and recruit students in countries where we do not currently have students.

   FY 2020-22 Activities

- Work with the Communication Team to carry out a Peregrine Fund orientation process that all students receive to ensure continuity in messaging and incorporation of the student into the organization as a whole. Evaluate the effectiveness of the orientation and adjust as needed.
- Work with Project Directors, the Communications Team, and students to develop and maintain pathways of communication between Peregrine Fund headquarters and the students we support. In particular, maintain regular communications from students to donors who are supporting these students.
- Work with Project Directors to continue to identify and recruit students in countries where we do not currently have students.

Identify and/or develop a raptor biologist in every country worldwide.

FY 2018 Activities

- Work with Project Directors, Paul Spurling, Chris McClure, Travis Rosenberry, and the Communications Team to develop an online database of current raptor biologists and the countries in which they work. It seems most appropriate for this to be a part of the redeveloped GRIN.
- Work with the team above to identify countries that do not have a raptor-focused biologist and begin to develop a plan to identify, recruit, and train a graduate student to become a raptor biologist.
- Work with team above to develop a communications plan with the network of raptor biologists to ensure regular information sharing, collaboration, and to help populate the Global Raptor Databank with timely information.

FY 2019 Activities

- Identify countries that do not have a raptor-focused biologist and continue to identify, recruit, and train a graduate student to become a raptor biologist.
- Begin to carry out a communications plan with the network of raptor biologists to ensure regular information sharing, collaboration, and to help populate the Global Raptor Databank with timely information.

FY 2020-22 Activities

- Train any graduate students in countries without a raptor biologist.
- Carry out communications with the network of raptor biologists to ensure regular information sharing, collaboration, and to help populate the Global Raptor Databank with timely information.

b. Maintain regular communication with every student and biologist with which The Peregrine Fund has worked to provide timely and accurate information on conservation issues within their country and assist in quick response to conservation needs.

FY 2018 Activities

- Work with the Communications Team and Project Directors to develop a communications plan to maintain information sharing with our network of students and biologists around the world.

FY 2019-22 Activities

- Work with the Communications Team and Project Directors to implement a communications plan to maintain information sharing with our network of students and biologists around the world.
- Evaluate effectiveness of communication, adjust as needed to strengthen plan.

Partners Involved

A large number of partners will be involved in developing and carrying out a successful Global Engagement plan. Anticipated partnerships have been noted in the activities portion of this document and include current and yet to be identified relationships. Part of the activities will include developing a database describing all Peregrine Fund partnerships. Partnerships will be valuable in providing economies of scale and scope for our work.

Evaluation

Every activity carried out for Global Engagement will be evaluated for effectiveness and data-driven results. Metrics will vary depending on which objective is being addressed but can include everything from increased membership sales to a positive gain in the desired results of solving the main, direct, anthropogenic threats facing each species.

The Global Engagement plan presents many opportunities for The Peregrine Fund's growth and conservation success. The primary threat to achieving the plan's goals is funding that is required to support the necessary staff and programs needed to implement activities.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$467,200	$561,100	$637,300	$671,400	$671,800	$3,008,800

Education Program at the Velma Morrison Interpretive Center

Personnel

Director of the World Center for Birds of Prey:	Tate Mason
Curator of Birds / Director of Global Engagement:	Erin Katzner
Assistant Curator of Birds:	Monica Pittman
Sales Manager:	Becky West
Education Coordinator:	Curtis Evans
Volunteer Coordinator:	Jessica Gordon
Raptor Specialist (Part Time):	Mike Garets

Project Background

The Peregrine Fund has been involved in education since its inception at Cornell University in 1970. Formed to save raptors from extinction, The Peregrine Fund (TPF) recognizes the need for engagement as an integral component of conservation. In tracing the root of raptor decline, human behavior is often implicated. Therefore public education continues to be cornerstone of our efforts to save raptors worldwide. In 1994, The Peregrine Fund made a major investment in education through the construction of the Velma Morrison Interpretive Center in Boise, Idaho. Since opening our doors, almost one million visitors have come face-to-face with raptors from around the world, and had the opportunity to engage with the mission of TPF. The vision of the education program at the World Center for Birds of Prey is to create a world where humans coexist with healthy raptor populations, indicating that ecosystems are intact and functioning properly. In order to achieve this vision we've set an overarching goal to serve as an educational resource, enabling people to connect meaningfully with birds of prey and the natural world. Through meaningful connections with individuals, we inspire people to value raptors and take action.

Since opening the World Center for Birds of Prey to the general public, the population of Idaho's Treasure Valley has more than doubled to 677,000 people. With the 9th fastest population growth in the country (2010 – 2016, US Census Bureau), the people of the State of Idaho will be challenged to

urbanize while protecting and preserving open space. Our education program serves as an important thread in a tapestry of non-formal education centers that work collectively to inform the citizens of Idaho and beyond about environmental issues. Evidence of success in Boise can be measured from two voter-approved initiatives, each of which directed $10M to protect over 11,000 acres of open space. In 2005, a levy passed with 59% approval, though business organizations such as the Chamber of Commerce lobbied against its passage. In 2015, a similar measure passed with 74% approval, enjoying support from a multitude of business interests. Successful environmental education is a crucial component of informing values and opening the door to positive outcomes for nature.

The education program at the World Center for Birds of Prey seeks to bring people into the fold of conservation. From schools to retirees, scout groups to university students, we aim to ingrain the mission of TPF into people's daily lives. Our guests, volunteers, and staff are influential voices in the realm of conservation in Idaho and beyond, and we intend to expand our base and influence in the coming years. By focusing on people and their roles in conservation, we are changing the future for nature and humanity.

Need Statement

This project addresses The Peregrine Fund's strategic engagement outcome by inspiring people to value raptors and take action, and be the catalyst for change.

Conservation in the 21st century can largely be characterized as an effort to save biodiversity in the face of overwhelming human population growth. Conservation is informed by science, but ultimately its success will depend on decisions made by individuals. We believe that humans and nature can coexist in a healthy balance when people make informed choices regarding the environment. For example, the Peregrine Falcon was saved through a collective change in behavior away from the use of DDT. We believe the California Condor will be saved when humans choose an alternative to lead as an ammunition for dispatching wildlife. Countless examples around the world indicate that human behavior is at the root of environmental problems, but human behavior can also be the solution! Our Boise-based education program provides the infrastructure to empower society to make decisions in their lives that will benefit the environment.

Education and outreach are cornerstones of our efforts to conserve birds of prey worldwide. At the World Center for Birds of Prey we provide valuable exposure for TPF and its projects through a multitude of public relations opportunities. We are a top-rated tourist attraction in Idaho and we have the ambition to become the pre-eminent raptor education center in the world. We structure our programming to make conservation relevant to the general public in

their everyday lives. Our intention is to inform values and provide concrete ways for people to get involved with conservation.

During peak seasons, the interpretive center is at or exceeds its physical capacity. Additionally, key infrastructure (including live raptor exhibits), have fallen behind the times and are in disrepair. In order to accomplish our educational objectives, a major investment in our infrastructure must be a priority. For more information on expansion objectives and anticipated costs, see Facilities Strategic Plan.

Goals and Objectives

Our overarching goal is to serve as an educational resource, enabling people to connect meaningfully with birds of prey and the natural world. In particular we aim to influence attitude and behavior, improve critical thinking, and develop a sustained interest in science and conservation. For each goal, it is our intention to maximize impact on the individual while also expanding our overall reach. We seek to inform and empower people to further our educational mission beyond our interpretive center by training and inspiring staff, volunteers, teachers, and visitors to carry on our mission in their own lives. Additionally, we consistently collaborate with outside organizations to scale up our impact.

Each goal is supported by the objectives listed below.

- Inspire people to value raptors (Goal)
    - Bring people face-to-face with birds of prey
    - Teach people about the importance of ecosystem health and highlight the role of raptors as environmental barometers
    - Create personal connections between people and birds of prey
    - Foster a general understanding of science and the role of science in saving endangered species

- Influence behavior
    - Demonstrate the use of science to evaluate evidence
    - Serve as a reliable source of actionable information about bird conservation
    - Reduce threats to raptors (persecution, poisonings, collisions, etc.)
    - Facilitate switch to non-lead ammo for harvesting game
    - Support TPF mission by growing membership base
    - Encourage civic engagement on behalf of the environment
    - Improve local habitat for birds and other wildlife

- Generate a sustained interest in science and conservation

  - Serve as a resource for teachers to learn and teach conservation science
  - Create opportunities for people, especially students, to authentically engage in science
  - Develop a sense of place in students (an appreciation for local ecosystems)
  - Foster interest in science as a career option

- Interpret TPF projects and serve outreach objectives for individual projects
- Reduce environmental impact of operations in such a way that empowers others to do the same (serve as a deliberate example)
- Assist in global engagement objectives
- Develop and retain first-rate, professional staff
  - Cultivate leadership and executive capacity in the ranks of our employees through individualized professional development experiences, systematic feedback, and advancement opportunities
  - Compensate staff at or above industry standards
- Ensure the long-term financial viability of the Education Program
  - Offset operational expenses
    - Admissions

Year	Percent of expenses covered
2011	34%
2016	41%
2022	Goal 50%

    - Foundations / Corporate Support / Individual Donations

Year	Percent of expenses covered
2011	34%
2016	35%
2022	Goal 50%

    - Education Endowment
      - Develop and expand legacy giving program
      - Grow the endowment by 3% per year

Activities

Our goals and objectives will be pursued primarily through the operation of the World Center for Birds of Prey. Our plan is to grow our educational capacity to become a global leader in conservation education. Overarching activities that will allow us to meet our goals are:

- Increase annual visitation to the World Center for Birds of Prey. Expansion refers to a potential capital investment in our facilities and visitor services.

	Without Expansion (est. 10% annual growth)	With Expansion** (est. 20% annual growth)
2010	28,600	-
2016	39,000	-
2018	47,000	47,000
2020	57,100*	67,700
2022	69,000	97,500

*Without expansion visitation above 50,000 will be uncomfortable for our guests and will lead to negative reviews, possibly impacting future admissions. **See Expansion under FACILITIES strategic plan.

Flight Demonstrations

  - Expand opportunities for the general public to see birds in flight
  - Attendance History and Projections:
    - 2014 - 3,500
    - 2016 - 4,200
    - 2017 - 5,000
    - 2019 - 7,000
    - 2022 - 20,000 (based on the completion of indoor flight space and addition of multiple flight-ready birds)

- Maintain and improve visitor experience
  Our strength is the individual connections people make to our birds, and to our mission, both of which are facilitated by an amazing cohort of dedicated volunteers and staff. The pool of available volunteers is growing and interest in getting involved remains high. We will continue to scale up our volunteer program to meet the needs and expectations of our guests. In order to evaluate visitor experience, we will design and implement a general public survey and add a method to systematically collect suggestions and comments. Survey will be implemented in FY18. Additionally, we will monitor reviews on social media including Facebook, Trip Advisor, Google, and new platforms as applicable.

- Meet or exceed the global standard for raptor husbandry
  The World Center for Birds of Prey must meet or exceed the current standard for care of captive animals. Standards in use are set through the International Association of Avian Trainers and Educators (www.iaate.org) and the Association of Zoos and Aquariums (www.aza.org). The strength of our message depends on the ethical treatment of our avian ambassadors and any deviation from this standard is unacceptable. Any expansion or requisite chamber modifications will be designed using these codes as a guide. This does not mean we will seek accreditation. Our goal is that all of our education raptors are housed in first-class exhibits by 2022.

- Clearly articulate the mission of TPF to the general public
  As opportunity allows, education staff and volunteers will have first-hand experience with TPF projects and project leaders. A thorough understanding of our projects is integral to properly articulating their importance to the general public. Additionally, our displays will be designed with projects taking center stage. A gauge of our success in this activity can be measured through our general survey and through tracking numbers of memberships purchased through the interpretive center. When people are inspired by our projects, they are more likely to support them and purchase memberships.

- Serve as a hub for volunteers and supporters to get involved with TPF
  Our interpretive center attracts people who want to make a difference and be a part of building a better future. By opening our door and programming to countless individuals, we empower people to make a difference within their own sphere of influence. By sowing our message in an authentic manner, we strengthen our ability to affect human behavior at scale. Starting in 2017 we began systematic surveys of our volunteers. Major findings will be tabulated and included in annual reports.

- Improve visibility at select off-site events
  There is great interest amongst the general public to bring our message (and birds) to community events. Off-site engagements can be extremely important to our endeavors and our participation is evaluated on a case-by-case basis. In particular, we evaluate the opportunity to participate on four axes:
    1.) Educational Value
    2.) Exposure for TPF
    3.) Opportunity for Fundraising or Networking
    4.) Availability of Staff and Volunteers

After the offsite program, participation numbers and pertinent notes about the event are recorded. By creating a feedback loop for off-site events, we will maximize our effectiveness along the axes listed above.

- Engage and increase membership base
  As the face of The Peregrine Fund for the general public, the visitor's center will play an active role in garnering support for mission through membership sales and e-newsletter subscribers. The education program will support the membership objectives as set by the membership strategic plan.
- Meet fundraising goals for operating expenses and expansion plans
  An essential role of the education program is to attract financial support for TPF. Overall, the pool of philanthropic donors who give to education is larger than the pool that gives to the environment and a robust education program will diversify the financial support for our mission.

- Develop distinctive engagement programs that appeal to wide audiences**.**
  - Programs will continue to be developed which engage people from all walks of life. Examples include art workshops, photography events, our annual writing camp, and many others. Our intention is to bring people into the realm of conservation by connecting with them through their underlying interests, whatever they may be.
  - Create additional special programming: Trainer-for-a-day, hawk-walk, owl prowl, backstage pass, field trips, TPF speaker series.
  - Utilize special programming to cement positive relationships with supporters

- Train Educators
  Teachers are extremely influential in the lives of children. We will develop accredited workshops (e.g. Wild about Raptors) that provide teachers with insight on how to incorporate conservation topics into general curriculum for all grade levels. Once this material is created, it will be made available on-line.

- Brand TPF through gift shop and on-line sales (see strategic plan for SALES)

- Increase educational value of WCBOP campus
  - Maintain and restore grounds and landscaping to benefit diverse, native wildlife
  - Wild bird feeding carried out to increase species diversity and richness
  - Promote exploration of shrub-steppe ecosystem
  - Maintain trails and interpretive signage

Partners Involved

It is imperative that each Peregrine Fund project communicates freely with the interpretive center so that outreach objectives, as defined above, are met. In order to scale up our impact we will partner with many organizations to strengthen the depth of educational experience that is available in Idaho and beyond. In particular we will be active in the Idaho Environmental Education Association, The Boise Museum Association, Southwest Idaho Directors of Volunteer Services, the International Association of Avian Trainers and Educators, Universities and institutions of higher learning, local schools, the regional cities and municipalities, and other partnerships as they arise and are deemed beneficial.

Evaluation

Program results are measured in both quantitative and qualitative terms. Number of individuals visiting, school groups and students, special events and off-sites are all tracked and reported. We also determine our success through an online survey system. We actively seek candid evaluations from teachers an incorporate feedback to improve our programming and curriculum. Follow-ups are done by phone and through teacher workshops to solicit additional insights and further develop a connection with teachers. We recently created a systematic survey of TPF volunteers and we are excited to capture their input. In 2018 we will be adding a survey designed to evaluate the experience of the general public. We will survey a subset of guests as they enter and another subset as they exit. In this way, we will compare how people feel about various conservation topics before and after experiencing our interpretive center.

In a growing field, social media is proving to be a capable tool for evaluating visitor experience. Many platforms offer the ability to leave candid reviews, so insight can be gained. In particular, reviews from Trip Advisor, Yelp, Facebook, and Google have proven to be valuable. We will continue to monitor and engage with these sites, as well as other platforms as they arise.

Lastly, membership is a crucial metric for determining the success of our education program. When people visit our center and are inspired to make a contribution to TPF, we can safely conclude that we had an impact on that individual. Our intention is to involve people with conservation, and becoming a member of The Peregrine Fund is a step in that direction.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$380,300	$388,700	$394,300	$442,500	$449,100	$2,054,900

Neotropical Raptor Network

Project Personnel

Project Coordinator:	Marta Curti
Project Supervisor:	Rick Watson, Ph.D.

Project Background

In 2002, during the First Neotropical Raptor Conference and Harpy Eagle Symposium held in Panama City, Panama, members of The Peregrine Fund and other researchers and biologists from the region first proposed the idea of a Neotropical Raptor Network (NRN) - a membership-based network of biologists working or studying in the Neotropics. The idea was met with much enthusiasm, and in 2003 the NRN was created at a meeting of founding members of the newly created Advisory Board.

The following year, with support from our Advisory Board and about 150 members, we produced a website and list-server and put out our first semi-annual newsletter which focused on the conservation work being done by our members.

Since its inception, the NRN has organized and participated in four Neotropical Raptor Conferences and has produced 23 tri-lingual newsletters (English, Spanish and Portuguese). To date we have over 400 members.

Need Statement

This project responds to The Peregrine Fund's strategic outcome of engagement to inspire people to value raptors and take action, to be the catalyst for change, and to invest in conservation leadership globally.

The Neotropics is one of the most biologically diverse areas in the world. However, due to a rise in deforestation, development, and human encroachment, it is also one of the most at-risk regions on the planet. Because raptors can serve as indicators of the overall health of an ecosystem and are an important component in maintaining this health, we believe it is imperative for us to learn as much as we can about and to protect the over 90 diurnal and nocturnal birds of prey found in

the Neotropics – many of which are poorly known or are listed as endangered. Clearly, this region is in great need of concentrated conservation efforts.

Though there are many committed biologists working throughout Latin America and the Caribbean, one of the most basic needs – that of easy communication and information sharing among biologists just beginning their careers, researchers and experts in the field – had been lacking for a long time. The NRN has filled in that gap and has made it easier for conservationists throughout the region to help each other in a myriad of ways.

By providing an efficient means for people to interact, individuals are able to get help with raptor identification, share photos and new publications, advertise for job or grant opportunities, recruit volunteers in searching for missing birds (via telemetry), or make connections with others in the field who are able to provide their expertise. A perfect example of this occurred a little over two years ago when we published an interview in the NRN Newsletter with a Peregrine Fund biologist working with the critically endangered Ridgway's Hawk in Dominican Republic. In the interview, the biologist mentioned that botfly (*Philornis pici*) infestations were causing extremely high mortality in nestling hawks. A researcher from Argentina who had been studying *Philornis* for years happened to read the article. He immediately got in touch with The Peregrine Fund and has been collaborating with us ever since in our efforts to reduce botfly infestations the Dominican Republic.

We believe that partnerships and collaboration, rather than competition and exclusion, can only strengthen and improve the effectiveness of conservation efforts across the globe. The NRN is a valuable tool to this end. We would like to continue to expand our work and our impact in the region.

Goals & Objectives

The principle goal of the NRN is to promote raptor research and conservation in the Neotropical region by enhancing communication and collaboration among those interested in the field.

By providing biologists, educators, falconers, and conservationists in the Neotropics with the tools to carry out their work, to spread the news about their successes and garner assistance when faced with challenges, we will be supporting the goals set forth by our action plan, including helping to prevent raptor extinctions in a high biodiversity-rich area, inspiring people to value raptors and take action, and investing in tomorrow's conservation leaders.

Specific Objectives for FY18-FY22

- Increase membership of the NRN by up to 100 new members

- Produce 10 more issues of the NRN Newsletter
- Host the V Neotropical Raptor Conference in 2020 in conjunction with The Peregrine Fund's 50th Anniversary Conference in Boise, with at least 100 attendees from Latin American/Caribbean Countries
- Support up to 20 students from Latin America and the Caribbean to participate in the V Neotropical Raptor Conference
- Increase activity on our website by 10%.

Activities

We believe raptor conservation and research have already benefited significantly from better communication and collaboration among the diverse community of biologists, ornithologists, falconers, raptor enthusiasts, decision makers, and other conservationists working in the Neotropics, via the NRN. As we work toward our goal, we will continue to engage in a number of activities each year.

- We will publish *Spizaetus*, the tri-lingual NRN Newsletter, semi-annually.
    - Through this effort we hope to expand our readership and continue to improve the number and quality of articles we receive. The newsletter has become an important medium for young biologists to gain publishing credits, which is significant as they move forward in their careers. It can also be an important tool to generate enthusiasm and interest in birds of prey and all aspects of their conservation.
    - The NRN Coordinator will be in charge of soliciting articles, designing the newsletter and recruiting volunteers/paid translators to help translate and edit each edition.

- Within the next five years, we will host the V Neotropical Raptor Conference (NRC) and begin selection of the location for the VI Neotropical Raptor Conference.
    - The V NRC will be held as part of The Peregrine Fund's 50th Anniversary "Global Raptor Conference" in 2020 in conjunction with Raptor Research Foundation and other raptor conservation organizations and universities.
    - This conference, in particular, will bring together scientists and students from around the world to discuss and cooperate in finding solutions for global raptor conservation issues, such as climate change, electrocution, poisoning, habitat degradation and other threats that are shared across landscapes, countries and continents.

  - The NRN Coordinator will work with partner organizations to organize and promote the conference through our List-server, Facebook, and other media outlets.
  - We will provide scholarships (through grants) to up to 20 students from Latin America and the Caribbean to attend the conference.

- We will improve the look, usability and available resources on the NRN website
  - A webpage can be an important resource for individuals seeking information, resources or contacts. We will add an interactive, searchable map (by country, species and research activity) linked to GRIN and Explore Raptors, to help researchers locate others in their home country, or others working with the same species in a different country, or to collaborate with someone who is engaged in a conservation activity they hope to gain more experience in.
  - We will include a tab to list job, volunteer and grant opportunities, as well as a site for educational resources and contacts.
  - We hope to make the website more user friendly and appealing as a way to boost NRN membership and visibility, as well as to make the NRN more useful to its members, overall.
  - The NRN Coordinator will be responsible for recruiting a web master to assist in the re-design of the website and will oversee the work.

Partners Involved

We do not work with any permanent partners on this project. However, our Advisory Board and most of our members are associated with local NGOs, governmental organizations and/or universities.

We collaborate and partner with local groups to organize our conferences, which we hold every 3-4 years. To date, we have worked with Raptor Research Foundation, Fundacion Rapaces de Costa Rica, Grupo de Especialistas en Buhos Neotropicales, World Working Group on Birds of Prey and Owls, and Centro Regional Universitario Bariloche (CRUB) - Universidad Nacional del Comahue, among many others.

Evaluation

There are several ways to evaluate the success of the NRN:

1) The quantity of long-term and new members to the list-server will demonstrate whether there is a sustained, increased or decreased interest and need for this type of service.

2) The level of activity on the List-server (i.e. how many messages are sent per week or month) will demonstrate if this tool continues to be useful to researchers in the region.

3) The number of articles we receive for the NRN Newsletter will be a key indicator of the importance of this medium as a tool for researchers to share the work they are doing, and gain support for their projects.

4) An increase or decrease of the number of visits to our website monthly will help us understand how the website is being used, its importance to NRN members as a resource, and which aspects might need to be improved or modified.

5) The attendance rates of our conferences will show a sustained, increased or decreased interest/need for these types of activities.

6) Direct feedback provided to us via the List-server or personal messages to the NRN Coordinator, will be a clear indication of what aspects of the NRN are working and which require modification or overhaul.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$16,000	$28,900	$101,400	$16,000	$16,000	$178,300

Neotropical Leadership Development

Personnel

Program Director: Hernan Vargas, Ph.D.

Background

The Neotropical Student Education program began in May, 2005 to provide on-site research supervision to existing Peregrine Fund programs in the Neotropics, expand research on little-known or endangered species throughout Neotropical countries, and implement a focused program to develop local capacity for raptor conservation and research through student training and education. Over the past 12 years, we provided small grants and graduated 20 students (4 BSc, 11 MSc, and 5 PhD) from 10 countries. Studies range from basic natural history, population dynamics and spatial ecology, to multi-raptor species at the ecological community-level. Highlighting some research achievements directly linked to raptor conservation, we have learned that: the main prey of Black-and-chestnut Eagles are domestic chickens in human-altered habitats of Colombia; main threats to Andean Condor vary among countries, from illegal shooting in Venezuela, Colombia and Ecuador where condors feed on calves, through the indigenous Yaguar Festival (fiesta) killing dozens of condors annually in Peru, secondary poisoning in Bolivia, to lead poisoning in Argentina and Chile; owls can be used as biodiversity indicators in the Temperate forest of Chile; Galapagos Hawks are feeding mainly on introduced rats (*Rattus rattus*) and are surviving less well after goat eradication on Santiago Island; international efforts are required for the protection of long-distance foragers such as the Andean Condors, electrocution is limiting population recovery of the endangered Crowned Solitary Eagle in Argentina; and long-term studies are required to understand the population



dynamics and demography of long-lived raptor species such as Harpy Eagles and Andean Condors. Through publication of scientific papers (51 papers to date) and book chapters, ongoing submission of technical reports to environmental authorities, and teaching at universities, this program is influencing conservation action and helping people coexist with raptors, their prey, and the habitats they need for survival. After graduation, the majority of these students also are employed in research, education or conservation positions with direct influence or authority in policy and legislation that benefits biodiversity conservation throughout the Neotropical region. In FY17, we provided small grants and supervision to nine students (two BSc, three MSc, and four PhD) conducting thesis research projects; two of them - one BSc and one MSc - completed their theses and graduated. In FY18, we will be supporting this research of one BSc, two MSc and five PhD students and expect graduation of two BSc, two MSc and two PhD.

Some tropical raptors are extremely rare or hard to study and do not provide sufficient data for a thesis. In such cases, we provide financial support to professional research biologists to conduct non-thesis research. Outstanding examples of the impact of this support was the rediscovery of the Critically Endangered White-collared Kite (*Leptodon forbesi*) in Brazil in 2007, a species thought to be extinct; and the discovery, in 2012-2016, of important unprotected nesting sites on privately owned land of the Critically Endangered Andean Condor in Ecuador. Based on these findings, the respective countries have taken measures to strengthen management and achieve long-term conservation results. From 2005 through 2016, a total of 13 non-thesis research projects were completed.

During the first phase of the program (2005-2017), we reacted to funding opportunities (i.e. co-funding provided by universities and in-country science organizations) and project ideas from university professors. However, over the next five years (2018-2022) under the PFund Strategic Plan, our strategy is to become more proactive by focusing our grant program on studies of IUCN - Critically Endangered and Data Deficient species occurring on areas of high raptor importance. Applying the umbrella species concept, this new approach will certainly have a higher conservation impact. As some of these threatened raptor species occur in remote areas and at low densities, we will need to increase our program budget and provide larger and more appealing grants to research students.

Need statement

This project addresses The Peregrine Fund's strategic engagement outcome by investing in conservation leadership globally.

Need for leadership development in the Neotropics

- Develop local capacity for raptor conservation and research through student training and education in Neotropical countries.
- Prevent extinctions of Critically Endangered and Data Deficient raptors throughout the Neotropics.
- The Neotropics holds a high diversity of raptors (102 species of diurnal raptors and 58 species of owls).
- The Neotropics contains 26 genera (50 species) of endemic diurnal raptors.
- The Neotropics has biomes of global importance (e.g., the Amazon Basin, Andes Mountains).
- The Neotropics has several areas of high raptor importance, provides high proportions of fresh air and fresh water, the two most important elements to support human life. Using raptors as umbrella species, we can achieve biodiversity conservation goals, and keep on benefiting from these ecosystem services.
- Neotropical countries have fast-growing economies (good for student education) and increasing conservation threats (bad for raptors and other biodiversity).
- This program is high impact, low cost (little infrastructure and personnel), and high value for money.

Neotropical raptor conservation

Some forest species occur at low density and are difficult to study, thus presenting great challenges for their conservation against the principal threats, which are habitat loss and persecution. The Harpy Eagle is an excellent flagship for tropical forest conservation because of its large size, striking appearance, and wide distribution within remaining lowland forest in the region. In South America, on the west side of the Andes, 90% of lowland forest has been lost; on the east side, the Atlantic forest has lost more than 93% of its primary cover. There is an urgent need to learn more about the region's raptor diversity and implement programs that help people to co-exist with raptors, their prey, and the habitats they need for survival.

Neotropical Science

We have a unique opportunity to accomplish original research on Neotropical raptors. There are increasing numbers of graduate students in Neotropical countries who could make significant contributions to conservation by answering key research questions. For instance, we need to understand how diversity, abundance, and distribution of raptors are affected by interactions between prey species and their changing environments (e.g., decreasing forest cover). What factors limit abundance, distribution, and breeding success? How closely do changes in raptor population numbers reflect changes in abundance of their prey species? Can changes in raptor population numbers be used as bio-indicators for anthropogenic activities and natural perturbations?

Goal

Develop scientific skills and technical capacity for new leaders in the Neotropical Region to become capable of independently implementing and leading raptor research and conservation in the future.

Objectives and Activities

Objective 1. Support education for application of the scientific method to answer research questions and solve conservation problems.

Activity 1.1. 2018-22: Teach students to think like scientists and apply principles of scientific reasoning to answer innovative research questions and solve conservation problems.

Objective 2. Recruit, fund, and supervise students to work on raptor species of concern while enhancing local capacity for research and conservation in Neotropical countries.

Activity 2.1. 2018-22: Recruit, fund and supervise up to 10 BSc, MSc, and PhD per fiscal year.

Activity 2.2. 2018-22: Recruit students from countries with high raptor diversity and with poor economies to make sure that every Neotropical country has, at least, one raptor biologist.

Activity 2.3. 2018-22: Prepare and submit funding proposals to national and international donors and develop in-country partnerships to co-finance grants.

Activity 2.4. 2018-22: Prioritize grant program based on studies of Critically Endangered and Data Deficient species, with preference to those occurring, on areas of high raptor importance.

***Activity 2*.5.** 2018-22: Graduate an average of two students per year.

Objective 3. Ensure publication and dissemination of results in a timely manner.

Activity 3. 1. 2018-22: Supervise students thesis project design, data collection, data analysis, thesis writing, report writing, to manuscript preparation and peer-reviewed publication.

Activity 3.2. 2018-22: Publish an average of five scientific papers per year.

Objective 4. Develop new research directions as appropriate to achieve conservation goals.

Activity 4.1. 2018-22. Adjust and adapt the student development program to the new guidelines of The Peregrine Fund´s strategic plan and take advantage of emerging opportunities for collaboration in the Neotropical region.

Evaluation

Project design, implementation and outcomes will be evaluated in 2020 (midterm evaluation to identify areas of improvement, measure effectiveness in reaching project goal and objectives, and recommend adjustments) and in 2022 (5-year period evaluation included in progress report). Specific indicators of success are described in the following table.

Category	Indicator of success
Program goal	Number of students graduated and research projects completed, theses completed, papers published, endangered raptor species studied, and number of relevant positions, held after student graduation, to achieve raptor conservation goals.
Activity 1.1.	High quality of theses and associated publications in high impact peer-reviewed journals indicate success of the application of the scientific method and reasoning.
Activity 2.1	Number of students recruited
Activity 2.2	Number of Neotropical countries where students come from
Activity 2.3	Number of proposals submitted and amount of funds obtained
Activity 2.4	Number of Critically Endangered and Data Deficient raptor species studied
Activity 2.5	Number of graduated students
Activity 3.1	Number of progress and technical reports submitted, number of theses completed, number of paper published, number of conferences delivered.
Activity 3.2	Number of papers published in peer reviewed journals
Activity 4.1.	Number of adjustments and new directions established based on Strategic Plan

Grant Duration and Publication Periods

Degree	Maximum grant duration	Expected graduation	Expected publication after graduation
BSc	1 year	2nd year	< 5 years
MSc	3 years	3rd year	< 5 years
PhD	5 years	5th or 6th year	< 5 years

Our grants are focused to finance the field component of thesis research.

Partners and Roles

Partner	Country	Project	Role
CECARA - Universidad Nacional de La Pampa	Argentina	Crowned Solitary Eagle	Project and student supervision
Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)	Argentina	Crowned Solitary Eagle & Andean Condor	Co-Funding: Student stipend, tuition, fees
Universidad Nacional del Comahue (UNCOMA)	Argentina	Andean Condor	Project and student supervision
Asociación Armonía	Bolivia	Andean Condor - Bolivia	Logistical support and student supervision
Universidade de Sao Paulo [University of Sao Paulo]	Brazil	Genetic Andean Condor & diurnal raptors	Project and student supervision
Universidade de Sao Paulo [University of Sao Paulo], Department of Zoology	Brazil	Diurnal raptors - Brazil	Project and student supervision
Fauna Australis Wildlife Laboratory	Chile	Andean Condor, Owls	Co-Funding: Project and student supervision
Comisión Nacional de Investigación Científica y Tecnológica (CONICYT)	Chile	Andean Condor and Owls - Chile	Co-Funding: Student stipend, tuition, fees
Pontificia Universidad Católica de Chile (PUC)	Chile	Andean Condor and Owls - Chile	Project and student supervision
Universidad de Chile (University of Chile)	Chile	Diurnal raptor community	Project and student supervision
Centro de Aves Rapaces Neotropicales	Colombia	Black-and-Chestnut Eagle	Logistical support and student supervision
Fundación Neotropical	Colombia	Black-and-Chestnut Eagle	Logistical support and student supervision
Pontificia Universidad Javeriana	Colombia	Black-and-Chestnut Eagle	Project and student supervision
Parque Nacional Galápagos [Galapagos National Park]	Ecuador	Galapagos Hawk and Owls	In Kind- Boat transportation, research permits.
Fundación Charles Darwin [Charles Darwin Foundation]	Ecuador	Galapagos Hawk and Owls	Scientific, logistical and accounting support
Universidad Católica de Quito (PUCE)	Ecuador	Galapagos Hawk, Andean Condor	Project and student supervision

Partner	Country	Project	Role
Escuela Superior Politécnica del Litoral (ESPOL)	Ecuador	Galapagos Owls, Black-and-Chestnut Eagle	Project and student supervision
Kohn Family (Owners of PROFORAN and Ilitío Wildlife Rescue Center)	Ecuador	Andean Condor - Ecuador	Donor: research, field assistance, accounting and hiring personnel.
Ministerio del Ambiente del Ecuador (MAE)	Ecuador	Andean Condor - Ecuador	Research permits and park rangers for field assistance.
Universidad San Francisco de Quito (USFQ)	Ecuador	Andean Condor - Ecuador	Student supervision, genetics and veterinary service
SENESCYT	Ecuador	Andean Condor - Ecuador	Co-Funding: Student stipend, tuition, fees
Aves y Conservación	Ecuador	Andean Condor - Ecuador	Student Supervision, Environmental education
Colegio de la Frontera Sur-Unidad San Cristóbal de las Casas, Chiapas, México.	Mexico	Owls in Mexico, Colombia, Costa Rica	Project and student supervision
Sociedad Mastozoológica de Panamá (SOMASPA)	Panama	Harpy Eagle - Panama	Scientific advisor
Ministerio de Educación de Panamá	Panama	Harpy Eagle - Panama	Education advisor
Universidad Autónoma de Chiriquí	Panama	Harpy Eagle - Panama	Logistical support and student supervision
Minera Panamá S.A.	Panama	Harpy Eagle - Panama	Donor
SERFOR	Peru	Andean Condor - Peru	CO-Funding: Condor Management Plan and Workshops
Centro de ornitología y biodiversidad - CORBIDI	Peru	Andean Condor - Peru	Andean Condor research, education and conservation
Manchester Metropolitan University (MMU)	UK	Diurnal raptors - Peru, Andean Condor - Bolivia	Project and student supervision
University of Missouri Saint Louis (UMSL)	USA	Galapagos Hawk	Project and student supervision, accounting support

Partner	Country	Project	Role
Butler Foundation	USA	Andean Condor - Ecuador	Donor
Barbara Butler	USA	Andean Condor - Ecuador	Donor

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$174,400	$175,800	$186,500	$197,000	$209,100	$942,800

Developing Africa's Conservation Leadership for Raptors (7-4-7 Program)

Project Personnel

VP/Director Conservation Strategy:	Munir Virani, Ph.D.
Assistant Director-Africa Program:	Darcy Ogada, Ph.D.
Director of Global Conservation Science:	Chris McClure, Ph.D.
Director of Global Engagement:	Erin Katzner

Project Background

Leadership is critical for successful achievement of conservation goals. This is one of the fundamental tenets of The Peregrine Fund as we approach 50 years as a world leader in raptor research and conservation. How do we continue to maintain this momentum, expand our vision and propel The Peregrine Fund over the next 50 years to positively change the future for nature and humanity? Qualified and experienced individuals are the essential, driving force for conservation progress and initiatives. Furthermore, good science, especially knowledge and understanding of biotic processes and systems, combined with leadership skills, is the anchor for effective conservation.

The Peregrine Fund is constantly striving to improve the situation for a species, or remove threats, or protect a landscape, or enable humans to co-exist with wildlife and nature. Leaders at every level understand that the world is changing, and changing rapidly. If we want to remain effective, the most valuable investment we can make is the development of our leaders today to ensure great leadership tomorrow. When we invest in leadership for the future we need to ensure that we can keep up, both with technology and with increasing levels of interconnection



and interdependence. One of The Peregrine Fund's enduring and appealing achievements through the decades has stemmed from our training and support of young scientists and dedicated individuals. We have inspired hundreds of "raptor evangelists" from around the world by helping them initiate their careers and inspired a lifelong commitment to raptors, science and conservation. Our reputation as a trustworthy and collaborative organization that is sought out by others from around the world is built upon relationships with former beneficiaries of our mentoring. Our conservation leadership initiative will reaffirm our dedication towards ultimately creating a raptor expert in every one of the 195 countries in the world; someone with conservation leadership training and skills on whom we can rely to help at all levels to implement our conservation and engagement strategy.

Nearly one-third of the world's diurnal raptors and a quarter of the world's owl species occur in Africa and its associated islands. Since 1991 when The Peregrine Fund's Pan African Raptor Conservation Project began, substantial work on little-known raptors has been achieved in southern and to a large extent eastern Africa, yet much remains to be learned about raptors in central, and western Africa, particularly the tropical forest-dwelling species. Raptor species are being up-listed on the IUCN Red Data List on an annual basis. For example, eight of the ten vulture species currently occurring in Africa are listed as Red Data with four currently classified as critically endangered and two as endangered. Africa's landscape is fast changing and the continent's biodiversity is a fundamental basis of its development, and underpins the wellbeing of current and future generations. For the great majority of Africans, biodiversity represents their only lifeline that can no longer be ignored. The reality is that biodiversity in Africa and its associated islands is threatened by the needs of the continent's human population that is rapidly increasing at an unsustainable growth rate. In addition, a bustling economy aimed at developing the continent's infrastructure is sweeping across sub-Saharan Africa. Energy needs for Africa will double over the next decade with huge investments earmarked for energy infrastructure development. Consumer spending is set to rise 80 percent by 2020 and Africa now has a fast-growing middle class, expected to increase from 60 million to 100 million people by 2025. This will have far reaching consequences for the survival of Africa's biodiversity. In 2015, Africa's trade with China had topped the US$300 billion mark.

If conservation and development are to be sustainable in Africa, there will be an urgent need to understand how development affects biodiversity and what measures are required for mitigation. Raptors, as far ranging, easily seen top predators, are excellent "flagships for conservation." Understanding their population dynamics, distribution and abundance, and ecological requirements in a rapidly changing continental landscape and creating an appreciation for the ecosystem services that they provide will be key towards ensuring their survival for future generations. **Most importantly, there will be a critical need to develop**

continental-wide local capacity in the field of raptor biology, conservation and management, as well as harnessing the use of modern technology to achieve conservation goals.

Since the inception of The Peregrine Fund's Africa Project in 1991, we have provided support to 38 Masters and five PhD students in Africa. The majority of our students have come from Madagascar (67%) and Kenya (26%) with one each from Swaziland, Ethiopia and Uganda. This is approximately 10% of the 54 African countries. To meet The Peregrine Fund's strategic 2050 vision of creating a raptor biologist in every one of the 195 countries in the world, we will expand leadership program to more African countries and plan to do this in five-year increments of supporting seven students in seven countries every five years (7-4-7 Program).

Need Statement

This project addresses The Peregrine Fund's strategic engagement outcome by investing in conservation leadership globally.

In 2013, Africa's economy was the world's fastest-growing at 5.6% a year, and GDP is expected to rise by an average of over 6% a year between 2013 and 2023. Unfortunately, this growth rate is not concomitant with the growth in scientific capacity. A lack of scientists and research capacity is threatening to reel back that economic growth. This is in sharp contrast to countries like China and other south and south-east Asian countries where there is a surplus of scientists, engineers, doctors and teachers trained at the early stages of their countries' development. In most African countries there are up to 1,000 times fewer scientists than in Asian countries at the equivalent level of development. Given the exponential rate of development in Africa, a critical need will be to build, nurture and maintain the capacity required to ensure that development goals are balanced with sustainable outcomes.

Raptor populations in Africa are being impacted by myriad threats. These include habitat loss as a result of rapidly growing human populations, rampant poisoning, persecution, and developmental impacts such as the growth of the energy sector without taking sustainability of resources into account. Conservation organizations in Africa are struggling to develop new approaches to protect the continent's remaining natural heritage. The challenge is to design strategies that not only will ensure the long-term viability of species and ecosystems but also will be politically and economically acceptable to local communities and governments. Developing the local capacity needed to gather scientific information and translating that to the policy and grass roots level will require in-country champions to bear the burden of that responsibility with passion, commitment and a burning desire to change the future for the benefit of nature and humanity. In addition, developing local capacity in Africa will ensure that The Peregrine Fund meets its conservation (e.g. Global Raptor Data Bank),

engagement and capacity building outcomes. There will also be a need to develop capacity in the fields of raptor management, rehabilitation and restoration.

Goal

Our overarching goal is to make a lasting contribution to global biodiversity conservation and science by developing a raptor biologist and/or champion in every country in the world through training, support and mentorship.

The goal of the Africa 7-4-7 program for the next five years is to test and establish training and educational procedures that will lead to the effective development of raptor biologists and conservation leaders from African countries where conservation is little appreciated and that will lead to a greatly expanded program in succeeding years.

Objectives

- Identify and provide hands-on training and support to seven students and individuals of exceptional qualities from Kenya, Uganda, Rwanda, Ethiopia, Botswana, Mozambique and Tanzania. These countries were selected based on The Peregrine Fund's ongoing work, engagement with current students as well as in-country partners.
- Enable students to carry out scientific research on raptors that develops critical thinking, problem solving, scientific and popular writing skills
- Develop, formalize and strengthen partnerships with individual academic professors, department heads and universities in Kenya, Uganda, Ethiopia, Botswana, Mozambique, Tanzania and South Africa.
- Seek support and partnership from western hemisphere universities such as Boise State University, University of Maryland, Wageningen University (The Netherlands), University of Helsinki, Finland.
- Initiate the groundwork to evaluate the feasibility of developing a "Center for Excellence in Strategic Raptor Conservation" in East Africa.
- With the help of partners such as Boise State University, Inter-Mountain Bird Observatory, Hawk Mountain Sanctuary, Hawk Conservancy Trust, Wageningen University, and the Endangered Wildlife Trust, develop an annual "week-long raptor biology course" to inspire African students to become raptor experts and champions.
- Explore collaborative opportunities with the United Kingdom's Conservation Leadership Program (CLP) which has evolved to address changing conservation needs, and has become an international capacity building program that supports young conservationists from least developed countries to undertake applied biodiversity projects in their own countries.

Activities

2017

- Washington Wachira (Kenya) completes his Masters fieldwork on the Urban Ecology of Nairobi's Raptors.
- Sidney Shema (Rwanda) completes fieldwork on the Raptors of the Athi-Kapiti area.
- Anthony Kanundu (Kenya) submits his Masters thesis on the small carnivores of Arabuko-Sokoke Forest.
- Alazar Daka (Ethiopia) completes his coursework for his PhD study, which he will develop on understanding human-vulture interactions in Ethiopia's urban landscapes.
- Petro Samwel (Tanzania) finalizes his Masters proposal to conduct a survey on the illegal trade of owl eggs in Tanzania.
- Paul Muriithi (Kenya) finishes his diploma coursework and research project on the Abyssinian Owl on Mt Kenya.
- Micheal Kibuule (Uganda) completes his fieldwork for his Masters study on Hooded Vultures of Kampala, Uganda.
- Martin Odino (Kenya) finalizes his proposal for his Masters study on developing sustainable solutions for mitigating impacts of the wind energy industry in Kenya.
- Tsaone Goikantswemang (Botswana) finalizes her Masters proposal to study Cape Vultures of the Manyelanong and Tswapong Hills in Botswana.

2018

- Washington Wachira (Kenya) develops PhD proposal on the ecology and behavior of Pygmy Falcons in Tsavo East and West National Parks and prepares for application to the University of Cape Town, South Africa under supervision of Drs. Amar and Virani.
- Anthony Kanundu (Kenya) successfully graduates with a Master's degree.
- Alazar Daka (Ethiopia) commences his PhD fieldwork on human-vulture interactions in Ethiopia's urban landscapes.
- Petro Samwel (Tanzania) commences her Masters fieldwork to conduct a survey on the illegal trade of owl eggs in Tanzania.
- Paul Muriithi (Kenya) completes his diploma on Abyssinian Owl on Mt Kenya.
- Micheal Kibuule (Uganda) successfully completes his Masters study on Hooded Vultures of Kampala, Uganda.
- Martin Odino (Kenya) commences fieldwork for his Masters study on developing sustainable solutions for mitigating impacts of the wind energy industry in Kenya.
- Tsaone Goikantswemang (Botswana) commences her Masters fieldwork on the breeding of Cape Vultures of the Manyelanong and Tswapong Hills in Botswana.

- Eric Ole Reson (Kenya) develops a PhD proposal to study the extent and socio-ecological correlates of illegal poisoning in Greater Masai Mara Ecosystem and its implications for targeted conservation actions for four critically endangered vulture species.
- Identify a student from Mozambique to enroll for a Masters program
- Source funding for six students to attend the annual Raptor Research. Foundation (RRF) conference in Kruger National Park (November 2018)
- First meeting at Kruger National Park in November 2018 to discuss the feasibility of developing a "Centre for Strategic Raptor Conservation." This will be a unique knowledge platform made up of early career African raptor researchers and peers conducting practice-oriented research on raptor biology and conservation. The goal will be to support its members in developing a strategic dimension of their collaborative research and transform results to effective conservation management and become high-performing and effective organizations.

2019-2022

- Washington Wachira (Kenya) commences fieldwork on the ecology and behavior of the African Pygmy Falcon in Kenya's Tsavo East and West National Park and successfully graduates with a PhD (2021).
- Sidney Shema commences fieldwork for Master's and successfully graduates (2021).
- Alazar Daka (Ethiopia) continues with his PhD fieldwork on human-vulture interactions in Ethiopia's urban landscapes; and successfully graduates (2021).
- Petro Samwel (Tanzania) successfully completes her Masters fieldwork on the survey on the illegal trade of owl eggs in Tanzania (2020)
- Micheal Kibuule (Uganda) enrolls for a PhD program to study Uganda's threatened raptors (2019).
- Martin Odino (Kenya) successfully completes his Masters study on developing sustainable solutions for mitigating impacts of the wind energy industry in Kenya.
- Tsaone Goikantswemang (Botswana) successfully completes her Masters fieldwork on the breeding of Cape Vultures of the Manyelanong and Tswapong Hills in Botswana.
- Eric Ole Reson (Kenya) completes field work (2019) successfully completes his PhD study on the extent and socio-ecological correlates of illegal poisoning in the Greater Masai Mara Ecosystem of Kenya and its implications for targeted conservation actions for four critically endangered vulture species. (2021).
- Mozambique student successfully graduates with a Masters degree (2022).
- Proposal in place (as feasible) for the development of "Center for Excellence in Strategic Raptor Conservation."

Partners involved

Dr. Richard Reading, Raptors Botswana and University of Botswana

Professor Derek Pomeroy, Makerere University and Nature Uganda

Professor Nathan Gichuki, University of Nairobi

Dr. Arjun Amar, University of Cape Town, South Africa.

Professor Ara Monadjem, University of Swaziland.

Dr. Ralph Buij, Wageningen, University Research, The Netherlands.

Dr. Andrea Satangeli, University of Helsinki, Finland.

Greg Kaltenecker, Boise State University.

Andre Botha, Endangered Wildlife Trust, South Africa.

Dr. Campbell Murn, Hawk Conservancy Trust, United Kingdom.

Dr. Colleen Downs, University of KwaZulu-Natal, South Africa.

Dr. William Bowerman, University of Maryland.

John Bowman, Cornell Lab of Ornithology, U.S.A.

The roles of all partners listed above will be to identify promising talent, provide academic oversight and supervision to students, assist with proposal writing, secure funding and ensure timely peer-reviewed publications.

Evaluation

We will evaluate the success of our program:

- Successful completion of academic programs i.e. Certificates, Diplomas, Bachelors, Masters and PhDs
- Numbers of peer-reviewed and popular articles published
- Excellence awards and recognition by media on the impact of the work done by leaders
- Scientific and conservation impact at species, habitat and community level
- Career impact e.g. employment post training
- Growth in staff and funding

Budget

Included in the Saving African Vultures from the Scourge of Poisoning budget.

BUILDING CAPACITY

Development

Personnel

VP of Global Partnerships and External Affairs	Geoff Pampush
Director of Global Operations	Joell Brown
Director of Membership	Linda Behrman
Sales and Gift Shop Manager	Becky West
Proposal Specialist	Bethany Poythress

Background

Our ambitious strategic plan calls for substantial increases in revenue over the course of the five year horizon. To address this we are bringing new development team members on to focus on capital expansion at the Boise Campus, major donor fundraising, and proposal development for foundations and other institutional donors. We also plan to secure substantial gifts to our endowment over the next five years – a $15M and growing asset which provides critical funding to a range of programs and will support the capital expansion.

At least 75% of our annual revenue is relationship driven – the result of a relationship between The Peregrine Fund and the individual or entity which carries over time. Just as The Peregrine Fund deeply values our science and conservation reputation and legacy, so do we treasure the relationships we have developed and maintained through our nearly 50 year history. This plan celebrates that fact and reveals the system we utilize to actively manage and record the ever evolving relationships.

Major donors, those contributing $10,000 or more each year, comprise half of our annual revenue. Arguably they are the most important source of revenue because not only are the gifts large but ideally the relationship travels the arc of time with flexibility to address evolving program needs and perhaps ever growing gift sizes. We strive to engage all major donors and prospects in all aspects of our work and treat them with the respect of true partners in the execution of our vision to conserve birds of prey.

While major donors comprise the largest single source of revenue each year, our membership is our

foundation for both revenue and advocacy on behalf of birds of prey. The membership are those who belong because they care about and celebrate birds of prey worldwide and they provide gifts each year to support our work. Over 800 individuals have been members for over 20 years. And while the membership revenues comprise less than 10% of our total annual revenue, these individuals are the foundation for planned gifts to The Peregrine Fund and continue their legacy after their lifetime.

For most of our history, public agencies have been financial in addition to statutory authority partners. Governments from federal to local are under pressure to reduce discretionary spending. Nevertheless our California Condor and Aplomado Falcon programs have been and continue to be beneficiaries of support. While currently comprising less than 15% of total revenues, our evolving relationship with the Dept. of Defense and our North American Non-Lead Program provide opportunities for deepening and broadening the public partnership with financing or programs we consider essential for the conservation of birds of prey in the US. This plan anticipates both the downward pressure on public funding but also our longstanding relationships and our need to expand them to new sources.

Corporate giving to conservation has evolved over the past 25 years. Earlier natural resource corporations supported endangered species restoration generally and The Peregrine Fund received substantial support from oil companies in particular. The focus of corporate giving has largely devolved to local giving, often employee driven and usually centered around social service and educational programs. This plan recognizes that fact and anticipates seeking corporate support for capital expansion for the Boise Campus as well as exploring fee-for-service engagement where the Peregrine Fund's expertise can serve to address a corporate natural resource need, including exploration of a certification program for electric transmission and wind generation systems.

The revenue goal for FY18, the first year of the Strategic Plan, is $5.3M plus. The plus represents our commitment to work with the Board and others to generate revenue beyond the minimum approved budget so that other needs can be addressed and our revenue generation capacity continues to growth throughout the duration of the 5-year strategic plan and beyond.

Individual Major Donors (gifts of >$10k)

New Major Donors (Geoff Pampush – lead)

Objective 1: Initiate at least 10 new major donor (qualified prospect) relationships each year.

a.) Development Committee will connect staff to 20+ major donor prospects in FY18.
b.) Development Director will research, collate, execute qualified prospect list contacts (200-400 names) in FY18.

Objective 2: Realize at least $50,000 in combined gifts within first year of relationship with the 10 or more new prospects.

a.) All new relationships will be assessed and asked for gift based on degree of development of relationship.

Objective 3: Steward new prospect relationships into regular giving at $10,000 and growing annually.

a) All major donor prospects on Moves Master List (template attached); ongoing (monthly) stewardship with request for funding made at appropriate time.

Existing Major Donors (Geoff Pampush – lead)

Objective 1: Steward every major donor to current giving or greater each year.

a.) All major donors are managed on Moves Master List and stewarded to maximum gift each year.

Objective 2: Engage each major donor to explore multi-year gift planning.

a.) Depending upon length of relationship and other factors, seek multi-year commitments at maximum levels from all major donors in FY18 and beyond.

Objective 3: Create unique engagement opportunities for every major donor every year (i.e. field trips, receptions, etc.)

a.) Through Moves Mgt. invite all major donors and prospects to at least one field opportunity to deepen relationships.

Objective 4: Engage every major donor in a conversation about a planned gift no later than FY20-year-end.

a.) Develop specific plan for individuals by end of FY18 and execute plan through end of FY20.

Objective 5: Continuously evaluate the membership database (donors up to $10k) for individuals capable of major gifts and steward them to such.

a.) Focus new MGO on this constituent group through research and execution of individual plans for qualified major donor (>$10k annual) prospects within membership in FY18 and beyond.

Corporations

Raptor Safe Initiative – Utility/Energy Infrastructure Certification Program (Rick Watson - Lead)

Goal:

Design and Implement a Global Certification System for preventing raptor mortality at energy systems and generate substantial net revenue.

1. Design and trade-mark RSI logo (FY18) – (Amy Siedenstrang - lead)
2. Write a business plan with professional help (FY18)- (Rick Watson-lead)
3. Evaluate the business plan (FY19) – (Rick Watson- lead)
4. If the plan is deemed likely to succeed, then implement the plan with feedback loops and evaluation mechanisms to verify that it is economically sound and provides the desired outcome of raptor safe energy generation and transmission infrastructure (FY20-22).
5. By year FY22, realize widely adopted RSI certification globally and generate at least $250,000 annual net revenue to TPF.

Fee for Service Projects

Goal:

Identify and execute research, planning, problem solving and other activities of interest or need to corporations on a fee for service basis which generates at least 25% net revenue after expenses.

1. (FY18) Convene board and staff committee to develop a range of options and principles (GP lead)
2. Identify staff and board leadership to pursue portfolio of corporate entities and pitch services. (GP lead)
3. (FY19-22) Execute Plan

Direct Corporate Fundraising

Goal:

Generate direct corporate support for TPF programs and capital projects (GP lead)

1. (FY18) Identify Board/director lead to work with staff to craft plan
2. (FY18) Develop plan which pairs corporate interest with TPF programs such as local/Boise/capital projects; natural resource companies with potential impacts on birds of prey with operations near TPF projects, etc.
3. (FY19-22) Execute Plan to generate consistent corporate funding.

Public Agency Funding

Goal:

Realize revenues for TPF programs from Federal and State Agencies in all fiscal years FY18-22 (Geoff Pampush – lead)

1. Execute coordinated lobbying and stewardship plan to realize at least $75k/yr. and $375k/yr. for the Aplomado falcon and California Condor programs respectively from the US Fish and Wildlife Service (GP lead).
2. Plan and execute revenue generation from western state fish and wildlife agencies to be used in the Lead Campaign.
    a. Generate, administer and execute plan for outreach with $250k/yr. for three years with Oregon Dept. of Fish and Wildlife beginning October 1, 2017 (Chris Parish- lead)
    b. Respond to RFP from California Dept. of Fish and Wildlife when released to similarly manage $1M/yr. for three years for outreach effort in California. (Chris Parish -lead; est. date – 2018)
    c. Develop same model programs in Utah and Arizona beginning in FY19 (Chris Parish- lead).
3. Maintain and deepen relationships with federal land management agencies (DoD, BLM, NPS) and other state wildlife agencies and continuously prospect new financial support for TPF programs (Chris Parish-lead).

Foundations

Goal:

Generate direct support, at scale, for TPF programs identified in the Strategic Plan (Geoff Pampush-lead)

1. Hire full time Proposal Development Specialist (completed)
2. Focus Specialist on programs most likely to garner restricted support from institutional foundations. (completed)
3. Enlist support from all program leaders to help identify opportunities to match foundations with TPF priorities. (ongoing)
4. Develop/manage master list for real time review at any time. (ongoing)

Multi-lateral or International Funding

Goal:

Secure financial support from multilateral institutions for qualifying programs such as Madagascar and the Darien (David Anderson- lead)

This includes sources composed of multiple institutional and national sources such as the World Bank, Global Environment Facility (GEF), Critical Ecosystem Partnership Fund (CEPF), REDD+, Green Climate Fund (GCF) and others.

It also can include national aid agencies, such as such as USAID, NORAD, and IDRC.

It can also include aid NGOs such are CARE, and Catholic Relief Services… and other conservation NGOs such as Conservation International, World Wildlife Fund, and Wildlife Conservation Society

See: https://en.wikipedia.org/wiki/List_of_development_aid_agencies

1. Engage multilateral consultant on Darien Program to internalize understanding of opportunities for funding and project development (underway).
2. Provide training to international program staff and proposal development specialist for identification of opportunities to fund programs through these institutions (as appropriate).

Endowment

Goal:

Secure additional gifts to the endowment of $10M (program support) and $12M (Boise Campus Expansion support) by 2022

Increases in endowment revenue are essential for funding some science and administrative functions. Further, any capital expansion requires a 1:1 endowment match to cover annual and deferred maintenance as well as increased operating costs.

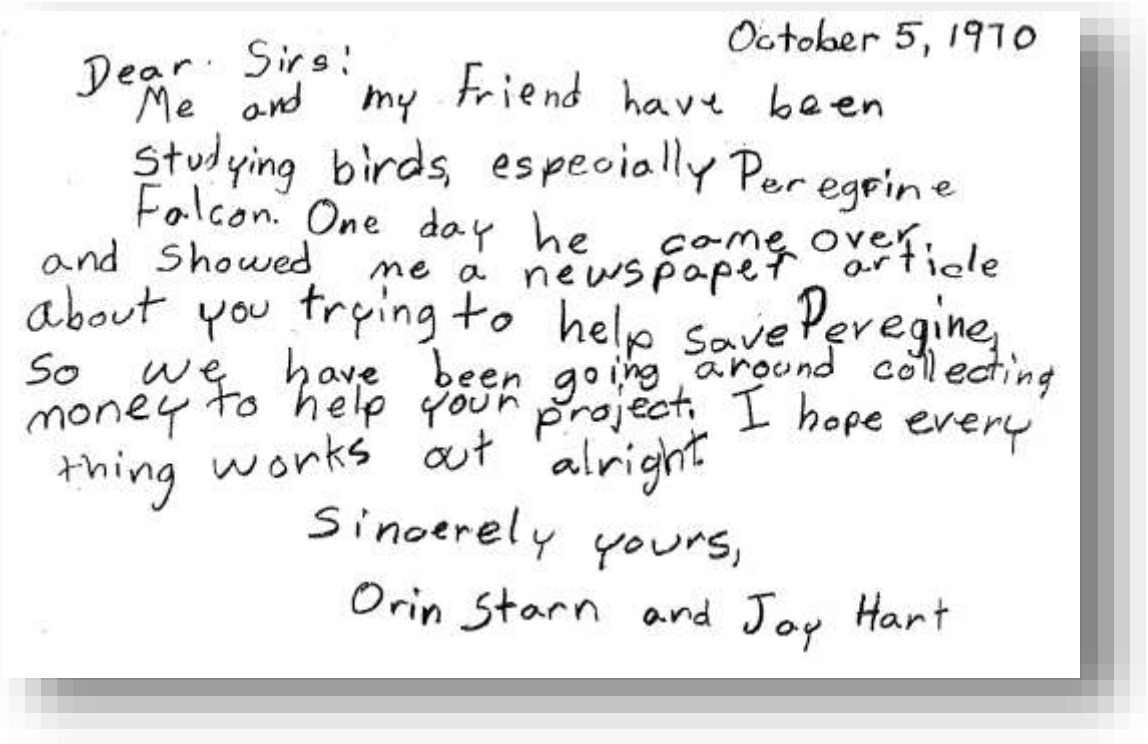
1. Develop specific plan for approaching key major donors capable of substantial endowment gifts in FY18. (Geoff Pampush lead)
2. Review and revise planned giving program plan to maximize effectiveness of outreach and pledges in FY18. (Geoff Pampush lead)
3. Seek endowment gifts from all major donors in support of the Strategic Plan beginning in year 2 (these are gifts following the requests of major donors under 1 above) (Geoff Pampush lead)

Planned Giving

Write and execute an updated planned giving plan by second quarter end FY18. (Geoff Pampush lead)

Membership

One of The Peregrine Fund's first private donations was from two children who, concerned about the plight of the Peregrine Falcon, collected money from their friends and neighbors and sent it to Tom Cade. Since then, The Peregrine Fund has attracted contributions from thousands of supporters of our work from the U.S. and around the world. In 1988, we elected to start a membership program.



October 5, 1970

Dear Sirs:
Me and my Friend have been studying birds, especially Peregrine Falcon. One day he came over and showed me a newspaper article about you trying to help save Peregine, so we have been going around collecting money to help your project. I hope every thing works out alright

Sincerely yours,
Orin Starn and Jay Hart

Purpose and Power of Membership

Communities are often informally connected by unwritten shared interests. Membership formalizes a community. The Peregrine Fund strives to engage people the world over to appreciate and integrate birds of prey into their world view. Our membership program strives to not only engage those constituents in their support for birds of prey but to take the additional step of providing financial support for the direct conservation and engagement programs The Peregrine Fund deploys worldwide.

The Peregrine Fund's members not only provide important financial support by joining and remaining engaged, but by displaying this membership allegiance to others (i.e. social media), the membership generates interest and momentum which further attracts new constituents to The Peregrine Fund's mission.

Goals of the Membership Program

1. Engage and steward the membership such that they become enlightened ambassadors of the mission and programs of The Peregrine Fund.
2. Encourage a continuously deepening financial commitment by all members such that they financially support The Peregrine Fund at the highest level possible.
3. Encourage planned giving by all members.
4. Execute a membership acquisition program to continuously grow the membership base.

Financial Contribution of the Membership Program

The Peregrine Fund's membership contributes over $500,000 annually in support of our programs (unrestricted membership gifts). For purposes of accounting, The Peregrine Fund categorizes all gifts of $10,000 or smaller as a membership gift. This includes restricted gifts by corporations and foundations within this gift size category. When restricted gifts of up to $10,000 are included, the contribution of the membership program totals in excess of $900,000 annually. This financial base of nearly a million dollars against a current revenue stream of $5.5M is an essential and broadening base.

FY18 Membership Objectives

1. Increase membership income to at least $927,000
    a. Focusing on Leadership Council and foundations contributing $10,000 or under, generate $927,000 or more.
    b. Send hard copy solicitation to current and lapsed members with compelling messaging at least once during the year.

2. Accelerate membership growth, both in number of donors and income (increase income at least 10% annually)
    a. Use multiple sources to identify and contact potential constituents (live programs, VMIC visitations, workplace giving campaign events, social media platforms, etc.).
    b. Redesign the website to become a more effective platform for attracting and engaging constituents to become members.
    c. Make "the ask" with combined direct mail, email, special media, VMIC visitation, and website.
    d. Capitalize on Fall Flights by streamlining engagement and solicitation opportunities.

e. Offer free fall flights event for Idaho Conservation League (and/or other conservation groups) members to recruit TPF members from their membership.

3. Sustain and strengthen relationships with members
    a. Send mail to all constituents (current and lapsed members) with donation envelope: winter postcard for year-end appeal, with corresponding emails (November); spring postcard (March); fall postcard to announce calendar (August); free calendar to members (October).
    b. Participate in national EarthShare co-op (Express) advertising and attend EarthShare campaign events to retain current level of EarthShare revenue.
    c. Send bi-weekly Notes from the Field email communications.
    d. Use webcam to connect to constituents and members.
    e. Invite key members to special events (VIP Fall Flights night, Speaker Series, etc.)
    f. Recruit volunteers to serve as welcoming ambassadors to new members.
    g. Working with Communications Team, design and produce new messaging visuals to replace Annual Report.
    h. Conduct member survey to acquire more information on our members.
    i. Continue Speaker Series for members (four annually).
    j. Develop new engagement opportunities through social media challenges and contests, encouraging recruitment of friends.
    k. Participate in annual statewide Idaho Gives online campaign.
    l. Encourage participation/viewing of Raptors at Risk (photo competition) to drive membership renewals and calendar sales.

4. Evaluate effectiveness of FY18 execution by mid-year; set objectives for FY19 and beyond.

Membership Background Addenda

The Peregrine Fund Membership Income History

FISCAL YEAR	TOTAL BUDGET	MEMBERSHIP BUDGET	% of overall budget	MEMBERSHIP INCOME	Increase %	income % of overall budget
2003	6,263,400	118,166	1.9%	343,289	5%	5.48%
2004	5,519,600	111,018	2.0%	337,712	-2%	6.12%
2005	5,838,600	102,320	1.8%	361,530	7%	6.19%
2006	6,817,100	106,344	1.6%	369,306	2%	5.42%
2007	6,803,200	99,922	1.5%	386,119	4%	5.68%

2008	6,738,100	96,851	1.4%	404,704	5%	6.01%
2009	6,807,600	130,987	1.9%	444,319	9%	6.53%
2010	5,325,512	103,060	1.9%	468,058	5%	8.79%
2011	5,975,389	151,490	2.5%	462,496	-1%	7.74%
2012	6,179,300	141,450	2.3%	484,386	5%	7.84%
2013	5,676,898	134,700	2.4%	577,352	16%	10.17%
2014	5,744,300	127,270	2.2%	641,593	10%	11.17%
2015	5,484,300	159,529	2.9%	722,468	11%	13.17%
2016	6,190,100	150,249	2.4%	909,138	21%	14.69%
2017	6,829,200	158,011	2.3%			

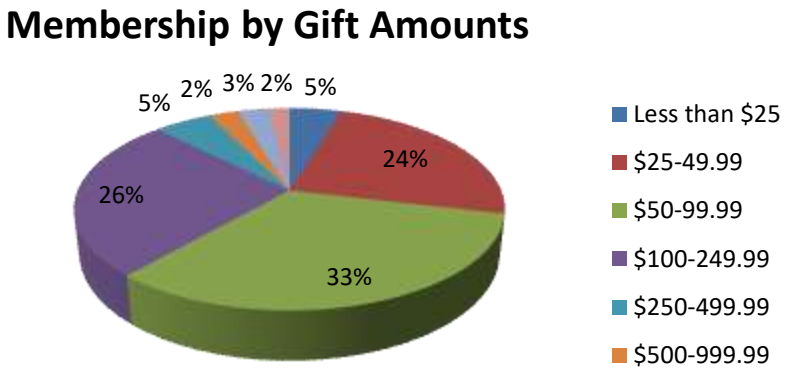
Marketing and Communication Plan

What groups do we need to serve most?	What do they need to hear from us?	What is the best way to find and communicate with them?	When will we communicate with them? How often?	How will we know if they have heard our message?
Members	Accomplishments	E-mail	Mailings 4x year	Greater income
Visitors	Our future plans	Website	Bi-weekly e-newsletter	Peer influence
Conservationists	How their donations are used.	Mailings	Special email announcements	
Biologists		In person-VMIC	Invites to special events	
		Off-site events		
		Workplace giving campaign events		

The Peregrine Fund Annual Gift Amounts

The average membership gift amount for FY16 was $149.

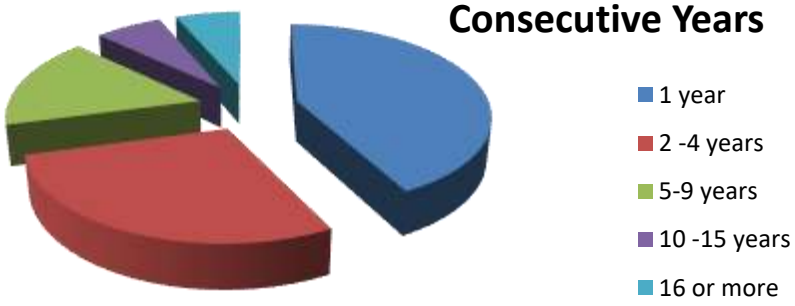
Less than $25	170	$250-499.99	188
$25-49.99	869	$500-999.99	96
$50-99.99	1189	$1000-2499.	101
$100-249.99	943	$2500-10,000	68



The Peregrine Fund Donor Retention

TPF has averaged a 61% donor renewal rate the past five years. The renewal rate for Visitor Center (VMIC) members averaged 22% during the same period.

Fiscal Year	Overall Retention	VMIC donors Retention
FY16	60%	26%
FY15	59%	24%
FY14	59%	21%
FY13	61%	20%
FY12	64%	21%



Members by location (FY16)

Sales and

Admission Revenues

Gift Shop

The Gift Shop is the first and last stop for visitors coming to the World Center for Birds of Prey. It plays a significant role in guests' overall experience, including the merchandise sold that adds to the revenue bottom line, but equally important, enhances brand awareness through logo-centric items. Further our fair-trade items originate from local people making and selling products from or near to our international programs. (Becky West – lead)

In addition, the Gift Shop serves as a central and primary processing center for a number of areas within the organization. Figures below do not include the transactions or dollars associated with Memberships, Special Events, and Specialty Sales, as they are captured elsewhere in this document. Annual projections for Gift Shop Sales - $125,000 and Online/E-commerce Sales - $12,000-$14,000. The modest figure associated with online sales and a corresponding required change in software vendors has prompted us to re-evaluate the ROI for this component. A full review and evaluation will be conducted in the FY18 Q2 to determine the best course of action moving forward.

Sales Goals

1. Generate $300,000 in net sales in FY18 and grow sales at 15% annually.
2. Generate new memberships in support of the mission.
3. Serve as one of the key platforms for marketing and brand awareness.

FY18 Objectives

1. Increase Gift Shop Sales by 12%
2. Create “Consider Conservation” promotion asking guests to donate a dollar towards our projects. (Unrestricted Funds)
3. Highlight a piece of a current project each month (e.g. student in Masai, education birds, Condor chicks)
4. Create Buttons each month to promote programs and projects.
5. Increase off-site Sales presence opportunities (Raptor Research Conference 2020, local community events) Sales Goals: $1,500 + per
6. Increase Volunteer training and management
7. Webinar Training for best retail (and e-commerce) management practices.
8. Create eye-catching designs for merchandise for our programs. Develop merchandise tags which include information about project and location.
9. Attend Seattle Gift market to purchase unique gift items.

Admissions to the Velma Morrison Interpretive Center

Gate admissions to VMIC are growing and will continue to grow with careful stewardship. Beginning in FY18 admission fees will rise from the current $7 to $10. This decision is based on market analysis and we believe will be positively supported by visitors.

Goal

Raise at least $200,000/yr through admissions at VMIC beginning in FY18 (Tate Mason- lead)

Objective 1

Provide quality programs throughout the year which attract visitors for educational and science entertainment value.

Moves Management Master List

In FY17 The Peregrine Fund began using a spreadsheet called the Moves Management List. This list tracks and schedules all activities related to prospects and donors who either currently donate in excess of $10,000 annually or are considered capable of such. Currently, we have over 200 actively tracked and managed names on this list. Table 1 provides an example of what is included in the document. The columns are self-explanatory but suffice it to say that this living document not only directs all the Moves Managers (note initials in Mgr column) but also provides projected revenue for the full fiscal year. This tool will prove to be invaluable over time in managing and tracking major donors, major donor prospects and stewardship of both in order to realize anticipated annual revenue.

Note also that all interactions with the individuals and entities on the Master List are also entered into our CRM database called Raiser's Edge (RE). RE is the master database for all organizational constituents.

Table 1. Moves Management Master Sample

SOURCE	Mgr	Type	FY17 $	REQ	75%	When	Whom	Project	O	N	D	J	F	M	A	M	J	J	A	S
Fdn XYZ	MV	Donor					Marta	West Indies												
Agency ABC	GP	Agency					Chris P	CA Condor												
Richie Rich	GP	Prospect					Geoff	Prospect												
Trust for Funding	RW	Donor					Geoff	Unrestricted												
AWWI	RW	Corporate					Rick	Research												
Learn Fdn	TM	Donor					Tate	Education												
TOTALS																				

Development Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$576,400	$595,800	$599,900	$604,100	$608,400	$2,984,600

Membership Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$169,500	$172,500	$182,200	$181,900	$191,600	$897,700

Sales Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$135,800	$134,900	$136,100	$136,600	$137,600	$681,000

Business Office

Personnel

Director of Global Operations:	Joell Brown
Accountant:	Cindy Attaway
Accounting Technician:	Kit Stevens
Front Office Assistant:	Marilyn Eagleton

Project Background

The Business Office provides administrative, communications, financial and logistical support to enhance and ensure efficient and accurate management of the business affairs of the organization.

Need Statement

The Business Office addresses The Peregrine Fund's strategic capacity outcome by helping to assemble infrastructure, facilities, and people.

The Business Office supports all of aspects of the organization. A well-run and efficiently organized Business Office is essential for any organization to operate effectively. Assistance is provided to all staff and the Board of Directors.

The Business Office oversees the Financial, IT/Technology, Operational and Personnel areas of the organization. At the heart of the financial department is a system which maintains records of all revenue and expenditures, to include accounts receivable, accounts payable and general ledger. It coordinates the management of the organization's endowment funds with the investment committee and a hired investment manager and with the bank that has custody of the endowment securities. Other responsibilities include, but are not limited to, administering grants or contracts that support various projects and programs; organizing the board and committee meetings; taking minutes; and assisting with any needs of the president, chairman, or members of the committees.

Beyond the day-to-day responsibility for the funds that support the operations of the organization,

the Business Office is also responsible for the production of financial reports for the organization and each program. The Accountant works with the President and Development staff to prepare the Annual Budget with input from Program Directors.

The Business Office works throughout the year with the auditors, the investment manager, bank representatives, insurance companies, and other organizations that have business dealings with the organization; in addition, it maintains all records of real estate and other fixed assets owned by the organization.

The Business Office serves as the Human Resources department. It implements and monitors policies and procedures relating to employees of the organization, ensuring federal requirements mandated by the Equal Employment Opportunity Commission (EEOC) and other pertinent legislation are followed. These policies and procedures include, but are not limited to: maintaining all personnel records for current and past employees of the organization; recording employment history, salary information, employee benefits, and payroll; and distributing employee information to program managers. The Business Office also administers the employee 403(b) retirement plan.

The Business Office serves as the “front door” of the organization, greeting and directing visitors to appropriate locations or personnel, answering incoming telephone lines, processing incoming/outgoing mail, and provides administrative support.

The Business Office assists the Board of Directors and the Founders with correspondence, maintains files on terms, committees, minutes and implementing directives. In addition, logistical arrangements for all board meetings, as well as preparation of materials for the meetings, are handled by the Business Office.

Goals & Objectives

Short Term (1 year)

Update Employee Handbook

- All employees utilizing Human Resources Information System (HRIS)
- Manager/Supervisor Handbook and ongoing training (hiring, harassment claims, etc.)
- Plan and Execute two Board Meetings
- Implement enhanced nominations process for Board
- Implement Executive Leadership Team
- Develop Leadership Training program

Long-term (2-5 years)

- Accounting package that integrates with donor database - provides manager direct access to finance information
- Human Resource staff - separate from finance/accounting
- Online portal for Board of Directors

Activities

Daily

Mailing, Deposits (donations, payments, sales), Gift Shop Orders, Reception, Financial Transactions,

Weekly

Billing, Payroll, Human Resources

Monthly

Balance Accounts, Grant Management and Reporting, Reports to Project Directors, Financial Status Report to Executive Committee

Annually

January: *W-2 wage reporting information to employees; 1099 Report of non-employee compensation; 4th quarter payroll tax returns; Property Tax exemption forms; D&O Insurance policy renewal; IRS Form 990 Draft; CA Form RRf-1& 199; 415 Limits Testing-Retirement plan*

February: *Insurance Renewals (D&O, EPLI, Security); IRS Form 990 Final; Pennsylvania Registration*

March: *Liability/Auto Insurance policy renewals*

April: *ERISA Form 5500-Retirement Plan; IRS Form 8955-SSA; 1st quarter payroll tax returns; Spring Board Meeting*

May: *Open Enrollment-employee benefits; Archives Museum policy; Retirement Plan Semi-Annual review*

June: *USAID Annual Report*

July: *2nd quarter payroll tax reports; Budget preparation*

August: *Budgeting*

September: *Idaho annual incorporation report; Budget finalization*

October: *3rd quarter payroll tax reports; Fiscal year closing, prepare work papers; Medicare Creditable Coverage Notices; Fall Board Meeting*

November: *Fiscal year audit; Retirement Plan Semi-Annual review; holiday mailings*

December: *Calculate taxable terms for final December payroll; holiday mailings*

Partners involved

Echelon Group - Benefits Administration

Eide Bailly - Financial Audit

Luther King Capital Management - investments

US Bank-Banking services: checking, savings, credit cards, merchant accounts, line of credit

*BLM, NMSU/WSMR, USFWS, USGS … billing and reporting; see projects for details

Evaluation

Timely processing of mailing, deposit, billing, reporting; providing staff and board members with the information and items needed; successful Audit; Employee Handbook distributed; HRIS system utilized by all staff for improved time/reporting accuracy and efficiency.

NOTE: As program scope and staff grow, reliance on financial and personnel resources will increase. These functions are currently being handled by one department; with growth will come increased complexity and additional investment in resources will be needed in the next 2-5 years.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$387,700	$348,600	$429,900	$438,500	$429,400	$2,034,100

Information Technology Strategic Plan

Personnel

Director of Global Operations:	Joell Brown
Director and Software Developer:	Paul Spurling
Sr. Systems Engineer:	Brett Sebring
Intern:	Taylor Rolison

Project Background

Since computers first arrived at The Peregrine Fund, investment in Information Technology (IT) planning, infrastructure, staffing, and budget has been an afterthought at best. As a result, nearly all business processes have been at high risk of interruption and data loss. Additionally, our physical location presents challenges in the form of an unreliable electrical supply, limited options for internet connectivity, and significant damage by weather and rodents.

Efforts to establish business standard IT practices began in late 2014 when Paul Spurling was assigned to handle all IT matters for TPF, in addition to fulfilling his webmaster and software developer roles. A status analysis began then, but no additional resources in funding or staffing were assigned. Brett Sebring was hired in December 2014 to take on the user support and system tasks that an outside vendor had been mishandling. A triage process was also immediately started to begin correction of the most severe issues. Taylor Rolison joined the team as a part-time intern in October 2016 to assist with training and user support.

The IT staff is now working hard to create foundational standards and procedures, while at the same time supporting ongoing business. Great progress has been made since early 2015, ranging from creation of a server room, to rebuilding the network to business standards, to installing an advanced network security system.

Data are referred to as the currency of science, and a primary role of IT is to ensure efficiency, security, stability, and scalability of the systems that collect, store, and disseminate data. The strategic plan's conservation, engagement, and capacity outcomes all rely heavily on the communication and data that IT makes possible. The IT staff is working on many projects to fully establish standard business systems and protections to enable these outcomes.

The conservation outcomes of the American Kestrel Partnership, Neotropical Raptor Network, and especially the Global Raptor Assessment are intrinsically and completely dependent on IT.

The engagement outcomes also rely upon IT to make possible communication to constituents, partners, and other audiences. Efforts are ongoing to establish a modern and efficient unified platform for all TPF's internet sites.

The Plan defines IT as a capacity outcome. Increasing IT provisions in order to fully support the business operational abilities of other capacity outcomes is yet another example of the foundational value of IT.

Need Statement

Information technology responds to The Peregrine Fund's strategic capacity outcome by assembling the IT infrastructure needed for success by all projects, programs, and organizational functions.

Every program and business function of The Peregrine Fund creates data and requires communication. Each of the three outcome types identified in the 2017 organizational strategic plan relies heavily on IT assets and services.

Conservation Outcomes

- All conservation programs generate data which must be collected, transmitted, and stored by IT systems, as well as being dependent on communication methods such as email, instant messaging, and file sharing.
- Global Raptor Assessment includes Global Raptor Impact Network (GRIN) and Global Raptor Data Bank (GRDB) which are entirely IT services and products that will require substantial resources to design and implement.
- California Condor program requires implementation of mobile data collection to streamline and improve accuracy of daily data collection and analysis.
- American Kestrel Partnership is entirely reliant upon internet community site, data collection apps, and database.
- Gyrfalcon and Tundra Conservation efforts generate large amounts of data and images that need to be stored and protected, along with website presence for field manual and partner communication.
- Neotropical Raptor Network is organized via website which is in dire need of updating

- Other conservation programs also generate data that needs to be protected in perpetuity.

Engagement Outcomes

- Websites and associated apps such as AKP are required for global communication with constituents including citizen scientists.
- Education requires website content for visitors. Nearly infinite possibilities for expanding TPF's education efforts to a global scale exist by utilizing IT resources such as streaming video.

Capacity Outcomes

- Development and membership efforts rely upon efficient and usable IT assets including website content and stable, reliable internet connectivity to the Blackbaud system.
- Other business support departments also rely heavily upon a reliable and secured internet connection, data storage, email, and other communication technologies

Goals & Objectives

- Provide resources for all staff to do their work; store and protect all TPF data; maximize system uptime.
- Utilize information technologies to enhance communication and collaboration, collect and preserve essential data, maximize website usability and effectiveness, facilitate fundraising efforts, and streamline workflows.

Activities

- The IT staff leverages information, creativity, and technology to develop and implement new and existing approaches for advancing the mission of The Peregrine Fund, while ensuring efficiency, security, stability, and scalability.
- No additional participants are recruited.
- Services provided by IT cover a broad spectrum from system development to daily user tech support. All services will be ongoing as long as TPF exists.
- Specific benchmarks of progress for the next five years are dependent upon what the other programs plan to do. Non-programmatic goals include preserving historical data, enhancing collaboration with partners, streamlining workflows, creating policies for and

standardization of data collection. Additionally IT will be involved in improving technologies for communication, outreach, sales, membership, and website usability (mobile compatibility, search engine ranking).

Partners involved

At this time, no unpaid partners exist. When funding is approved, FFW will be a key external consultant for all internet assets.

Evaluation

Evaluation is based on whether stated goals and objectives are achieved, whether fast, reliable communication tools are maintained, data is managed and available in perpetuity, and staff actions are fully and efficiently supported.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$561,100	$315,600	$324,300	$340,700	$353,000	$1,894,700

Facilities, Maintenance & Construction, and Vehicles

Personnel

Director of the World Center for Birds of Prey:	Tate Mason
Maintenance Specialist:	Sam Davila
Maintenance Specialist:	Brian Gloshen
Propagation Manager:	Marti Jenkins

Project Background

The World Center for Birds of Prey is the headquarters of The Peregrine Fund (TPF), a non-profit conservation organization dedicated to saving birds of prey worldwide. Internationally renowned as a hub of research and education, our 581 acre campus provides the physical space and facilities required for our mission. In 1984 TPF combined two disparate facilities (Ithaca, NY and Fort Collins, CO) into one location on the outskirts of Boise, Idaho. With commanding views of the Treasure Valley and the Snake River Plain, the campus was quickly put to work as an administrative headquarters and for propagating endangered raptors. From the beginning, TPF produced Peregrine Falcons and gleaned the expertise needed to successfully propagate many other species, from Aplomado Falcons to Harpy Eagles. The current focus of our propagation efforts is with the Critically Endangered California Condor. The propagation facilities are maintained not only for current use, but also for future need. In addition to propagation and administration, our campus serves to facilitate scientific research, environmental education, archival purposes, transportation, employee residences, and open space.

Public engagement is an essential function of the World Center for Birds of Prey. Since opening the Velma Morrison Interpretive Center (1994), almost one million people have gained a first-hand experience with our mission of raptor conservation. The goal of the facilities plan is to ensure that the physical components (facilities and vehicles) are in place and maintained for TPF to both operate smoothly and grow successfully.

A demonstrated track record for achievement sets TPF apart. Our reputation allows us to attract the world's best talent, which immeasurably strengthens our organization. A key component in employee satisfaction and

retention is our exceptional campus. The World Center for Birds of Prey is a place where science and engagement collide to advance conservation on a local, regional, and global scale.

Need Statement

Facilities, Maintenance & Construction, and Vehicles addresses The Peregrine Fund's strategic capacity outcome by helping to assemble infrastructure and facilities needed by all functional areas of the organization.

In the dynamic landscape of raptor conservation, The Peregrine Fund has been successful in its ability to effect conservation in the field. Over the years, the vast majority of expended funds have gone directly to raptor conservation projects. Unfortunately, there is now a considerable back-log of deferred maintenance at the World Center for Birds of Prey. Many of our buildings are now over 30 years old and require attention. To meet the demands of our strategic plan and reach our Vision 2050, it is imperative that we invest in our campus and facilities. The present strategic plan will serve to prioritize the needs of our campus and set the stage for TPF to succeed now, and into the future.

The Administration, Herrick Collections Building, and Interpretive Center are currently separated by a large parking lot. Plans are underway to create a cohesive campus which will permit an integrated experience for everyone who works at, or visits the World Center for Birds of Prey. As TPF grows, it is imperative that we build expanded education and research facilities, while simultaneously maintaining our current physical structures. An expansion plan will address the massive log of deferred maintenance projects and transform the World Center for Birds of Prey into a global destination for both researchers and the general public. Environmental sustainability was not an initial design feature of the World Center for Birds of Prey, but going forward it will be factored into everything we build.

Goals and Objectives

Our overall goal is to maintain facilities and build new structures to facilitate TPF's strategic plan. We intend to set the stage for the future of the World Center for Birds of Prey through the maintenance and expansion of our education, research, and administration facilities. Throughout, focus will be on efficiency and sustainability. Goals include:

- Maintain current infrastructure
- Expand infrastructure to meet organizational objectives
- Meet employee and visitor expectations for safety and security
- Facilitate transportation (vehicle) needs of TPF
- Provide equipment and expertise necessary for all maintenance objectives

Activities

- Maintain buildings and all physical infrastructure on campus
- Maintain HVAC system
    - In May of 2017 we implemented a comprehensive HVAC maintenance agreement with Capital City Heating and Cooling
    - Maintain HVAC units and anticipate replacement expenses
- Reduce environmental impact of operations
    - Upgrade Lighting to LED or equivalent low wattage (ongoing)
    - Maintain and/or replace obsolete HVAC systems
    - Reduce water use 10% below 2015 usage by 2018
    - Reduce energy use by 7% below 2015 usage by 2018
    - Incorporate solar installation in 2019 as part of facility expansion
    - Incorporate a 'Green Team' that will evaluate operations and identify concrete opportunities to operate sustainably. Begin this effort in the winter of 2017-18.
- Maintain and restore the four residences on the hill
    - Identify and prioritize needs
    - TPF staff will conduct majority of maintenance projects
    - Projects requiring outside expertise will undergo a competitive bidding process
- Maintain all vehicles (including licensing and insurance) and develop a plan for the acquisition and disposition of current fleet
- Maintain all landscaping in a Firewise manner (www.idahofirewise.org)
    - Landscaping to reduce the risk of wildfire to our operations is an ongoing effort
    - In 2017 we began a cooperative agreement with Idaho Firewise address the flammability of our current landscaping
- Ecosystem Restoration
    - Increase presence of native plant species, decrease invasive species
    - Focus on the control and eradication of state-listed noxious weeds: Hoary Cress, Rush Skeleton Weed, others as identified
    - Greatly reduce prevalence of annual grasses (cheatgrass, medusahead wild rye)
    - Engage community to both learn and teach about restoration ecology
- Maintain sprinkler and irrigation systems
- Maintain all roadways, keeping them clear of snow, ice, and debris.

- Add or replace signs around the property as needed
- Repair and/or replace gates and fences
- Assist in set-up / tear-down for events

Proposed Expansion

The expansion of the World Center for Birds of Prey is envisioned as a three phase operation, each phase lasting 1-2 years.

Phase 1 (2018-2019)

The visitor parking lot is moved to the west of the Interpretive Center, creating vehicle-free space for pedestrians at the center of our campus. The newly landscaped space between the buildings sets the stage for five to eight modern raptor exhibits which are built in Phase 2. An expanded gift shop is built to facilitate higher volume of admissions and sales. Included in the gift shop are two offices, storage, and restrooms. West Flying Hawk Lane is also resurfaced during phase 1.

Phase 2 (2019-2020)

Five to eight raptor exhibits are built in the area of the former parking lot and current courtyard.

Phase 3 (2020-2022)

A building is constructed to house a flex space / flight theater, indoor raptor exhibits, and multiple offices.

Partners Involved

Hatch Design Architecture

Idaho Power

Suez Water

Bureau of Land Management

Various Businesses and Community Groups

Evaluation

Ongoing consultations will be conducted with TPF staff, management, and Board of Directors to determine where investments should be made and how priorities will be set. Plan to be revisited on an annual basis.

Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$193,100	$195,900	$198,100	$200,200	$202,600	$989,900

Expansion Budget

FY18	FY19	FY20	FY21	FY22	TOTAL
$0	$920,000	$3,000,000	$7,160,000	$0	$11,080,000

The above figures only consider construction capital and do not include corresponding endowment funds projected at a 1:1 ratio. That is, as we raise capital for construction, we will build the endowment at the same rate to build a reliable support base for building maintenance and operations.

PROJECT	FY18	FY19	FY20	FY21	FY22	TOTAL
The Global Raptor Impact Network (GRIN)	846,600	1,153,700	1,195,700	1,281,500	1,287,100	5,764,600
Recovering the Northern Aplomado Falcon	342,500	203,000	203,100	203,300	204,300	1,156,200
Golden Eagle Monitoring	135,100	116,600	111,500	111,500	107,400	582,100
Propagation at the World Center for Birds of Prey	116,000	115,200	118,200	118,800	120,800	589,000
California Condor Propagation	437,800	417,900	423,000	429,700	435,100	2,143,500
California Condor Reintroduction Program	579,300	540,300	522,900	520,800	518,900	2,682,200
North American Non-Lead Program	721,300	820,900	1,190,500	1,458,200	1,826,000	6,016,900
American Kestrel Partnership	215,100	263,200	252,200	244,100	244,800	1,219,400
Gyrfalcon and Tundra Conservation Program	231,400	199,200	196,800	206,400	207,100	1,040,900
Andean Condor Conservation in Ecuador	145,000	145,700	149,400	152,300	156,500	748,900
Impact on Andean Condors of Yawar Fiesta in Peru	107,800	60,800	45,300	49,000	52,800	315,700
West Indies-Ridgway's Hawk Conservation Project	423,000	359,000	325,000	350,500	360,500	1,818,000
Puerto Rican Sharp-shinned Hawk Project	63,300	71,000	72,700	74,600	76,400	358,000
Cuban Kite Project	49,300	52,900	8,100	8,100	8,100	126,500
Orange-breasted Falcon Conservation	165,700	166,000	166,400	166,800	167,300	832,200
Harpy Eagle Research and Conservation	219,200	198,100	190,200	61,500	62,000	731,000
Darien Landscape Conservation Initiative	133,100	114,700	178,800	304,000	332,100	1,062,700
Saving Africa's Vultures	339,500	159,000	159,400	157,400	157,600	972,900
Madagascar Conservation Project	454,400	514,900	455,900	463,700	476,300	2,365,200
Philippine Eagle Conservation Project	35,300	35,300	35,300	35,300	35,300	176,500
Critically endangered Vultures in Central India	42,500	29,700	29,700	30,600	29,700	162,200
Raptor Safe Initiative	90,500	135,000	127,900	127,900	127,900	609,200
Global Engagement	467,200	561,100	637,300	671,400	671,800	3,008,800
Education Program at VMIC	380,300	388,700	394,300	442,500	449,100	2,054,900
Neotropical Raptor Network	16,000	28,900	101,400	16,000	16,000	178,300
Neotropical Leadership Development	174,400	175,800	186,500	197,000	209,100	942,800
Development	576,400	595,800	599,900	604,100	608,400	2,984,600
Membership	169,500	172,500	182,200	181,900	191,600	897,700
Gift Shop	135,800	134,900	136,100	136,600	137,600	681,000
Business Office	387,700	348,600	429,900	438,500	429,400	2,034,100
Information Technology	561,100	315,600	324,300	340,700	353,000	1,894,700
Facilities Maintenance	193,100	195,900	198,100	200,200	202,600	989,900
Velma Morrison Interpretive Center Expansion	-	920,000	3,000,000	7,160,000	-	11,080,000
TOTAL	**8,955,200**	**9,709,900**	**12,348,000**	**16,944,900**	**10,262,600**	**58,220,600**