Research agenda update

Currently planned projects for 2020 and beyond

Our goals

To improve the lives of animals in the wild, we have to understand them first. Which animals are capable of subjective experiences? What is the quality of their lives like in the wild? How can we safely and sustainably help them?

Answering these questions is beyond the reach of any one research group. That’s why Wild Animal Initiative’s highest priority is supporting the growth of a self-sustaining research community that can advance welfare biology research on many fronts at once.

The goal of our own research program is to catalyze the kinds of conversations we would like to see continued by other welfare biology researchers. To that end, we’ve selected a variety of projects that:

1. demonstrate the diversity of welfare biology research,
2. highlight key themes that we expect to be important to identifying programs that can help as many wild animals as possible, and
3. leverage the expertise of our research team.

We’re always excited to collaborate, so we’ve presented each of our planned projects in the context of broader research areas of interest. We’ve also listed some areas without planned projects. We see these areas as highly impactful, but don’t have the time or expertise to take them on alone. If you or someone you know would be interested in exploring topics like these further, please reach out!

Our research plans

Theory
- Estimating welfare distribution and capacity across taxa
- Frequency of different causes of death
- Community relationships
- Optimal population size

Methods
- Welfare metrics
- Remote monitoring

Policy
Regulation of novel technologies
The OneHealth paradigm
Coordinating with related communities
Relationships between welfare and common public policy areas

Applications
Fertility control programs
Agricultural harms to insects
Influence of domestic cats on small wild animals

Theory

Theoretical projects investigate fundamental principles that govern welfare outcomes in nature. These projects often use modeling techniques to explore underlying dynamics, particularly when data is scarce.

Estimating welfare distribution and capacity across taxa
Both the capacity for subjective experience and the average quality of life are likely to vary greatly across taxa. In order for welfare biology research to have the greatest impact possible, we will need to know which animals are in greatest need of help. We're interested in developing conceptual frameworks and identifying species traits that can inform prioritization efforts.

- **Our work so far:** We developed the concept of welfare expectancy to roughly estimate the distribution of welfare across species using only basic demographic data.
- **What we're doing in 2020:** We're combining the welfare expectancy model with empirical estimates of neuron count for different species. While neuron count is a highly imperfect proxy for sentience, testing how the model combines with empirical data will help us understand how to use the model for cross-species comparisons once better proxies are identified.

Frequency of different causes of death
When and how an animal dies are major factors in the overall quality of that animal’s life. Reducing the most painful causes of death seems like a highly promising approach to improving wild animal welfare. However, an animal spared from one cause of death will still die eventually. For example, a raccoon successfully vaccinated against rabies might die of starvation instead. The net effect of programs that target a particular cause of death depends on how different causes of death substitute for each other.

- **Our work so far:** We developed population models that can report on the relative frequency of different causes of death under given conditions.
- **What we’re doing in 2020:** We’re exploring insights from those models and attempting to parameterize them using real-world data on the ecology of predator-prey pairs. We will also review prior empirical research on mortality factors, which will help us to identify promising methodologies for academic research into causes of death among wild animals, as well as informing our judgement of how important this set of questions may be.
Trophic dynamics

Predation is a stereotypical example of suffering in nature. However, wild communities are complex. Changing animal populations can have consequences throughout the food web, both in terms of animal interactions and in terms of the total number of individuals the ecosystem can support.

- **What we're doing in 2020:** We're using population modeling to review the complex relationships between consumer populations, trophic structure, and total welfare.

Density-dependence of welfare

The concentration of animals relative to a resource (such as space or food) will influence a range of welfare-relevant dynamics. How total welfare varies with population size is, in particular, a complex relationship. As long as animals are living good lives, it seems better for more individuals to exist. But increasing population density can lead to lower welfare by increasing competition, disease transmission, or social stress.

- **Our work so far:** We demonstrated how the tradeoff between population size and density suggests that, for a given set of resources, there could be an optimal population size that maximizes welfare. Whether that optimum exists and how hard it is to achieve depends on the actual relationship between population density and individual welfare.

- **What we're doing in 2020:** We're exploring that relationship with an observational study comparing the population densities and welfare indicators of rock pigeons (*Columbus livia*) across different US cities.

Methods

Methods projects develop techniques and best practices for wild animal welfare projects. At this early stage, this work primarily involves developing tools to measure welfare or identify welfare threats.

Welfare metrics

Welfare is hard to measure because it is subjective by definition and most animals can’t directly report their experiences. While a variety of tools have been developed for the captive context, very few have been applied to wild animals, and most cannot be used to compare between species. Developing such metrics is critical to being able to assess the welfare status of a wild population and determine whether projects aimed at improving their welfare are successful.

- **What we've done so far:** Biomarkers of aging seem like they could be a promising step towards developing welfare metrics that are objective and broadly applicable across different taxa. We've written a report summarizing the promise of telomere length and hippocampal volume as welfare metrics.

- **What we're doing in 2020:** We're looking for collaborators to develop an experimental test of telomere length as a welfare metric.
Remote monitoring

Technological advances in camera traps, tracking devices, and logging instruments have led to an unprecedented ability to study animals remotely. One promising technology for welfare monitoring is biologgers (specifically, tri-axial accelerometers paired with satellite-GPS locators), which can give detailed information about the movement, behavior, morbidity, and mortality of wild animals. Biologgers are already used to study animal welfare, and are increasingly used in wildlife ecology.

- **What we're doing in 2020:** We're reviewing how bioglogger data can be used to evaluate welfare along the Five Domains model. We’re also exploring how to link bioglogger data with environmental data to determine the relationships between environmental context and wild animals' wellbeing.

Policy

Improving wild animal welfare at scale will require the resources and coordination of large institutions. This includes governments and the research and advocacy communities that influence them. Our policy projects seek to incorporate wild animal welfare into institutional decision-making processes, benefitting wild animals either by changing policy in the short term or by normalizing wild animal welfare as a policy priority in the long term.

Regulation of novel technologies

Technological advances could make wildlife management much more humane, cost-effective, scalable, targeted, or sustainable. However, new technologies can carry new ecological, social, and ethical risks. Government regulation plays a pivotal role in determining how quickly novel technologies are developed, what safety standards they are held to, how the public perceives their safety, and how they can be used in the wild.

- **What we've done so far:** One of the roles of regulation is to enforce an appropriate balance of risk and reward in technology development. We sought to inform these decisions with our investigation of the tradeoffs between persistence and reversibility in the design of potentially long-lasting interventions to improve wild animal welfare.

- **What we're doing in 2020:** We are interested in exploring which novel technologies are most promising for wild animal welfare, how they might be regulated in the United States, and what, if anything, wild animal welfare advocates can do to promote safe and effective regulation.

The OneHealth paradigm

Reducing the burden of disease seems like one of the most technically feasible and publicly popular approaches to improving wild animal welfare. OneHealth is a global public health paradigm linking the health of humans to that of animals and their shared environment. As a rare policy framework that explicitly addresses wild animals' quality of life, it presents a unique opportunity to advance institutional concern for wild animals, secure funding for welfare biology research, and convene relevant expertise.
What we're doing in 2020: We’re reviewing the contributions of OneHealth to wild animal welfare to date and identifying opportunities for further research and collaboration.

Coordinating with allied communities

Many other advocacy communities want humans to have a stronger relationship with the natural world. Some, such as the Compassionate Conservation movement, explicitly value the welfare of individual wild animals. By engaging more with adjacent research and advocacy communities, we may be able to more effectively promote welfare policies.

What we've done so far: We published a paper suggesting how restoration ecology can incorporate wild animal welfare in order to promote both restoration and welfare goals.

What we're doing in 2020: We’re exploring areas of shared goals between wild animal welfare and conservation, particularly focusing on the conservation community’s goal of fostering environmental attitudes among the public that favor environmental stewardship and highlighting the importance of common animals.

Climate change mitigation

Mitigating climate change will require massive land-use changes, including planting forests or grasslands for carbon sequestration, building solar and wind farms, and changing agricultural practices. As we work to make the earth more habitable for humans, we should make sure our efforts benefit nonhuman species as much as possible. Comparative studies of different approaches to carbon sequestration or renewable energy production could inform policy decisions on which implementation strategies to prioritize.

What we're doing in 2020: We’re looking for partners to explore this research area and develop advocacy strategies.

Applications

Our applied research focuses on projects that can be implemented in the near term to improve wild animal welfare.

Fertility control programs

Managing fertility is a highly promising approach to improving wild animal welfare. For species where intraspecific competition has a strong influence on juvenile mortality, fertility reduction can increase survivorship (see: compensatory survivorship in mosquitoes paper). For wild animal populations that humans already control, fertility management offers a humane alternative to lethal management. Fertility management can also be paired with efforts to decrease the frequency of painful deaths to keep target populations stable, limiting any unanticipated ecosystem effects of such projects.

What we're doing in 2020: We’re using urban rock pigeon (Columbus livia) populations as a case study in fertility management for wild animal welfare. Pigeons are highly numerous, and many cities already manage their populations with lethal poison. Pigeon management drugs are commercially
available and have the potential to be highly cost-effective. Using population modeling, literature reviews, and observational studies, we will explore the welfare consequences of replacing lethal management with fertility management.

**Agricultural insect management**

Agricultural pest management kills vast numbers of insects every year. Even though we are uncertain about insect sentience, there is at least some risk that current pest management practices are causing harm to trillions of individuals. Shifting to more humane pest management practices could be a highly cost-effective way to improve insect welfare with minimal risk of unanticipated side effects.

- **What we've done so far:** We released a report on agricultural pest management practices and their potential effects on insect welfare. As a supplement to this report, we developed a database of insecticidal compounds and their modes of action, as well as a method for estimating the number of insects affected by pest management programs.
- **What we're doing in 2020:** We're expanding these supplemental materials, developing promising directions for research collaboration, and exploring next steps for insect welfare interventions.

**Influence of domestic cats on small wild animals**

Domestic cats (*Felis catus*) can harass, injure, and kill small wild animals. Owned outdoor cats are also at higher risk of injury and disease, and have shorter lifespans on average than indoor cats. Keeping cats indoors represents an interesting opportunity to potentially reduce the suffering incurred by predation while improving the lives of the predator species.

- **What we've done so far:** We partnered with a Pennsylvania animal shelter to conduct a messaging study about outdoor cats. Adopters were randomly provided with a leaflet about the positive impacts of indoor living on cat health, a leaflet about the negative impacts outdoor cats have on wildlife, or no leaflet. Shelter staff followed up with adopters over three months to determine if wildlife or cat welfare information affected the adopters' choice to allow their cats outdoors.
- **What we're doing in 2020:** We're analyzing the data from this study. Our goal is to establish if the messaging methods tested in this case were effective, and to see if it would be worthwhile to pursue further outdoor cat interventions. We expect to deprioritize this work, both because initial results suggest the leaflets had little or no effect and because we are uncertain about the net effect of keeping cats indoors (see research by Rethink Priorities on this topic).