THE CONSERVATION STRATEGY
OF
PITTSBURGH ZOO & AQUARIUM

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Motivation

The Pittsburgh Zoo & Aquarium (hereafter, the PZA) has a proud history of championing wildlife and conservation in Western Pennsylvania and across the globe. The mission of the organization orients our conservation work towards long-term impact by working with our communities. Similarly, the vision for the organization is to provide effective conservation leadership by bringing collaborators together. In both its mission and vision, PZA commits itself to transformative and exemplary conservation programs.

Guided by this renewed commitment to field conservation activities for measurable impacts, this conservation strategy provides a framework to address pressing needs in biodiversity conservation and incorporates cutting-edge ideas in conservation practice. For additional reference, the Association of Zoos and Aquariums defines field conservation as “efforts that directly contribute to the long-term survival of species in natural ecosystems and habitats.” (See link for more details).

This conservation strategy lays the roadmap with the following guiding questions in mind:

1. What are the major drivers of biodiversity decline that a conservation leader such as the Pittsburgh Zoo & Aquarium can help address?
2. How can PZA help address these causes of biodiversity decline? How can we build programs robustly, reflecting the latest biological and social science, and emergent conservation practices?

The Framework: Responding to The Three Grand Conservation Challenges

Our field (*in-situ*) conservation work focus on these three areas of grand conservation challenges by identifying a given project's connection to one or more of these challenges.

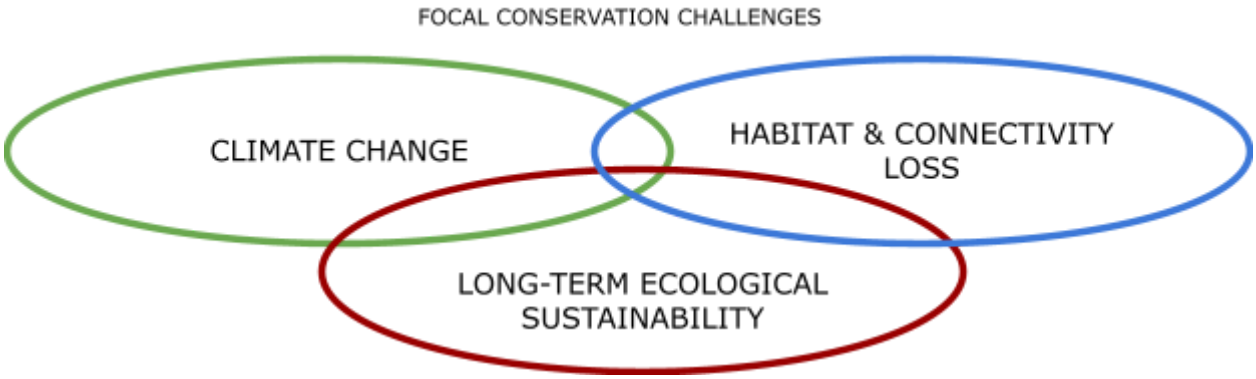

Figure 1: Climate change, long-term ecological sustainability, and habitat loss represent the three most pressing, grand challenges to biodiversity.

Climate Change is the defining environmental challenge of our time. Anthropogenic climate change affects human societies, animal communities, and ecosystems. Anthropogenic climate change is an inescapable primary driver for ecosystem change and species loss.[1] Recent reports and research point to an elevated risk of biodiversity extinctions from climate change.[2,3] Additionally, the effects of climate change threaten the resilience and well-being of human communities in Pittsburgh and around the globe. Programs that contribute to climate resilience in ecosystems and habitats are a key part of the conservation portfolio. Additionally, conservation action can pair with climate adaptation, for example– green stormwater infrastructure, or mitigation, for example– restoring high-elevation forests in red panda habitats, in local and global settings.

Habitat Loss is the leading cause of biodiversity loss and species extinctions.[4,5] Loss of tropical rainforests through fragmentation and clearing is an unfortunate example of irreplaceable biodiversity loss. Habitat loss, conversion, and degradation also reduce biodiversity in the US. In addition, habitat degradation and decline happen due to changes in ecological disturbances such as fire and flood, often exacerbated by climate change or other anthropogenic factors. Habitat loss and degradation work synergistically with climate change to affect species distributions and ultimately lead to local extinctions. Reversing habitat loss and restoring habitat connectivity can maintain wildlife populations and ecosystems.

Long-term Ecological Sustainability: Finding ways to coexist with our environment and the animals that live in them can create resilient human communities and diverse landscapes or

seascapes that are alive and sustainable.[6] Public-facing conservation engagement institutions such as the Pittsburgh Zoo & Aquarium can promote the coexistence of animals in their habitats with human communities and create an empathic conservation ethic that includes both human and nonhuman members of the regional community. Ecological sustainability through a living landscapes approach, where animals and humans share the land and seascapes, can foster human-wildlife coexistence and facilitate inclusive conservation practices for the empowerment of indigenous and local voices in conservation. In addition, recognizing the role human communities play in managing wildlife populations, especially in international or indigenous contexts, opens up avenues for inclusive and effective conservation practices. This, indeed, is the next frontier in biodiversity conservation.[7]

Core Operational Values

In guiding the establishment and evaluation of local, regional, and international conservation projects, we will be guided by four core values (figure 2). These values correspond to the values outlined in PZA's Strategic Plan. Effective conservation programs, especially the ones we establish and execute, will integrate aspects of these value pillars represented by how the conservation work is carried out in the three grand conservation challenge areas. These core values represent an understanding of best practices in conservation, informed by interdisciplinary challenges to historical practices from decolonizing, community-based, and systems-centric perspectives. The following section describes these pillars and how they may guide our conservation efforts.

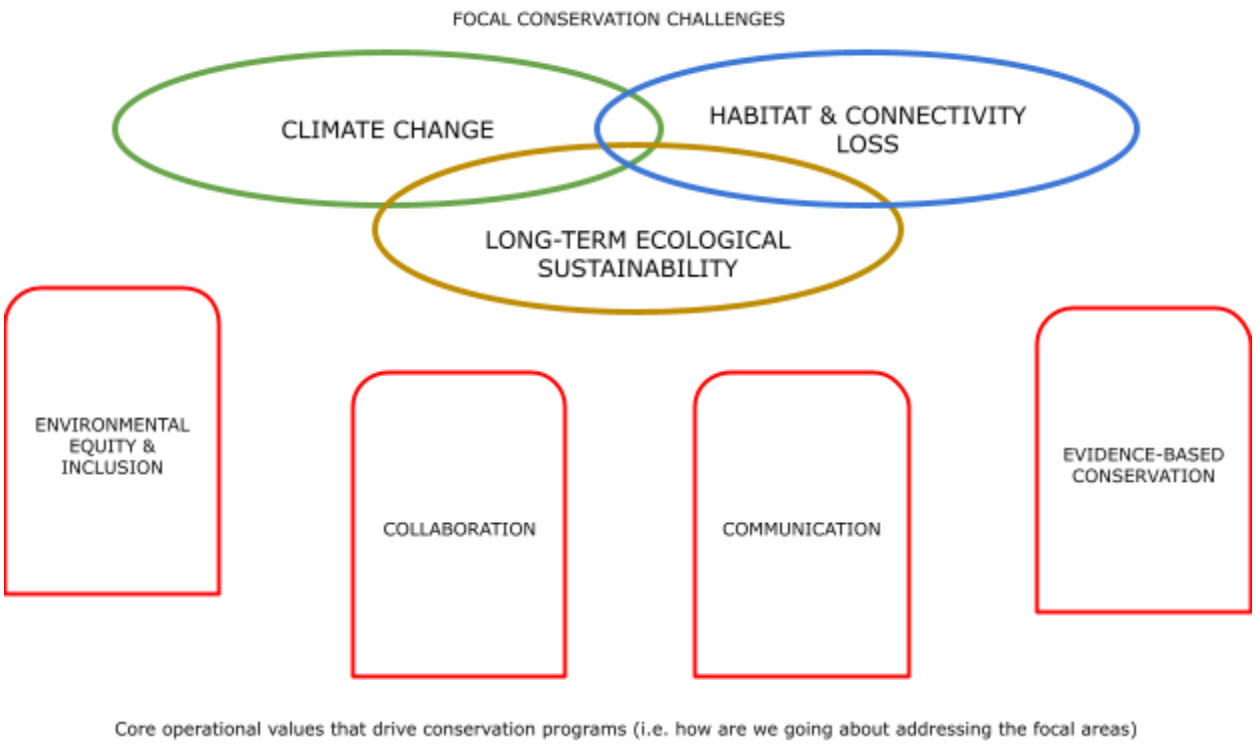

Figure 2: Core operational values that guide our conservation work

Environmental Equity and Inclusion

Modern conservation movement traditionally has excluded indigenous groups, communities of color, and other underrepresented groups. These communities are among the most vulnerable to environmental changes such as climate change. These communities can be key collaborators and leaders in conservation efforts. For example, indigenous peoples own or manage a quarter of terrestrial lands globally.[8] Whether we include underrepresented groups in an equal, participatory way and whether we can orient conservation work to address pressing environmental needs in these communities will determine the long-term success of Pittsburgh Zoo and Aquarium's conservation work. This value corresponds to the values of **Respect** and **Inclusion** highlighted in the Strategic Plan. Following are some, not all, relevant ideas that can guide our conservation work.

A. Addressing environmental disparities: Our conservation work aim to address environmental disparities in the partner communities in an equitable, collaborative manner. For example, locally, our work value the collaboration on issues such as climate adaptation and justice in underserved neighborhoods and internationally, access to livelihoods and resources for partner communities around community managed or otherwise protected areas.

B. Inclusive, participatory narrative: Conservation work has often been top-down, colonial, or savior-attitude driven. Our conservation programs identify community interests and

strengths and be inclusive of the community's agency and ideas. We view the communities we work with as valued partners and not passive recipients of conservation efforts.

C. Supporting diverse identities and backgrounds in conservation: Through supporting diverse conservation practitioners and helping grow the next generation of diverse conservation leaders, our conservation programs work toward more diverse and effective conservation outcomes.

D. Addressing historical exclusions, elevating minority experience and voices: Conservation and the environmental movement can be more effective if historically marginalized, underrepresented groups, especially from an environmental perspective, are elevated and included in the conservation programs. Our conservation work will work to elevate underrepresented, marginalized voices and environmental concerns.

E. DEI values applied to cross-cultural conservation work: The values mentioned above need to be included in our international work as much as in our domestic conservation work. Across cultures, conservation work can be more challenging with societal barriers, in addition to language barriers. Our work will be sensitive to the structures of power within a community and strive to be respectful and collaborative with our international partners and communities.

Collaboration

Conservation is an interdisciplinary field that has become increasingly more collaborative in recent decades. Informed by the lessons learned from the early days of biological conservationists working independently from local communities or other stakeholders, we have learned that working with the community in a collaborative manner and including stakeholders from multiple institutions and disciplines is key to conservation success. Inspired by the values of **Respect** and **Inclusion** highlighted in the Strategic Plan, we will value collaboration with partners within PZA, our communities at home and abroad, and colleagues at other institutions. In fact, the organization's mission statement ("we connect people to wildlife, inspiring our communities to conserve nature for future generations") heralds a call to connect and collaborate with professional colleagues and the public in advancing conservation action.

A. Collaboration with the community: Community-based conservation has become integral to conservation program planning and execution. In successful conservation work, communities are empowered partners invested in mutually addressing the conservation challenge and ensuring lasting success. This applies to our local, regional, and international programs. Relevant guiding ideas are:

    i. What are the partner community's strengths and assets?

ii. What is the conservation need in the community? How would the community benefit from the collaboration?

iii. How can PZA be a trusted partner of the community in addressing conservation challenges?

B. Collaboration among departments: Different departments within the Pittsburgh Zoo & Aquarium possess unique skills and strengths to contribute towards field conservation success. Weaving conservation projects and collaborations through the Animal Departments, Education, Communication & Marketing, Horticulture, etc ensure that different aspects of field conservation projects are woven across departments and well supported by the experts in the respective fields. Involving different departments also ensure that conservation projects and solutions are holistic.

C. Collaboration with other organizations: PZA's Strategic Plan calls for Uniting Our Communities. In our conservation work, we collaborate with organizations that are engaged in a project area or at a geographic location with overlapping conservation interests, which is key in extending our conservation efforts and making lasting impacts. In addition, we aim to empower and amplify partner voices, who share a common conservation mission. Collaborations with researchers and practitioners from different institutions ensure conservation programs are multifaceted and reflective of real-world conservation problems. These collaborations also bring to the table skillsets and resources needed for conservation success beyond the Pittsburgh Zoo & Aquarium team.

Communication

Pittsburgh Zoo &Aquarium's Strategic Plan outlines the values of **Wonder** and **Connection** that motivate us in our conservation work. Furthermore, the **Inspire Our Audience** goal of the Strategic Plan drives us to connect conservation stories with our audience. In recent years, as zoos have expanded their missions to include conservation, sustainability, and environmental education, zoo-based programs play an important role in informal education around environmental and conservation topics. In fact, zoos and living collections institutions are uniquely poised to tell conservation stories to their audience in an engaging way that inspires hope and catalyzes action. In undertaking conservation projects, a key question is how a given conservation story inspires awe and wonder and fosters a connection between our audience and the environment. Communication and education to the community are also integral parts of behavior change-based and participatory conservation programs. Some criteria for this aspect of our conservation work:

A. Storytelling component or utility for communication: When designing a conservation project, we must consider the aspects that lend themselves to communicating the work

to an audience. Our conservation projects aim to identify and integrate suitable elements for storytelling and identify the potential of the storytelling or communication component to inspire empathy, awe, or behavior change in the audience.

B. Synergy with the Education team: The Education team at Pittsburgh Zoo & Aquarium is invested in translating and communicating complex environmental and scientific ideas to a range of audiences at PZA and in surrounding communities. For a given conservation project, we need to think about how the conservation work intersects with current Education programs and goals. In addition, involving the Education team in the conservation work by identifying educational components of a conservation project is invaluable in participatory conservation projects. Outreach and education potential of a conservation project is a key criterion for future conservation work.

C. Advocacy: Zoos can communicate with policymaking bodies effectively from a non-partisan, trustworthy position. Pittsburgh Zoo & Aquarium can be an authoritative voice for speaking about regional conservation issues. Closer to home, PZA can be an important partner in climate resilience and local conservation needs through advocacy and support to local partners. Advocacy is a useful part of the overall conservation strategy to further conservation program goals.

Evidence-based Conservation

On-the-ground conservation efforts need to be designed in response to evidenced conservation needs and challenges, and follow-up actions need to be adjusted by evaluating outcomes.[9] Conservation work drawing on current research is necessary for successful on-the-ground efforts. In addition, sharing insights and results from conservation practice help Pittsburgh Zoo and Aquarium contribute to the field and demonstrate effective leadership in this area. Evidence-based conservation connects with the **Innovation** and **Excellence** values outlined in the Strategic Plan.

A. Conservation needs connected to action: For effective conservation, projects need to be designed to address demonstrated needs on the ground. Criteria for consideration here is whether conservation needs have been assessed for specific stressors, threats, and challenges that the work is intended to respond to.

B. The proposed conservation measure is consistent with current research and literature: Informing conservation project planning and design with current research and understanding can help actions to be more effective. Clearly defining measurable, achievable, and realistic conservation goals can ensure project success. In addition, intermediate steps for evaluation and adaptive goal setting can ensure long-term success for ambitious programs. Grounding plans, goals, evaluations, and methodologies

in the current understanding of conservation biology and social sciences isl be an integral component of our conservation work.

C. Conservation research, reporting and sharing: Conservation actions, especially in integrative conservation projects, working across biological and social disciplines, can yield important insights into conservation practice. PZA's conservation efforts include documenting conservation outcomes and sharing this research with fellow practitioners and in published literature whenever possible. Valuing research through conservation work encourages our conservation work to be cutting-edge and contributes to the field by sharing knowledge and understanding gained through our work.

Geographic Scale of the Conservation Programs

The range of biodiversity conservation problems in the three grand challenge areas manifest at multiple spatial scales. Given Pittsburgh Zoo & Aquarium's intent of bringing global conservation efforts to local and regional audiences, we execute programs that operate on these three scales. Pittsburgh Zoo & Aquarium is committed to helping address the environmental and conservation challenges facing the urban, suburban, and exurban communities in Western Pennsylvania. As a zoo with national leadership and a global collection, we also commit to providing conservation and environmental leadership in addressing the most pressing global conservation challenges of our time, such as climate change and habitat loss.

Figure 3: The different geographic scales in our current and future conservation work

Local Programs

The Pittsburgh Zoo & Aquarium's local program engages with communities in the Greater Pittsburgh metro area to promote urban ecological resilience. We aim to do this through on-the-ground conservation and restoration work, by working closely with the Education team at Pittsburgh Zoo & Aquarium and partnering with local collaborators/organizations. Programs can address the three grand challenges (page 3), and the conservation value pillars may guide specific projects. Examples of local projects can be urban landscape restoration with the aim of promoting urban pollinator habitats and sustainable landscape care. Another example can be increasing community climate resilience by partnering with local communities and organizations, by catalyzing climate change conversations, and increasing community capacity by identifying and helping address these needs in the community. Staff conservation grants focus on this spatial scale.

Regional Programs

Conservation involvement in regional projects may involve partnering with other conservation organizations for aquatic conservation efforts such as mussel reintroduction and assurance populations, advocacy and coalition-based efforts such as partnering with the state chapter of the Nature Conservancy for climate change and biodiversity policy-making and planning, and watershed-scale conservation programs. We are establishing several breeding programs for reintroduction and wildlife conservation in collaboration with PA state agencies. Staff conservation grants may also focus on this spatial scale.

Global Programs

Conservation work with partners in other countries can be done via direct involvement, staff time donated to partners, and by sending occasional conservation support funds. Our international programs will be developed with organizations whose work embodies similar values of collaboration, cooperation, evidence-based conservation, and environmental equity and inclusion. Some of the promising avenues for international collaborations are conservation programs on red pandas, African elephants, and lions through the Saving Animals From Extinction (SAFE) programs of the Association of Zoos and Aquariums. We're exploring additional conservation opportunities in Uganda for human-wildlife coexistence and in tropical marine ecosystems.

Planning and Evaluation of Programs

Utilizing the framework (figure 2, page 5) laid out, we are actively assessing opportunities for and initiating new programs. Concurrently, we are reinvigorating previous conservation partnerships and exploring new opportunities. The current and new programs are opportunities to operationalize the strategy and evaluate our program for conservation impact. Through evaluating current programs and assessing the new opportunities with guidance from the framework, we strive for conservation impact and excellence in our programs. In other words, effective conservation programs result from iterative practice of the strategy.

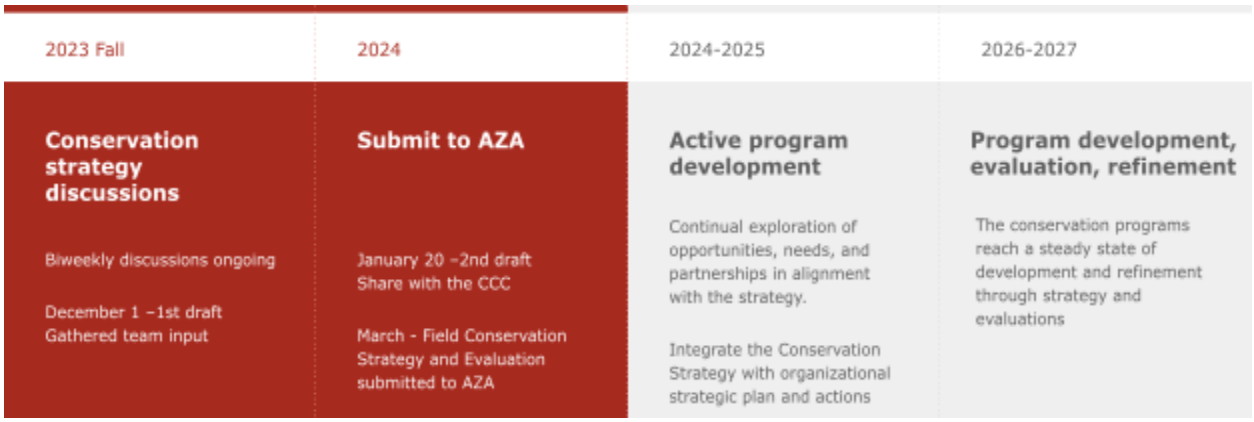

Figure 4: The conservation strategy framework, combined with the initial conservation programs, helps identify opportunities, needs, and partnerships for effective field conservation programs over time.

Conservation program design and assessment: To effectively design and execute a conservation program, we utilize a Conservation-by-Design framework. Please see Appendix 1 for a schematic of this framework. The planning, implementation, and evaluation phases are viewed within an adaptive management cycle, all while connecting to the body of evidence on a given conservation problem.

Evaluation: We have created an evaluation rubric based on the strategy framework (i.e. figure 2). Please see the link for a template of the rubric. The rubric allows for qualitative and quantitative evaluation. The qualitative feedback allows for evaluation of programs and projects in the manner of National Science Foundation or National Institute of Health grants. In addition, the rubric can be easily modified to suit evaluation needs.

We evaluate ongoing programs periodically using the comprehensive evaluation rubric cited in the Conservation Strategy. Additionally, we have identified interim Key Performance Indices (KPI) and metrics. Some preliminary KPIs are mentioned below:

Program	**Key Performance Indices**
Canopy-based Urban Conservation Program	#s of trees planted, community people engaged, team members involved in tree adoption events
ECO grants	# of proposal received, funded, acres restored/conserved/covered
SAFE programs	Matched against each SAFE program objectives. Additionally, # of team members involved in each SAFE, # of communication stories generated, and size of zoo audience engaged
Sea Turtle Second Chance	# of turtles rehabilitated and released, size of audience engaged

Field Conservation Programs

In the spring 2024, Pittsburgh Zoo & Aquarium created its new field conservation strategy. The strategy received input from a wide group of internal team members and feedback from the Collections and Conservation Committee in Spring 2024. A complete strategy was shared with the Collections and Conservation Committee in July 2024. This strategy and program update was submitted to the AZA during the 2024 inspection. Since then, this strategy is being implemented alongside the resource conservation (sustainability) strategy and the conservation education strategy. Together, these three strategies comprise the Institution's overall Conservation Strategy. In the implementation phase of the field conservation strategy, the following programs are ongoing:

Local Programs:

Canopy-based urban biodiversity programs: PZA has initiated a biodiversity-based tree canopy program in Pittsburgh in partnership with Tree Pittsburgh, an urban tree-based conservation not-for-profit based in Pittsburgh. Current work focuses on tree adoption events and biodiversity-based educational engagement in underserved communities in the city. Tree Pittsburgh and PZA are co-creating tree-based biodiversity education and engagement materials for accompanying tree adoptions and for use in urban green spaces. PZA team members engage in community tree adoption and planting events, supporting Tree Pittsburgh in a public-facing manner. In the current agreement for 2024-25, at least ten tree adoption events are being held as part of the collaboration with Tree Pittsburgh. Educational materials supporting tree adoption in Pittsburgh are also being developed by the Zoo's Education team and Tree Pittsburgh. Furthermore, by engaging in community green spaces, we are planning to support biodiversity-based plantings through staff time, expert advice on design, and educational signage.

Empowering Conservation Opportunities (ECO) Grants: ECO grants are open to all PZA team members and focus on increasing collaboration and impact in Pittsburgh and surrounding areas. Offered annually, the 2024 grant awardees were notified in June 2024, and fieldwork on the awarded projects took place in 2024. See the link for the 2024 call for proposals. Three groups of grantees, five team members in total, worked on water quality monitoring (Three Rivers Water Keeper), urban park habitat restoration (Pittsburgh Park Conservancy) and are working on hellbender surveys (Western PA Conservancy). The call for 2025 proposals will be announced in March.

Regional programs

Reintroduction programs at the International Conservation Center: The International Conservation Center (ICC) in Somerset County (1.5 hours from Pittsburgh) is the PZA's conservation breeding and reintroduction center. At this center, species of conservation concern are bred for reintroduction according to established program specifications. Partnerships with SAFE (Saving Animals From Extinction) Bison and Red Wolf have been established for conservation breeding. Wild Bison (i.e. verified genetic stock), received from American Prairie, MT, arrived at the ICC in 2024. Additionally, in 2025, through a partnership with Pennsylvania Game Commission, we are setting up a soft release site for Allegheny Woodrat, a species listed as threatened in Pennsylvania. Individuals bred at other zoological facilities will use the soft release site at the ICC to acclimatize and become release-ready for reintroduction.

Sea Turtle Second Chance Program: The PZA team rehabilitates cold-stunned sea turtles through the winter months and releases the turtles in late spring, typically in May. The program started in 2015, and has rehabilitated 5-10 sea turtles each year, with ~200+ hours/year on average. In 2023-24 winter, after six months of rehabilitative care, two team members traveled with two Kemp's ridley and four green sea turtles for release off the coast of Jacksonville, Florida. In 24-25 winter, PZA is rehabilitating 13 sea turtles of loggerhead (2), green (4), and Kemp's ridley (7) sea turtles.

Regional collaboration on mussel reintroductions: PZA is working with Western Pennsylvania Conservancy to contribute in the The Pennsylvania Boat Commission's mussel-rearing and release program. As part of this program, mussels from the Boat Commission's hatchery will be reared for growing into larger size classes prior to releasing in Southwest Pennsylvania streams where mussels have been extirpated locally. Discussions in 2024 resulted in a field facility visit to Union City, PA and internal staff activation for this program. Further discussions with Western PA Conservancy is taking place in early 2025 to determine next steps and setting up mussel rearing facility at the Aquarium on PZA campus.

AZA SAFE Programs

The PZA team is involved with various Saving Animals From Extinction or SAFE programs. Since accreditation in 2024, PZA staff's collaboration with the SAFE programs have increased considerably. Currently, PZA partners with the following SAFE programs: Red Panda, African Elephant, North American Songbirds, North American Bison, African Lion, and Sharks and Rays. We are also assessing institutional partnerships in SAFE Orangutan and Sunflower Seastar.

Involvement and leadership in these programs are increasing, and the conservation work is integrated in the conservation program activities. Key contributions to various SAFEs are mentioned below:

SAFE Red Panda: PZA personnel are key members in the SAFE Red Panda, with Shafkat Khan (director of conservation) the Vice Program Leader, Jenn Torpie (vice president of Education and Community Engagement) co-leading the Public Engagement workgroup, and Lauren Kane (Associate Veterinarian) co-leading the One Health workgroup. Shafkat Khan and Jenn Torpie are part of the SAFE's steering committee. Khan spent 2 weeks in April 2024 for collaborations with Red Panda Network and also assessed opportunities for conservation impact through SAFE Red Panda. The program plan is due to the AZA in February 2025; zoo staff provided significant leadership in creating the program plan.

SAFE African Elephant, International Elephant Foundation: PZA is a founding member of SAFE African Elephants. The program plan is in the final stages and PZA will participate in collaborative action for this SAFE. In addition, PZA is a longtime supporter of the International Elephant Foundation (IEF). Through financial contributions to IEF, PZA supports a grants program that funds on-the-ground research and conservation of African elephants.

SAFE North American Songbirds: The canopy-based urban conservation program mentioned earlier is the chief way we contribute to the SAFE North American Songbird program goals. Additionally, zoo staff have implemented and are expanding bird-window collision prevention measures throughout the zoo. New signage on ways zoo guests can provide habitats for songbirds in their front and backyards has been installed in Kids Kingdom.

SAFE Orangutan: Zoo staff have participated in this SAFE since 2023. Kelsey Forbes, curator of mammals, is a member of the education advisory committee of this SAFE and has coordinated with in-situ partners for education and engagement resource curation in 2023 and 2024.

International Programs

Victoria Falls Wildlife Trust (VFWT): PZA has worked with VFWT in the past, with animal care staff participating in TB exams, elephant collaring activities and other field support for VFWT activities. We are expanding upon this partnership on human-elephant coexistence in the Kavango-Zambezi (KAZA) transfrontier landscape, where 50% of the global African elephant population lives. In 2024, PZA supported VFWT for wildlife ranger training to take place in 2025. Additional educational collaborations are also ongoing to support VFWT's school programs.

Uganda/ICON: Centered at Murchison Falls National Park, Uganda, PZA has initiated a partnership with Innovation for Conservation (ICON) of WildCRU, Oxford University, UK for developing a conservation capacity-building program. The on-the-ground work at and around Murchison Falls supports human-wildlife coexistence practices in collaboration with the Ugandan wildlife agencies. The parties are collaborating on a snare removal and repurposing program that generates livelihood benefits for the community, called Snares to Wares. Our contributions will make the community artisan training more effective, and involve the community in sharing conservation-related information with the project team for effective monitoring. Educational collaborations between the two parties will focus on integrating nature and conservation education with school-based nutrition and community activation efforts. The overall goal for both streams of work is to reduce community dependence on marginal livelihood activities, such as poaching or harvesting from Murchison Falls, and increase community support for wildlife and community coexistence.

Awajun in Alto-Mayo, Peru with Machacuay Community Conservation: In collaboration with Bioparc Conservation, a French zoological conservation organization, PZA is helping implement community-based conservation in the Alto-Mayo region of Peru with two villages of Awajun indigenous communities. Our partner on the ground, Machacuay Community Conservation, supports the two indigenous villages with camera trapping, on-the-ground organization and management of Peruvian government provided funds for 100K hectares of rainforests. In collaboration with another NGO, OnePlanet, PZA is providing conservation planning and assessment for establishing effective livelihood and forest monitoring in this highly biodiverse region. An agreement is in place for sharing camera trap data with PZA education courses. A recent biological survey in the neighboring valley by Conservation International documented 20+ species new to science. With our contribution in planning and limited funds, PZA is helping conserve high biodiversity rainforests with direct climate change and community benefits.

Natural Resource Conservation Strategy

Pittsburgh Zoo and Aquarium is committed to sustainability and natural resource conservation. Through its 2022-2027 Strategic Plan, the Zoo prioritizes the goal of "Sustain Our Resources." Under this goal, incorporating sustainability practices into our operations is highlighted as an important objective. The Zoo has an established record of sustainability practices. To further the sustainability outcomes, in 2024, the Zoo has committed to the Climate Toolkit, a set of sustainability goals for living collections and cultural institutions.

The Climate Toolkit sets out nine different topic areas for sustainability action. While we officially committed to these goals in 2024, we are already making significant strides in several areas. For instance, our recycling and internal composting operations are already meeting or surpassing the goals outlined in the Climate Toolkit. This is a testament to our dedication and the effectiveness of our sustainability practices.

Recycling and Composting: An important operation for us here at the zoo is to divert waste from landfills. We accomplish this task by working with partners in different areas to send materials for reuse, recycling, and composting. Antiquated and broken electronic equipment such as computers, printers, and monitors are taken to the local Goodwill E-Cycle Center where they are handled properly for reuse or recycling. In April 2024, the Zoo ran a public e-recycling campaign. The effort resulted in the recycling of 353 Cell Phones, 69 tablets, 21 cameras, and 89 other electronic items. The proceeds from the recycling effort were donated to AZA SAFE Gorilla.

Over 12,000 lbs. of ferrous and nonferrous metals are taken to our local scrap yard for processing. A commercial partner has purchased over 720 wooden pallets from the zoo in 2023. They refurbish these pallets for reuse.

Through our partnership with the City of Pittsburgh, we have been able to remove over 10,500 lbs. of plastic and glass from the waste stream. We have a relationship with a company that has taken more than 65,408 lbs of cardboard. The revenue earned from this operation allowed us to expand our efforts in 2023 by working with a new partner that recycles specific types of plastic waste. An updated contract with Pepsico will eliminate single-use plastic bottle sales at the Zoo in 2025. Although the market for paper recycling has weakened in the recent past, we still managed to send over 20,000 lbs. to our partnering vendor. The internal transition towards electric systems through an organizational shared calendar and switch of purchase orders (smalls) is further reducing paper use at the Zoo.

In 2023, we worked with a provider to compost over 320,000 lbs. of organic waste such as manure, leaves, branches, and food scraps.

Highlights of materials recycled in 2023

- Organic Waste, leaves, and Food Scrap– 128 boxes x 25 yards per box x 100 lbs. per yard=320,000 lbs.

- Cardboard – 65,408 lbs. of cardboard
- Pallets – $1080 / $1.50 per pallet = 720 pallets
- Recycling collected by the city – 350 lbs. a week, 30 weeks in season = 10500 lbs. of plastic and glass
- Royal Oak Paper Recycling – 19,690 lbs
- Scrap metal - $2398 dollars / $125 per ton Light Iron prices / 2000 for lbs = 38,368 lbs.
- E-recycle - Goodwill E-cycle program – 6 loads to the program in 2023

Water Use: Water conservation has been a major priority since 2019, when the zoo installed 24 water meters at a cost of $35,000, supported by the 2019 RAD Funding source. These meters greatly assisted with understanding our water consumption, eventually leading us to discover several water leaks. In 2022, we spent approximately $25,000 making repairs to existing dated infrastructure, reducing our annual consumption by 20 million gallons. Reduced consumption results in reduced expense. A reduction from 108 million gallons in 2020 to 66 million gallons in 2022 (a 42-million-gallon annual savings) has an approximate value of $775,000.

Energy: The Pittsburgh Zoo and Aquarium purchases its energy through a consortium and currently uses a 40% renewable energy supply. In 2025, renewable energy is set to comprise 50% of the energy supply for the Zoo. The Zoo's grounds and horticulture team purchases electrical equipment when appropriate and is transitioning to battery-operated tools by phasing out gas-powered tools.

Green Team: To interweave sustainability through all teams at the zoo and to empower team members on their sustainability journey, the Zoo has an active Green Team. The team members have organized trash pick-ups along the road adjacent to the zoo twice a year, with 12 people joining each pick-up in 2023 fall and 2024 spring. The Green Team also collected and recycled 82 lbs of batteries in 2023-24. The Green Team has taken the lead on the Climate Toolkit goals and has coordinated conversations with departmental leads, integrating staff empowerment with sustainability actions.

SSA Group and Concessions: The SSA group manages the Zoo's concessions and is an integral partner for customer-facing sustainability operations. Some notable highlights from SSA's sustainability initiatives in 2023-24 are highlighted below:

- replacement of compostable and plastic disposable serviceware – the plates, boats, knives, and forks used to serve food at the Jambo Grill - with reusable, washable aluminum trays and silverware. This action has helped to reduce waste at the Jambo Grill by a significant amount. The number of contributions to landfills was reduced by an estimated 5,700 pounds each year.
- Receipt paper was switched to Eco-Chits which is 100% phenol-free, made from 100% recycled paper and has a compostable cardboard core. As an added feature, each time receipt paper is purchased from EcoChit, they donate money to OneTreePlanted, an organization that plants trees in California and elsewhere. Around 210 trees were planted this past year because of this relationship.

- In retail, the green efforts also extend to apparel. Most garments feature 100% cotton – eliminating microplastics, and inks are Eco-Passport certified and Global Organic Textile Standard approved. A “dry” digital print process is used that demands less water for washing and curing the fabric and consumes less power than other printing solutions.

Appendix 1

ADAPTIVE MANAGEMENT CYCLE
During each phase of the cycle, managers draw on and contribute to the evidence base for conservation, building intellectual capital and advancing conservation efforts well beyond The Nature Conservancy's own.

Conservation-by-design: a framework that guides conservation planning and action processes. The Nature Conservancy, 2018.

Selected References

1. Hannah, L. et al. Conservation of biodiversity in a changing climate. Conservation Biology 16, 264-268, doi:10.1046/j.1523-1739.2002.00465.x (2002).
2. IPCC. Climate Change 2022: Impacts, Adaptation, and Vulnerability. (Cambridge, UK and New York, NY, USA, 2022).
3. Arneth, A. et al. Post-2020 biodiversity targets need to embrace climate change. Proceedings of the National Academy of Sciences of the United States of America 117, 30882-30891, doi:10.1073/pnas.2009584117 (2020).
4. Haddad, N. M. et al. Habitat fragmentation and its lasting impact on Earth's ecosystems. Science Advances 1, e1500052, doi:doi:10.1126/sciadv.1500052 (2015).
5. Powers, R. P. & Jetz, W. Global habitat loss and extinction risk of terrestrial vertebrates under future land-use-change scenarios. Nature Climate Change 9, 323-+, doi:10.1038/s41558-019-0406-z (2019).
6. Chambers, J. C., Allen, C. R. & Cushman, S. A. Operationalizing Ecological Resilience Concepts for Managing Species and Ecosystems at Risk. Frontiers in Ecology and Evolution 7, doi:10.3389/fevo.2019.00241 (2019).
7. Naugle, D. E., Allred, B. W., Jones, M. O., Twidwell, D. & Maestas, J. D. Co-producing Science to Inform Working Lands: The Next Frontier in Nature Conservation. BioScience 70, 90-96, doi:10.1093/biosci/biz144 (2019).
8. Garnett, S.T., Burgess, N.D., Fa, J.E. et al. A spatial overview of the global importance of Indigenous lands for conservation. Nat Sustain 1, 369–374 (2018). https://doi.org/10.1038/s41893-018-0100-6
9. Parks, D. et al. Funding evidence-based conservation. Conservation Biology n/a, e13991, doi:https://doi.org/10.1111/cobi.13991 (2022).