Partner Coordination
CHAPTER 7

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PARTNER COORDINATION & ENGAGEMENT

Chapter Recap

- ✓ Pennsylvania's diverse, knowledgeable, and motivated natural resources community eagerly and fully supported the comprehensive review and revision process.
- ✓ The 2024 Fish & Wildlife Diversity Forum provided a structured, facilitated format for 82 participants from 58 entities (including affiliates/subunits) to share their resource concerns and suggested conservation actions on Pennsylvania Wildlife Action Plan (PA WAP) relevant themes.
- ✓ The Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission are committed to supporting and engaging current and new partners to implement the 2025-35 PA WAP.

Background

The Pennsylvania Game Commission (PGC) and Pennsylvania Fish and Boat Commission (PFBC) are empowered with state authorities to secure the well-being of the Commonwealth's fish and wildlife. Thus, PGC and PFBC (Commissions) coordinated the 2015-25 Pennsylvania Wildlife Action Plan (PA WAP or Plan) implementation, comprehensive review and revision, and developed the 2025-35 PA WAP. In this effort, the Commissions are supported by an enduring coalition of statewide conservation partners participating in technical and advisory capacities, within an established PA WAP administrative structure (Fig. 7.1)

Steering Committee and Wildlife Action Plan Coordinators

Relevant to their statutory roles for managing Pennsylvania's fish and wildlife, the PGC and PFBC led the 2015-25 PA WAP comprehensive review and revision process. PA WAP Steering Committee members provided essential support and input throughout (Table 7.1). As a foundational PA WAP administrative body operating under an established Committee charter, Steering Committee roles in this process included administrative and technical

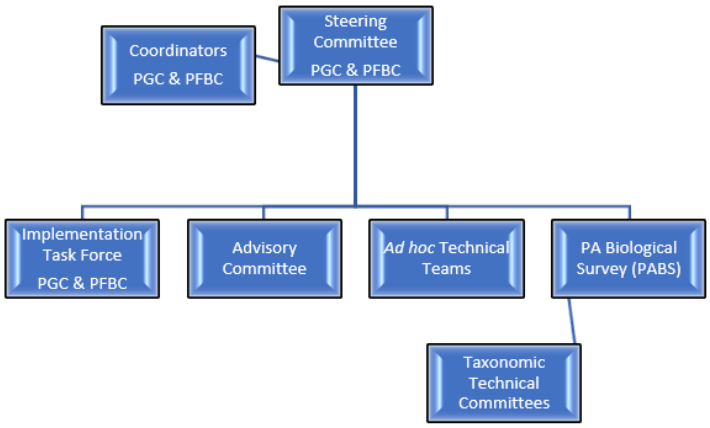

Fig. 7.1. Administrative and committee structure for revising the 2015-25 PA WAP.

guidance, and critical review of key plan features and draft materials.

Responsive to the Steering Committee, the PGC and PFBC Wildlife Action Plan Conservation Planning Coordinators (hereafter Coordinators) (Fig. 7.1; Table 7.1) directly managed the revision process including a broad range of administrative and technical tasks and communications. Among these activities were coordinating with the Advisory Committee and technical committees (Table 7.2), commission staff, and partners, as well as organizing and facilitating meetings and webinars, overseeing PA WAP database management, developing grant proposals, editing and drafting original materials, and assimilating internal and public comments into the revised plan. Beyond Pennsylvania partners, the Coordinators also worked with established Northeast U.S. regional committees, building upon processes supporting landscape-scale conservation, established for 2015-25 Wildlife Action Plans across the Northeast region.

Table 7.1. Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission Senior and Program staff serving on the 2025-2035 Pennsylvania Wildlife Action Plan Steering Committee.

Game Commission	Fish and Boat Commission
Executive Director	Executive Director
Director, Wildlife Management Bureau	Director, Bureau of Fisheries
Chief, Wildlife Recovery Division	Chief, Division of Environmental Services
Chief, Habitat Planning and Development Division	Chief, Natural Diversity Section
Chief, Conservation Education & Social Science Division	Chief, Division of Habitat Management
Wildlife Recovery Conservation Planning Coordinator	Conservation Planning Coordinator

Table 7.2. Administrative unit and general responsibilities for revising the 2015-2025 Pennsylvania Wildlife Action Plan.

Administrative Unit/Capacity	Responsibilities
Steering Committee	Guide, review, and approve interim and final products.
PGC and PFBC Wildlife Action Plan Coordinators	Provide direct and daily revision process oversight, review materials and coordinate with partners.
Advisory Committee	Support and counsel Steering Committee and Wildlife Action Plan Coordinators on scientific merits of the revision process and materials and provide recommendations for achievable implementation.
Technical Committees (PA Biological Survey, Habitat, Communications, and *ad hoc* Technical Committees)	Review and assess species, habitats, threats, and conservation actions for technical support revision of the 2015-25 PA WAP.

Other critical support for the plan included extensive programming, administrative, and Geographic Information Systems support provided by several PGC Bureau of Automated Technology Services personnel. Outreach assistance from PGC and PFBC marketing and communications personnel provided instrumental support to promote the plan through web, social media, and other formats.

Engaging Partners in the Revision Process

For decades, Pennsylvania partnerships have been the conservation keystone. It is through these collaborations of knowledge, financial resources, and technical skills we work towards our collective conservation goals to achieve desired outcomes. Pennsylvania's fish and wildlife face unprecedented challenges to their survival (see Chapter 3, Threats; Required Elements Associations) with solutions beyond the scope of any individual agency or organization. For the past 20 years, each PA WAP has identified the most current threats to at-risk species and their habitats, coupling potential actions with these threats to ameliorate their impacts. To identify and address these expansive resource concerns, as discussed below, we engaged partners across multiple formats and topics to comprehensively review and revise, where needed, the 2015-25 PA WAP.

U.S. Fish and Wildlife Service (USFWS)

The PGC and PFBC formally initiated the 2015-25 PA WAP comprehensive review and revision through a joint letter of commitment (December 6, 2023, Appendix 7.1), followed by a virtual meeting with USFWS Northeast Regional Office of Conservation Investment leadership on February 14, 2024. During this meeting, PGC's Wildlife Recovery Conservation Planning Coordinator and PFBC's Conservation Coordinator reviewed Pennsylvania's proposed revision process, including tasks and timelines.

Throughout the revision process, the USFWS remained an active partner. In June 2024, USFWS Northeast regional staff convened a Wildlife Action Plan Coordinators meeting to share essential regional materials, answer questions, and demonstrate approaches to addressing the eight Required Elements. This meeting provided crucial revision guidance and highlighted significant conservation opportunities for Wildlife Action Plans. Northeast Association of Fish and Wildlife (NEAFWA) State Wildlife Action Plan Coordinator Subcommittee conference calls provided ongoing opportunities for coordinators and technical contributors (e.g., Terwilliger Consulting, Inc., The Nature Conservancy, U.S. Geological Survey-Northeast Climate Adaptation Science Center) to share information specifically developed to support the revision process. We also coordinated with a USFWS Wildlife Refuge Manager in Pennsylvania in a request for site resource management plans.

Advisory Committee

For the 2015-25 PA WAP, the Commissions formed an Advisory Committee to seek external experience and perspectives from natural resource community members. We continued to engage this committee during 2015-25 PA WAP implementation and, sought their advisement during 2025-35 PA WAP development.

This external committee is composed of federal, state and county governments, research institutions, non-governmental organizations and private foundations with statewide, multi-species, or landscape-scale responsibilities (Table 7.3). These partners historically contributed to vital scientific natural

Table 7.3. Pennsylvania Wildlife Action Plan Advisory Committee members. USFWS = United States Fish and Wildlife Service; USDA = United States Department of Agriculture; USGS = United States Geological Survey.

Federal Agencies	**Non-Governmental Organizations**
USFWS Northeast Regional Office	American Fisheries Society-PA Chapter
USFWS Pennsylvania Field Office	American Rivers
USDA Animal and Plant Health Inspection Service	Audubon Mid-Atlantic
USDA Natural Resource Conservation Service	Chesapeake Bay Foundation
USDA Forest Service, Allegheny National Forest	Mid-Atlantic Center for Herpetology and Conservation
USGS Cooperative Fish & Wildlife Research Unit – Pennsylvania[1]	Pennsylvania Biological Survey (PABS)
USGS Water Science Center - Pennsylvania	Pennsylvania Association of Conservation Districts
State Agencies & Research Institutions	Sustainable Forestry Initiative Implementation Committee - Pennsylvania
Pennsylvania Department of Conservation and Natural Resources	The Nature Conservancy, Pennsylvania/ Delaware
Bureau of Forestry	The Wildlife Society – Pennsylvania Chapter
Bureau of State Parks	Western Pennsylvania Conservancy
Pennsylvania Department of Environmental Protection	WeConservePA
The Pennsylvania State University	**Multi-state Jurisdictional Agencies**
Maurice K. Goddard Chair Center for Private Forests	Delaware River Basin Commission
	Susquehanna River Basin Commission

[1]During the revision process, this federal agency lost key staff and was not an active participant but was a founding committee member.

resource needs, guided crucial management decisions, or have been direct partners in implementing

conservation actions. A formal Advisory Committee Charter and Operational Guidance outlined committee responsibilities and expectations. As process advisors (i.e., not decision-makers), this deliberative group provided essential input on foundational PA WAP components, critically reviewed draft materials, and recommended scientific and technical materials to the Steering Committee and Wildlife Action Plan Coordinators.

Technical Committees and Related Support

Technical contributions were instrumental to the revision process, including extensive support from Pennsylvania Biological Survey (PABS) taxonomic committees and a Habitat Committee. PABS members (see PABS, https://www.pabiologicalsurvey.org/) and technical committees (Table 7.4; see *Acknowledgements*) include scientists throughout the state, state and federal agency representatives, Pennsylvania's major natural history museums and scientific institutions, and interested individuals with requisite technical expertise. Taxonomic experts reviewed and contributed species data, provided recommendations for Species of Greatest Conservation Need (SGCN) designation, threats, conservation actions, research and survey needs, and authored several species accounts. Technical committee participants often worked well beyond their daily responsibilities and, in some cases, retired technical experts provided their knowledge from years of experience to advance the process.

Table 7.4. Pennsylvania Biological Survey Technical Committees contributing to the Pennsylvania Wildlife Action Plan revision process.

- Amphibians and Reptiles
- Ecological Communities
- Fishes
- Invertebrates
- Mammals
- Mollusks
- Ornithological

Tribal Governments

Pennsylvania has a rich Native American heritage and, per the 2020 U.S. Census, 31,052 Native American and Alaskan Natives live in Pennsylvania (0.2% of Pennsylvania population; U.S. Census Bureau, https://data.census.gov/profile/Pennsylvania?g=040XX00US42#race-and-ethnicity). Recognizing this important historical relationship, we invited tribal government representatives to the 2024 Fish & Wildlife Diversity Forum (discussed below), though representatives were unable to participate. No formally designated tribal lands are administered by federally recognized tribes in the state; yet we seek to more fully understand the relationship of indigenous ecological knowledge to Pennsylvania's Species of Greatest Conservation Need and their habitats.

2024 Fish & Wildlife Diversity Forum

The Commissions administered and coordinated the 2024 Fish & Wildlife Diversity Forum (hereafter Forum), in collaboration with PABS and Foundation for Pennsylvania Watersheds (Appendix 7.2). This 1.5-day invitation-only event included 82 conservation leaders from 58 entities, with a collective emphasis to bolster PA WAP effectiveness by soliciting partner recommendations for the 2025-2035 PA WAP. Pre- and post-meeting surveys helped further assess and understand 2015-2025 PA WAP implementation advantages and constraints. Forum objectives were to:

1. Exchange information on conservation accomplishments in the preceding decade.
2. Highlight PA WAP implementation accomplishments.
3. From conservation stakeholders, enlist resource concerns and potential actions to address those concerns.
4. Inspire active participation by stakeholders in PA WAP implementation.
5. Illustrate approaches and resources that may benefit priority species and habitats.
6. Describe opportunities for voluntary participation in wildlife conservation.

Five plenary presenters offered a national overview of State Wildlife Action Plans and specific PA WAP implementation by the PGC and PFBC. This essential background material preceded the seven facilitated breakout groups which formed the primary venue for participants to share their extensive knowledge of resource concerns and associated conservation actions. Participants in these productive breakout groups generated over 300 resource concerns and identified over 400 conservation actions.

Through a post-Forum survey, respondents offered valuable feedback on ease of use and interpretation of 2015-2025 PA WAP and Conservation Opportunity Area (COA) Tool, which will guide the PGC and PFBC as they consider the structure and content of the 2025-2035 PA WAP. Overall, the Forum met or exceeded attendee expectations and provided a venue for fostering collaboration and networking.

Forum input influenced foundational 2025-35 PA WAP components, such as guiding principles, goals, objectives, and strategies. Additionally, species account authors considered threats and actions when updating threats assessments and devising action strategies, research priorities, and survey needs. We also shared Forum breakout group responses within the Commissions for program assessment.

Partner Collaboration to Advance 2025-35 PA WAP Implementation

Partnerships are foundational to achieving 2025-35 PA WAP goals and essential for successful conservation action implementation. It is through collectively exchanging ideas, acknowledging mutual responsibilities, and sharing resources that we will meet the challenges posed by growing resource concerns (e.g., threats, stressors). Pennsylvania's fish and wildlife live in dynamic environmental conditions and management actions must adapt with emerging issues to maintain and enhance their populations. The most challenging conservation situations are when prompt collaboration is essential for the persistence of habitats or species.

White-nose Syndrome (WNS) is a notable example of when the need for immediate action by partners with diverse expertise proved essential. WNS was unknown in Pennsylvania in 2005, yet by close of the 2005-15 PA WAP, extensive resources were gathered and partnerships developed, including wildlife managers, scientists, technical resources, state and federal agencies, to research and address this existential threat to hibernating bats. In the interim, from these collective efforts, substantial progress has been made to ameliorate WNS impacts, though the work is ongoing (see WNS Case Study [***in prep***]).

Advisory Committee

In the decade ahead, the Advisory Committee will continue to serve an integral role in informing and guiding 2025-35 PA WAP implementation. Beyond providing supportive scientific information, member organizations and agencies (as well as private landowners) will be able to assist with tracking

implementation activities through the Pennsylvania Wildlife Action Map Conservation Action Tracker (CAT) (https://wildlifeactionmap.pa.gov/). Throughout the 2005-15 and 2015-25 PA WAPs, we were unable to adequately track implementation types and distribution, especially work not funded by State and Tribal Wildlife Grants. The CAT was developed to address this challenge.

We will continue to engage Advisory Committee members during implementation through PA WAP Coordinator-led meetings or written updates. Minimally, this collaboration will occur annually; however, we will convene the committee more frequently when guidance or topical discussions are needed.

Technical Committees

The PABS Steering and Technical Committees will remain essential partners to ensure PA WAP scientific rigor, assist implementation, and promote PA WAP goals, objectives, and strategies. Other technical and *ad hoc* committees will be activated as needed to maintain a science-based plan and assist implementation pursuits. The revision process identified numerous conservation actions and resource concerns which are expressed in the species accounts and throughout the Plan. Implementing and resolving many of these needs is expected to require broad technical input and action.

Northeast U.S. Regional Partners

Species-level fish and wildlife management requires collaborative conservation across jurisdictional boundaries and, through the PA WAP, we engage regional partners to address multi-state species needs. Central to this regional collaboration is the USFWS, with jurisdictional responsibilities for Pennsylvania's federally listed species. The USFWS also coordinates regional initiatives and administers significant financial resources through multiple grant programs, especially State and Tribal Wildlife Grants for State Wildlife Action Plan revision and implementation.

State Wildlife Action Plans in the northeast region are also supported by the U.S. Geological Survey Northeast Climate Adaptation Science Center (NECASC) with timely and well-developed summaries of complex climate science research, included in this Plan. Climate data compilation, modeling and analysis (e.g., Staudinger et al. 2024) have greatly advanced in recent years, but under these dynamic conditions, additional studies are needed to understand the pervasive threat of climate change. Allied in this climate science is the Regional Invasive Species and Climate Change (RISCC) network which assesses the mutually synergistic effects of climate change and invasive species. NECASC and RISCC are regional scale partners for 2025-35 PA WAP implementation.

The PGC and PFBC will remain active participants in the Northeast Association of Fish and Wildlife Agencies (NEAFWA) and SWAP relevant committees, including the Northeast Fish and Wildlife Diversity Technical Committee (NEFWDTC) and SWAP Subcommittee. The NEFWDTC guides numerous initiatives supporting regional data collection and analyses. For example, the NEFWDTC provides technical input for Regional Conservation Needs Program and Competitive State and Tribal Wildlife Grant projects, with products from many studies used throughout this Plan.

Additionally, AFWA leads several national and international work groups and programs with which PGC and PFBC will continue to partner for SGCN recovery. For example, AFWA coordinates the multi-partner Southern Wings program to support and advance habitat conservation, management, and research for

priority migratory birds that spend up to eight months of the year outside of the United States (Southern Wings; https://southern-wings.fishwildlife.org/).

Tribal Governments

Throughout 2025-35 PA WAP implementation, the PGC and PFBC will work to provide opportunities for federally recognized tribes, historically present in Pennsylvania to contribute to SGCN habitat and population recovery and 2035-45 PA WAP development. Coordinating with Native American Tribes is currently constrained by several factors including limited tribal resources (e.g., staffing, funding), limited PGC and PFBC resources (e.g., staffing), and administrative barriers for coordinating with tribal sovereign nations. With assistance from federal agencies, especially USFWS, we aim to develop an enduring partnership with federally recognized tribal nations historically connected to Pennsylvania.

Summary

Conservation partners are essential to an effective and enduring plan. In Pennsylvania, partners supporting the PA WAP encompass broad ecological interests and expertise. For the 2025-35 PA WAP, the knowledge, support and enthusiasm of these partners contributed immeasurably to the PA WAP revision process and will be indispensable to the Plan's successful implementation. Through the next decade, we will continue collaborating with these partners while fostering new relationships to guide innovative technologies (e.g., Pennsylvania Wildlife Action Map), develop novel applied research and survey techniques, and implement priority conservation actions. For this coordination, as we progress into 2025-35 PA WAP implementation, we will maintain our current administrative (e.g., Steering, Advisory, technical committees) and operational (e.g., Wildlife Action Plan Coordinators) structure, adapting when needed to accommodate dynamic environments. This approach will allow us to effectively work with partners and Commission staff, oversee relevant projects (e.g., Wildlife Action Map), and track implementation progress.

References

PGC and PFBC (Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission). 2025. Pennsylvania Wildlife Action Map-Conservation Opportunity Area Tool and Conservation Action Tracker. A web-based tool supporting the Pennsylvania Wildlife Action Plan. Harrisburg, PA. https://wildlifeactionmap.pa.gov/. (accessed April 2026).

Staudinger, M. D., A. V. Karmalkar, K. Terwilliger, K. Burgio, A. Lubeck, H. Higgins, T. Rice, T. L. Morelli, A. D'Amato. 2024. A regional synthesis of climate data to inform the 2025 State Wildlife Action Plans in the Northeast U.S. DOI Northeast Climate Adaptation Science Center Cooperator Report. 406 p. *Available at*: https://www.sciencebase.gov/catalog/item/62866381d34e3bef0c9a813c.

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Appendix 7.1 PGC and PFBC PA WAP revision intention letter

Pennsylvania's official notification to the U.S. Fish and Wildlife Service announcing intention to comprehensively review and revise the 2015-2025 PA WAP, December 4, 2023.

COMMONWEALTH OF PENNSYLVANIA

Pennsylvania Game Commission
2001 Elmerton Avenue

Pennsylvania Fish and Boat Commission
1601 Elmerton Avenue
Harrisburg, PA 17110

OFFICE OF
EXECUTIVE DIRECTOR
717-787-3633

OFFICE OF
EXECUTIVE DIRECTOR
717-705-7801

December 4, 2023

Ms. Colleen Sculley, Chief
Division of Wildlife & Sport Fish Restoration
U.S. Fish & Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035

Dear Ms. Sculley,

We are pleased to announce that the Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission will comprehensively review and revise, as needed, the 2015-2025 Pennsylvania Wildlife Action Plan, with submission of the revised plan by October 1, 2025. A project timeline is attached for your reference.

For nearly 20 years, Pennsylvania's Wildlife Action Plans have guided the Commonwealth's at-risk species management and galvanized the Commissions and partners with a common purpose to secure our Species of Greatest Conservation Need and their habitats for future generations. Since 2005, this work has delisted, upgraded (i.e., from state endangered to threatened), or recovered 27 species in the state. This notable progress is well-aligned with congressional intent of the State and Tribal Wildlife Grants Program to avoid species endangerment. Further, the Pennsylvania Wildlife Action Plan Conservation Opportunity Area Tool has enhanced our Plan's accessibility by the public and practitioners.

Understandably, considerable work remains, and we look forward to advancing our efforts under the 2025-2035 Pennsylvania Wildlife Action Plan (Plan). Through our new Plan, we will tackle ongoing and emerging environmental threats using innovative techniques for species recovery and enhancing implementation through advanced technologies to make the new Plan more readily usable by staff, partners, and public.

In the next few weeks, project leads Cathy Haffner, Pennsylvania Game Commission Conservation Planning Coordinator (chaffner@pa.gov), and Diana Day, Pennsylvania Fish and Boat Commission Conservation Coordinator (diday@pa.gov), will coordinate a meeting with you, Dee Blanton, and Game Commission and Fish and Boat Commission fish and wildlife diversity program managers to more fully review our approach and receive further guidance for a successful outcome. We are grateful for your enduring support of our efforts.

Yours in conservation,

Bryan J. Burhans, Executive Director
Game Commission

Timothy D. Schaeffer, Executive Director
Fish and Boat Commission

RE: Pennsylvania Wildlife Action Plan Revision Commitment
December 4, 2023
Page 2

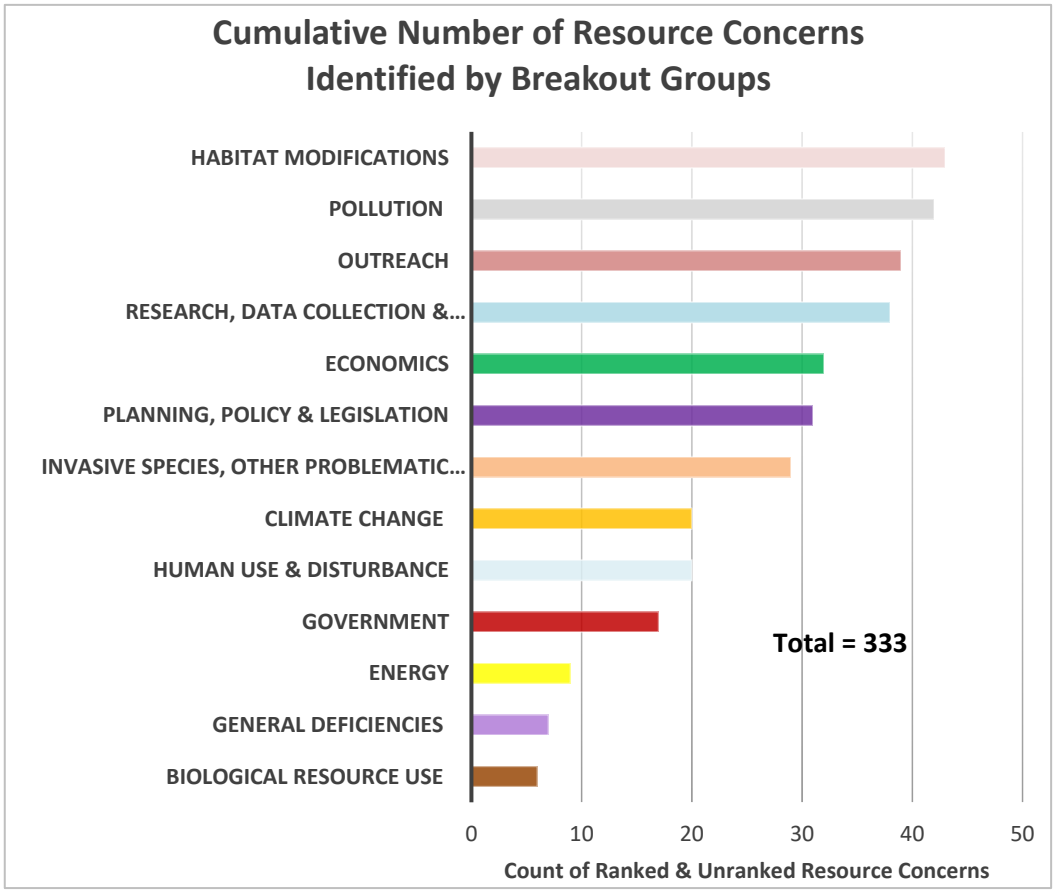
Attachments (1)

Cc: D. Blanton (USFWS)

Cc Haffner, Catherine; Shirk, Melanie; Craig, Lydia; Blanton, Dee
Bcc Schnupp, Matthew; Williams, Lisa; Kuhn, Kristopher; Smiles, Heather A; Urban, Chris

Appendix 7.2 Fish & Wildlife Diversity Forum report

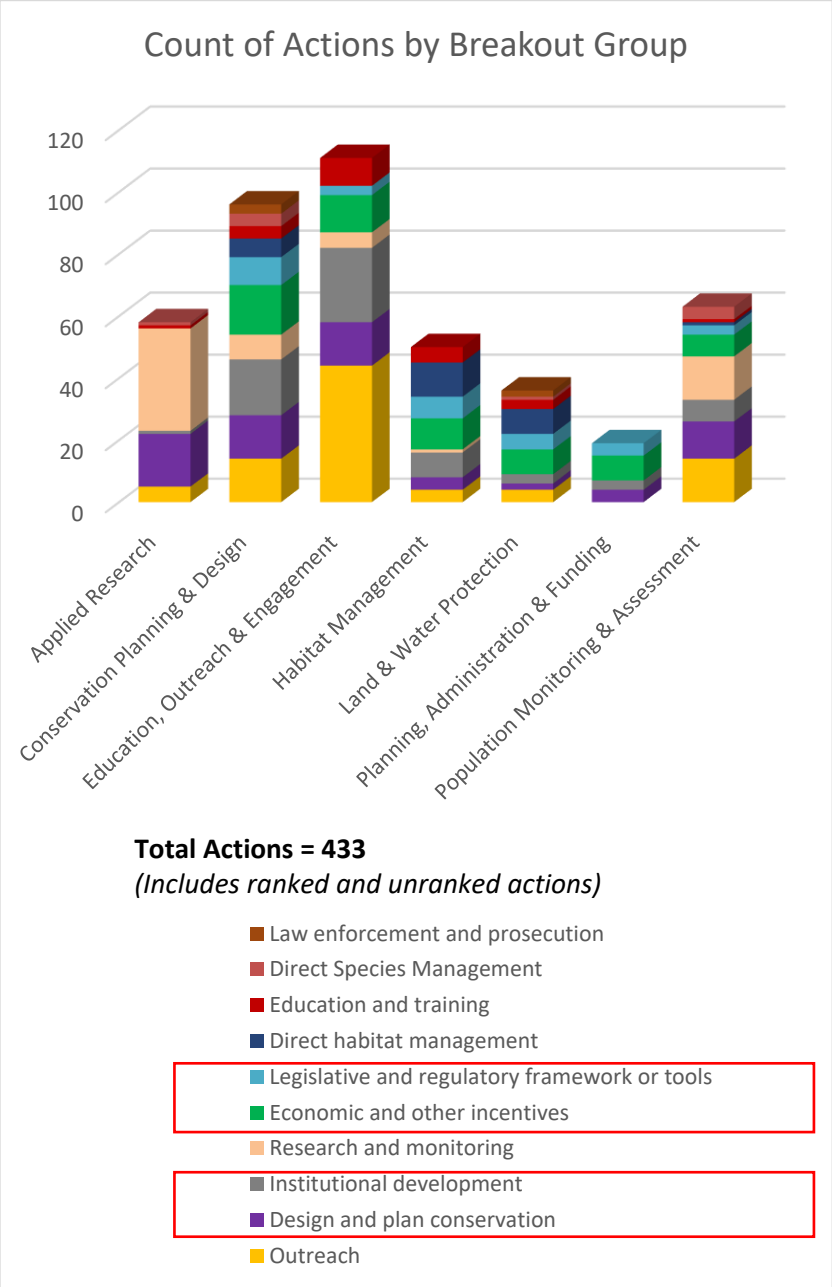
Fish & Wildlife Forum Summary Materials



Number of unique resource concerns identified by 2024 Fish & wildlife Diversity Forum breakout groups, organized by theme/category. Includes ranked resource concerns or unranked resource concerns with ranked Actions.

Overarching ranked resource concern themes and sub-topics *(not comprehensive)* from 2024 Fish & Wildlife Diversity Forum breakout group discussions.

MAJOR THEME	GENERAL SUB-TOPICS
HABITAT MODIFICATIONS	Dams, Lack of Habitat Connectivity, Habitat Loss, Lack of Urban Forests & Open Space, Lack of Early Successional Habitats, Habitat Fragmentation/Degradation, Lack of Prescribed Fire, Need for Headwater and Wetland Protection, Water Quality & Quantity
POLLUTION	Abandoned Mine Drainage, Light & Noise Pollution, Fracking Waste, Harmful Algal & Bacterial Blooms, Microplastics, Stormwater, Thermal, Road Salt, Acid Deposition, Agricultural Management (Nutrients, Pesticides), Waste Stream Management, Medications, Emerging Pollutants
OUTREACH	Lack of Communication & Engagement with Public, Insufficient Access to information, Resources, Lack of Traditional Ecological Knowledge & Diversity Representation, Lack of Knowledge & Trust in Science, Need for Human Dimensions Investment
RESEARCH, DATA COLLECTION & MANAGEMENT	Lack of/Inadequate Data Tools, Lack of Data Access, Monitoring, Data Gaps, Lack of Monitoring, Uncertainty, Lack of Attention to Soil Health, Fungi, Terrestrial Invertebrates, Prioritizing Habitat Conservation,
ECONOMICS	Insufficient Conservation Funding & Coordination Across Multiple Needs, Incentives, Prioritization, Disregard for Economic Benefits of Conservation
PLANNING, POLICY & LEGISLATION	Orphaned Taxa, Lack of Plants and Fungi in Wildlife Action Plan, Lack of Collaboration & Political Support, Landscape-level and Comprehensive Planning, Ordinances, Lack State Jurisdiction-Terrestrial Invertebrates, Slow Species Recovery, Cultural Workplace Practices for a More Diverse Workforce
INVASIVE SPECIES, OTHER PROBLEMATIC SPECIES, GENES & DISEASES	Overabundance of Deer, Cats, Feral Hogs; Invasive Species, Pests, Pathogens, Wildlife Health, Species Population Shifts/Decline (e.g., Invertebrates, Common Species);
CLIMATE CHANGE	Impacts on Fish & Wildlife, Phenology, Sea Level Rise, Seasonality, Species Shifts, Resiliency, Threat Amplification
HUMAN USE & DISTURBANCE	Cumulative Threat Impacts on Wildlife, Conflicting Habitat Uses, Motorized Outdoor Recreation, Inaccessibility of Private Lands, Bird Window Strikes, Urbanization
GOVERNMENT	Lack of Collaboration, Staffing, Workforce Development, Enforcement, Permitting Process Limitations
ENERGY	Implications for Wildlife from Solar, Wind, Oil & Gas, Injection Wells, Mineral Extraction
GENERAL DEFICIENCIES	Lack Human Resources, Resource Management Conflicts & Measurements, Social Science Considerations, Loss of Institutional Knowledge
BIOLOGICAL RESOURCE USE	Forest Management, Need for Sustainable Forests, Lack of low-grade hardwood markets, Agriculture Management



Summary counts of categorically classified conservation actions by breakout groups during the 2024 Fish & Wildlife Diversity Forum. Red boxes indicate Actions common among all breakout groups.

SUMMARY REPORT

2024 PENNSYLVANIA FISH & WILDLIFE DIVERSITY FORUM

Moving Fish and Wildlife Conservation Forward in the Next Decade

Steve Rier

March 7-8, 2024

State College, PA

May 31, 2024

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Suggested citation

PGC and PFBC (Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission). 2024. 2024 Pennsylvania Fish & Wildlife Diversity Forum Summary: Partner perspectives on Resource Concerns and Conservation Actions to advance Pennsylvania's Wildlife Action Plan. Harrisburg, Pennsylvania.

Abbreviations

Abbreviations	Full Description
FWD	Fish & Wildlife Diversity Forum (2024)
FPW	Foundation for Pennsylvania Watersheds
PABS	Pennsylvania Biological Survey
PA WAP	Pennsylvania Wildlife Action Plan
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
SGCN	Species of Greatest Conservation Need
SWAP	State Wildlife Action Plan
WDF	Wildlife Diversity Forum (2012)

ACKNOWLEDGMENTS

Our sincere gratitude to:

- Forum attendees who brought inspiring energy and enthusiasm to this gathering and greatly advanced the Pennsylvania Wildlife Action Plan (PA WAP).
- *Pennsylvania Biological Survey (PABS)* Executive Committee members, (Brady Porter, President; Elizabeth Crisfield, President-elect; Roger Latham, Treasurer), and Technical Committee Chairs. Notably, Roger Latham's determined efforts were crucial for Forum success and included developing the registration system, monitoring Forum registrations, and submitting a grant proposal to support nongovernmental attendee travel.
- PA WAP Steering Committee members for their enduring support of the event. Special thanks to Matthew Schnupp for serving as emcee and keeping the event on-time, Tim Schaeffer for delivering an enthusiastic welcome, and to plenary speakers Lisa Williams, Chris Urban, Scott Bearer, and Sean Murphy for their informative and engaging presentations.
- *Foundation for Pennsylvania Watersheds* for providing a meeting convening grant to support scholarships for nongovernmental organization participants and other crucial event needs.
- *U.S. Fish and Wildlife Service*, Office of Conservation Investment for funding provided through State Wildlife Grants to the Pennsylvania Game Commission (PGC) and Pennsylvania Fish and Boat Commission (PFBC).
- Mark Humpert (*Association of Fish and Wildlife Agencies*) and Scott Weidensaul for their time and remarkable contributions to the event and the broader conservation community.
- PGC and PFBC staff who tirelessly contributed to planning, coordination, breakout group facilitation and recording, webpage development, communications, and as support staff:

Patti Barber (PGC)	Nicole Hill (PGC)	Sean Murphy (PGC)	Greg Turner (PGC)
Scott Bearer (PGC)	Tyler Hock (PGC)	Tyler Neimond (PFBC)	Chris Urban (PFBC)
Lydia Craig (PGC)	Stefan Karkuff (PGC)	Curtis Noll (PGC)	Lisa Williams (PGC)
Kim Garris (PFBC)	Alisha Keller (PGC)	Kate Otterbein (PGC)	Nate Zalik (PGC)
Sean Gimbel (PFBC)	Renae Kluk Kiehl (PFBC)	Mike Scafini (PGC)	
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EXECUTIVE SUMMARY

On March 7th and 8th, 2024, in State College, PA, the Pennsylvania Game Commission (PGC) and Pennsylvania Fish and Boat Commission (PFBC) hosted the 2024 Fish & Wildlife Diversity (FWD) Forum. We initiated the event to enlist conservation partner recommendations for the 2025-2035 Pennsylvania Wildlife Action Plan (PA WAP) implementation and, through pre- and post-meeting surveys, assess constraints and benefits of the 2015-2025 PA WAP.

For State Wildlife Action Plans, states are obligated to fulfill eight Required Elements. Of these congressionally identified directives, Required Element 7 mandates states to "*coordinate with federal, state, local agencies and Indian tribes as part of implementation and comprehensive review and revision of State Wildlife Action Plans.*" The 2024 FWD Forum supported this Required Element, but also contributed to Required Elements 3 (Threats), 4 (Conservation Actions), and 5 (Monitoring). Acquired information will support the 2025-2035 PA WAP.

PFBC and PGC Executive Directors distributed invitations to over 230 individuals from 137 state and federal agencies (including subunits/affiliates), nongovernmental organizations (e.g., conservation districts, environmental educators, local land use planners, implementation groups), and tribal governments. These invitations yielded 82 participants from 58 entities (including affiliates/subunits).

Five plenary presenters provided a national overview of State Wildlife Action Plans and specific PA WAP implementation by the PGC and PFBC. This essential background material led into the seven facilitated breakout groups which formed the primary venue for participants to share their extensive knowledge of resource concerns and associated conservation actions. These breakout groups were immensely productive with over 300 resource concerns and 400 conservation actions identified.

Through a post-Forum survey, respondents offered valuable feedback on the ease of use and interpretation of 2015-2025 PA WAP and Conservation Opportunity Area (COA) Tool which will guide the PGC and PFBC as they consider the structure and content of the 2025-2035 PA WAP. Overall, the Forum met or exceeded attendee expectations and provided a venue for fostering collaboration and networking.

ABOUT THE FORUM

Background

The Pennsylvania Wildlife Action Plan (PA WAP), led by the Pennsylvania Game Commission (PGC) and Pennsylvania Fish and Boat Commission (PFBC), is the authoritative decadal blueprint for conserving Species of Greatest Conservation Need (SGCN) and an essential resource for conservation partners across the Commonwealth. Initiating and nurturing partnerships is integral to advancing conservation, thus the role of partnerships is securely imbedded in federal State and Tribal Wildlife Grants Program enabling legislation. Congressionally required Element 7 mandates states to "*coordinate with federal, state, local agencies and Indian tribes as part of implementation and comprehensive review and revision of State Wildlife Action Plans.*"

In 2012, the PGC convened the Wildlife Diversity Forum (2012 WDF) bringing together conservation partners from across Pennsylvania to provide crucial input on resource needs and potential actions to support wildlife diversity and the forthcoming 2015-2025 PA WAP (see AFWA 2012). This event was instrumental in framing important issues and sparking creative solutions, such as the concept of a web-based tool to visualize where PA WAP actions should occur. The Pennsylvania Wildlife Action Plan Conservation Opportunity Area (COA) Tool, which launched in August 2019, eventually emerged from these ideas. With success of the 2012 WDF well-documented, the PA WAP Steering Committee approved a Fish & Wildlife Diversity Forum (2024 FWD Forum) to enlist from conservation partners their perspectives on the implementation and constraints of the 2015-2025 PA WAP and support the development of 2025-2035 PA WAP.

Further, the 2024 FWD Forum was identified in the 2016 PA WAP Communications Strategy and addressed select 2015-2025 PA WAP, goals, objectives, and strategies (i.e., broad to fine scale). Among these, Goal 5 specifies the PGC and PFBC will *continue to improve cooperation within and between public agencies and other partners in wildlife conservation planning and implementation* of which one of the objectives (5.1) is to *maintain an effective Wildlife Action Plan.* Within this objective, two strategies are particularly relevant:

> Strategy 5.1.1. Convene conservation partners at a frequency sufficient to assess knowledge gaps, document progress and ensure a relevant State Wildlife Action Plan.
>
> Strategy 5.1.2. Coordinate with local, state, and federal governments, private landowners, and other conservation partner to support Pennsylvania's Wildlife Action Plan.

Overall, the 2024 FWD Forum addressed federally required Element 7 (Partners), supported required Elements 3 (Threats), 4 (Conservation Actions), and 5 (Monitoring) while contributing to 2015-2025 PA WAP implementation.

Purpose

The PFBC and PGC convened the 2024 FWD Forum to enlist conservation partner recommendations for the 2025-2035 PA WAP and, through pre- and post-meeting surveys, understand implementation and constraints of the 2015-2025 PA WAP.

Objectives

1. Information Exchange: Serve as venue for exchanging information and strategies among conservation leaders, educators, local officials, and conservation professionals across Pennsylvania on conservation responsibilities, status of Pennsylvania Species of Greatest Conservation Need fish, wildlife, and their habitats and funding the conservation of legacy species (plenary session).
2. Highlight Accomplishments: Inform conservation leaders, educators, local officials and conservation professionals of PA WAP accomplishments and progress over the past decade (plenary session and displays).

3. Identify Conservation Concerns and Actions: Gather insight from conservation stakeholders on short-term (5-10 years) needs and strategies for critical conservation actions that would benefit priority species (nominal group process).
4. Inspire Action: Motivate multiple stakeholders to better understand and engage/advance fish and wildlife conservation programs and projects at the local, state, and national level (facilitated discussion, networking opportunities).
5. Highlight Species & Habitats: Present PA WAP approaches and resources that may facilitate actions benefitting priority species and habitats (displays).
6. Encourage Participation: Describe opportunities to actively participate in Pennsylvania fish and wildlife conservation (volunteer opportunities).

Anticipated Outcome(s)

1. Essential input from partners on PA WAP implementation, conservation concerns and potential actions, barriers, and solutions.
2. Identified needs for the 2025-2035 PA WAP including: planning, implementation, funding, coordination, and other issues.
3. Advance collaboration between governmental and non-governmental entities.

APPROACH

Overview

Co-hosted by the PGC and PFBC, with administrative support from the Pennsylvania Biological Survey (PABS) and funding support from Foundation for Pennsylvania Watersheds (FPW), the 2024 FWD Forum was convened March 7-8th in State College, PA. Spanning 1.5 days, the Forum included five plenary presentations, seven facilitated breakout groups, a keynote banquet presentation and concluded in the afternoon, March 8th with an all-participant summary of breakout group discussions (see Appendix A: Agenda). The PGC and PFBC fostered communication with invitees and registrants, prior to, during and after the event by materials posted to an event web page and via email.

Audience

PFBC and PGC Executive Directors distributed invitations to over 230 individuals from 137 state and federal agencies (including subunits/affiliates), nongovernmental organizations (e.g., conservation districts, environmental educators, local land use planners, implementation groups), and tribal governments through the PGC GovDelivery digital communications system. To address priority topics efficiently and effectively, it was important that participants had broad knowledge and experience within their agency/organization. Therefore, within these entities, invitations were directed primarily towards program managers, organization leaders (e.g., presidents, tribal leaders), academicians, researchers, and PABS Executive Committee members and relevant Technical Committee Chairs (Appendix B: Attendees).

Scholarships

Optimizing participation by reducing financial barriers to nongovernmental organization attendance was of particular interest to the PGC and PFBC. To support this intention, PABS secured a $2,000 convening grant from FPW from which they offered competitive travel scholarships to offset participation costs. Invitees received email announcements for scholarship availability and PGC posted information on the event web page. Three organizations requested, and were granted, assistance. With approval from FPW, PABS applied remaining funds to limited, specific uses to offset Forum costs.

Surveys

The PGC and PFBC enlisted participant input through pre- and post- Forum surveys (Microsoft© Forms). Results from these surveys offered crucial information that guided Forum development and perspectives on the 2015-2025 PA WAP that will inform the 2025-2035 PA WAP.

Agenda

Plenary session presenters welcomed participants and provided foundational information especially focusing on PA WAP planning, implementation, partnerships, Species of Greatest Conservation Need (SGCN) recovery, and monitoring.

PGC and PFBC staff-facilitated thematic breakout groups garnered detailed information for the 2025-2035 PA WAP. During event registration, participants prioritized their preferred breakout group from seven topics/themes adapted from the 2012 WDF groups (Table 1). Following registration, we reviewed the number of participants and affiliations for parity and consistency among groups. In most cases, we assigned participants to their first or second priority topic, with rare exception requiring assignment to lower priority topics. We instructed participants to stay with the same breakout group throughout the event, enabling the discussions to build from resource concerns to actions over the 1.5 days.

Table 1. 2024 Fish & Wildlife Diversity Forum breakout group themes. Participants prioritized their preference during registration and remained in the same group throughout the event.

Breakout Group Themes
• Applied Research
• Conservation Planning & Design
• Education, Outreach & Engagement
• Habitat Management
• Land and Water Protection
• Policy, Administration, & Funding
• Population Monitoring

We provided PGC and PFBC staff facilitators and recorders detailed guidance and an MS-Excel template file for recording participant responses. Following an introductory period for breakout group members, facilitators posed the question: *What concerns need to be addressed, now or within the next 10-12 years, to conserve Pennsylvania's diversity of fish, wildlife, and their habitats?.* The intent of this discussion was to assess threats, stressors, needs, and barriers to fish and wildlife conservation in the remaining 2015-2025 PA WAP and upcoming 2025-2035 iteration. After listing concerns, participants ranked the concerns as "high", "moderate", or "low" priority using a weighted scoring rubric. We then sorted concern scores from high-to-low for the subsequent task of identifying actions to address priority concerns.

Facilitators asked: *For each identified priority concern, what are the critical conservation actions that must be taken to address it?* As with the initial question regarding "concerns", as time allowed, conservation actions were ranked as "high", "moderate", and "low". Additionally, participants were asked to identify partners who would be involved in implementing the conservation action and a categorical timeframe (years) for initiating implementation (i.e., 0-3, 4-7, 8-12).

From the seven breakout groups (Table 1; Figure 1), we compiled and synthesized information to maintain details while harmonizing similar information to enhance interpretation. We then combined resource concerns and conservation sections from all breakout groups and assigned each to standardized threats and action categories identified in the 2022 Northeast Lexicon (Crisfield and NEAFWA 2022) to facilitate event synthesis and better align with 2025-2035 PA WAP development.

Figure 1. One of seven breakout groups convened during the 2024 Fish & Wildlife Diversity Forum. Breakout groups were the primary format for gathering participant input. Photo credit: PFBC.

We removed unranked resource concerns from the count because unranked concerns lacked associated conservation actions. We assumed these concerns to be purposefully excluded by the group.

The standardized threat categories do not account for indirect threats to species or habitats. Therefore, we adopted additional themes for organizing individual concerns as applicable.

RESULTS

Audience

PFBC and PGC Executive Director invitations garnered a total of 82 attendees from 58 entities (including affiliates/subunits) (Appendix B: Attendees). Additionally, 27 PGC and PFBC staff participated as emcee, plenary speakers, facilitators, recorders, and on-site support staff. Including PA WAP Advisory Committee members and special guests (e.g., PGC Commissioner Pride), 110 individuals attended the Forum in total.

Plenary Session

Prior to the event, sixty-five percent (65%) of participants were "very" or "moderately" familiar with the PA WAP, with only 6% "not at all" familiar (Figure 2). For participants with "slight" or "no" PA WAP familiarity, plenary presentations (Appendix A: Agenda) provided context for the breakout group discussions.

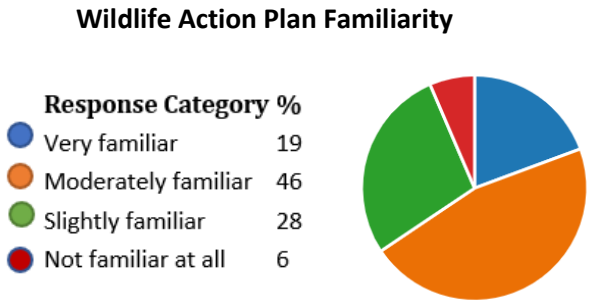


Figure 2. Responses by 2024 Fish & Wildlife Diversity Forum registrants to the pre-event survey question: *How familiar are you with the 2015-2025 Pennsylvania Wildlife Action Plan?*

Opening the session was emcee Matthew Schnupp, PhD (PGC) and, on behalf of the PGC and PFBC, PFBC Executive Director Tim Schaeffer, PhD, provided a warm, inspiring, welcome (Figure 3). Mark Humpert (Association of Fish and Wildlife Agencies) provided an overview of State Wildlife Action Plans, their historical significance and role in current conservation. Building on this, Lisa Williams (PGC) discussed the many parts needed for productive conservation, leading into Chris Urban's (PFBC) review of conservation successes, such as species delisting, and acknowledging the long-term commitment required for these achievements. Scott Bearer, PhD (PGC) reflected on the role of partnerships in conservation and Sean Murphy, PhD (PGC) illustrated landscape-scale partnerships and technological advances in bird conservation with the Motus Wildlife Tracking system. Universally, all presenters attributed the importance of partnerships for the many successes thus far and emphasized their essential role for future conservation advancements.

Figure 3. Moderators and presenters during the Q & A session during the 2024 Fish & Wildlife Diversity Forum plenary (L-R, Matthew Schnupp-PGC, Mark Humpert-AFWA, Tim Schaeffer-PFBC, Sean Murphy-PGC, Lisa Williams-PGC, Chris Urban-PFBC, Scott Bearer-PGC. Photo credit: PFBC.

Breakout Groups Overview

Collectively, breakout groups identified and ranked over 300 unique resource concerns and over 430 conservation actions. Given time constraints and topic complexity, not all breakout groups were able to identify conservation actions for priority concerns, or if conservation actions were identified, were unable to assign a priority rank. Throughout this report, counts or percentage display of concerns or actions do not imply or impart statistical significance, but rather offer context for the number of ideas noted about

a topic. Here, we offer an initial digest of extensive information garnered from breakout group participants that will continue to be refined as we develop the 2025-2035 PA WAP.

From a simple count of topics within these themes, we found the top four concern categories to be *Habitat Modifications*, *Pollution*, *Research, Outreach, and Data Collection & Management* (Figure 4). These concerns were followed by similarly numbered *Economics*, *Policy & Legislation*, and *Invasive Species and other Problematic Diseases and Genes*.

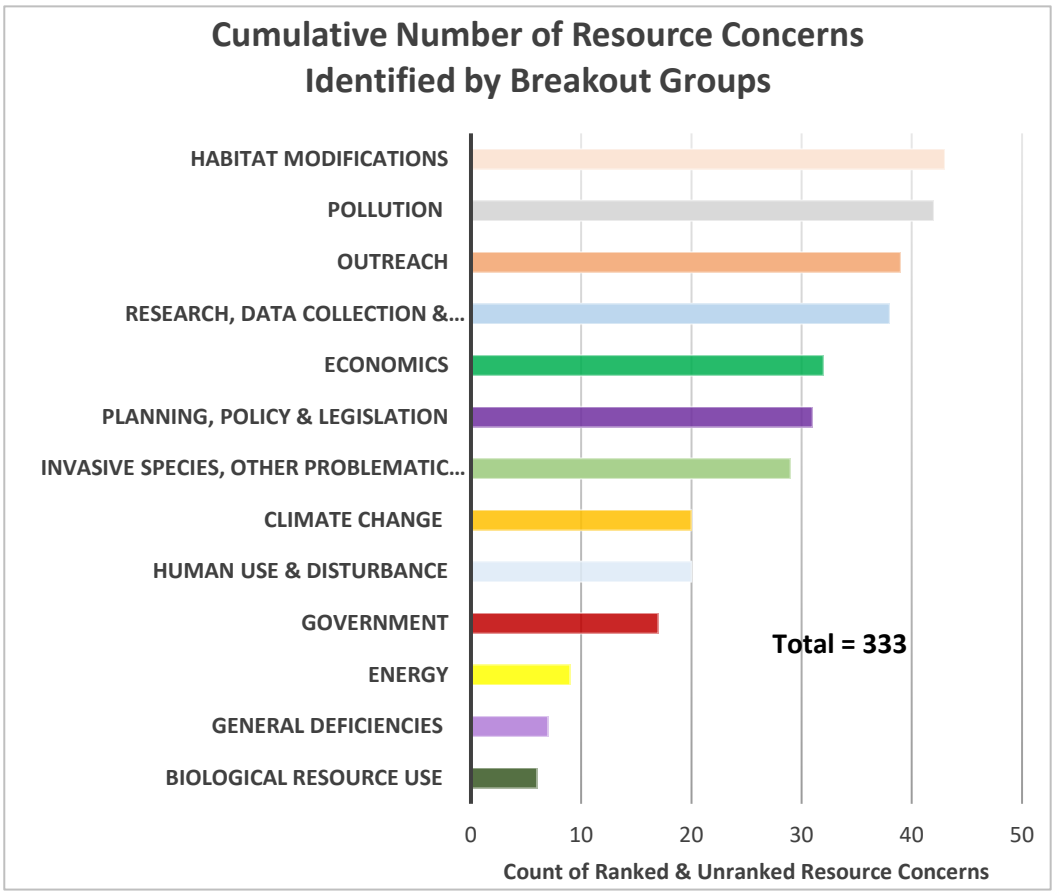


Figure 4. Number of unique resource concerns identified by 2024 Fish & wildlife Diversity Forum breakout groups, organized by theme/category. Includes ranked resource concerns or unranked resource concerns with ranked Actions.

Within the major themes, we compiled sub-topics (Table 2) and, though not a comprehensive list, collectively illustrate the broad scope of concerns facing Pennsylvania's fish and wildlife resources as identified by breakout group members. As the state's comprehensive reference for SGCN and their habitats, the PA WAP brings together these concerns and associated actions to guide recovery and management.

Table 2. Overarching ranked resource concern themes and sub-topics *(i.e., not comprehensive)* from 2024 Fish & Wildlife Diversity Forum breakout group discussions.

MAJOR THEME	GENERAL SUB-TOPICS
HABITAT MODIFICATIONS	Dams, Lack of Habitat Connectivity, Habitat Loss, Lack of Urban Forests & Open Space, Lack of Early Successional Habitats, Habitat Fragmentation/Degradation, Lack of Prescribed Fire, Need for Headwater and Wetland Protection, Water Quality & Quantity
POLLUTION	Abandoned Mine Drainage, Light & Noise Pollution, Fracking Waste, Harmful Algal & Bacterial Blooms, Microplastics, Stormwater, Thermal, Road Salt, Acid Deposition, Agricultural Management (Nutrients, Pesticides), Waste Stream Management, Medications, Emerging Pollutants
OUTREACH	Lack of Communication & Engagement with Public, Insufficient Access to information, Resources, Lack of Traditional Ecological Knowledge & Diversity Representation, Lack of Knowledge & Trust in Science, Need for Human Dimensions Investment
RESEARCH, DATA COLLECTION & MANAGEMENT	Lack of/Inadequate Data Tools, Lack of Data Access, Monitoring, Data Gaps, Lack of Monitoring, Uncertainty, Lack of Attention to Soil Health, Fungi, Terrestrial Invertebrates, Prioritizing Habitat Conservation,
ECONOMICS	Insufficient Conservation Funding & Coordination Across Multiple Needs, Incentives, Prioritization, Disregard for Economic Benefits of Conservation
PLANNING, POLICY & LEGISLATION	Orphaned Taxa, Lack of Plants and Fungi in Wildlife Action Plan, Lack of Collaboration & Political Support, Landscape-level and Comprehensive Planning, Ordinances, Lack State Jurisdiction-Terrestrial Invertebrates, Slow Species Recovery, Cultural Workplace Practices for a More Diverse Workforce
INVASIVE SPECIES, OTHER PROBLEMATIC SPECIES, GENES & DISEASES	Overabundance of Deer, Cats, Feral Hogs; Invasive Species, Pests, Pathogens, Wildlife Health, Species Population Shifts/Decline (e.g., Invertebrates, Common Species);
CLIMATE CHANGE	Impacts on Fish & Wildlife, Phenology, Sea Level Rise, Seasonality, Species Shifts, Resiliency, Threat Amplification
HUMAN USE & DISTURBANCE	Cumulative Threat Impacts on Wildlife, Conflicting Habitat Uses, Motorized Outdoor Recreation, Inaccessibility of Private Lands, Bird Window Strikes, Urbanization
GOVERNMENT	Lack of Collaboration, Staffing, Workforce Development, Enforcement, Permitting Process Limitations
ENERGY	Implications for Wildlife from Solar, Wind, Oil & Gas, Injection Wells, Mineral Extraction
GENERAL DEFICIENCIES	Lack Human Resources, Resource Management Conflicts & Measurements, Social Science Considerations, Loss of Institutional Knowledge
BIOLOGICAL RESOURCE USE	Forest Management, Need for Sustainable Forests, Lack of low-grade hardwood markets, Agriculture Management

Concerns by Breakout Group

Each breakout group was thematically different, yet groups identified common resource concerns. Common categories among all groups included: *Other: Resource Needs* (19%), *Other: Education & Outreach* (17%), *Pollution* (13%), *Invasive & Other Problematic Species*, *Genes & Diseases* (11%), *Other: Administrative Needs* (10%), *Residential & Commercial Development* (9%), and *Climate Change* (5%) (Figure 5; Appendix D: Results). Notably, the generic category *Other: Resource Needs* includes topics such as inadequate funding, lack of personnel or human capacity, insufficient data or information, and similar deficiencies.

Actions by Breakout Group

Similarly, we placed conservation actions within defined categories and summarized them by breakout groups. For the 433 conservation actions identified, *Outreach* accounted for more overall actions (20%) than other action categories, though it was not noted by every breakout group. All groups noted four action categories including *Design*

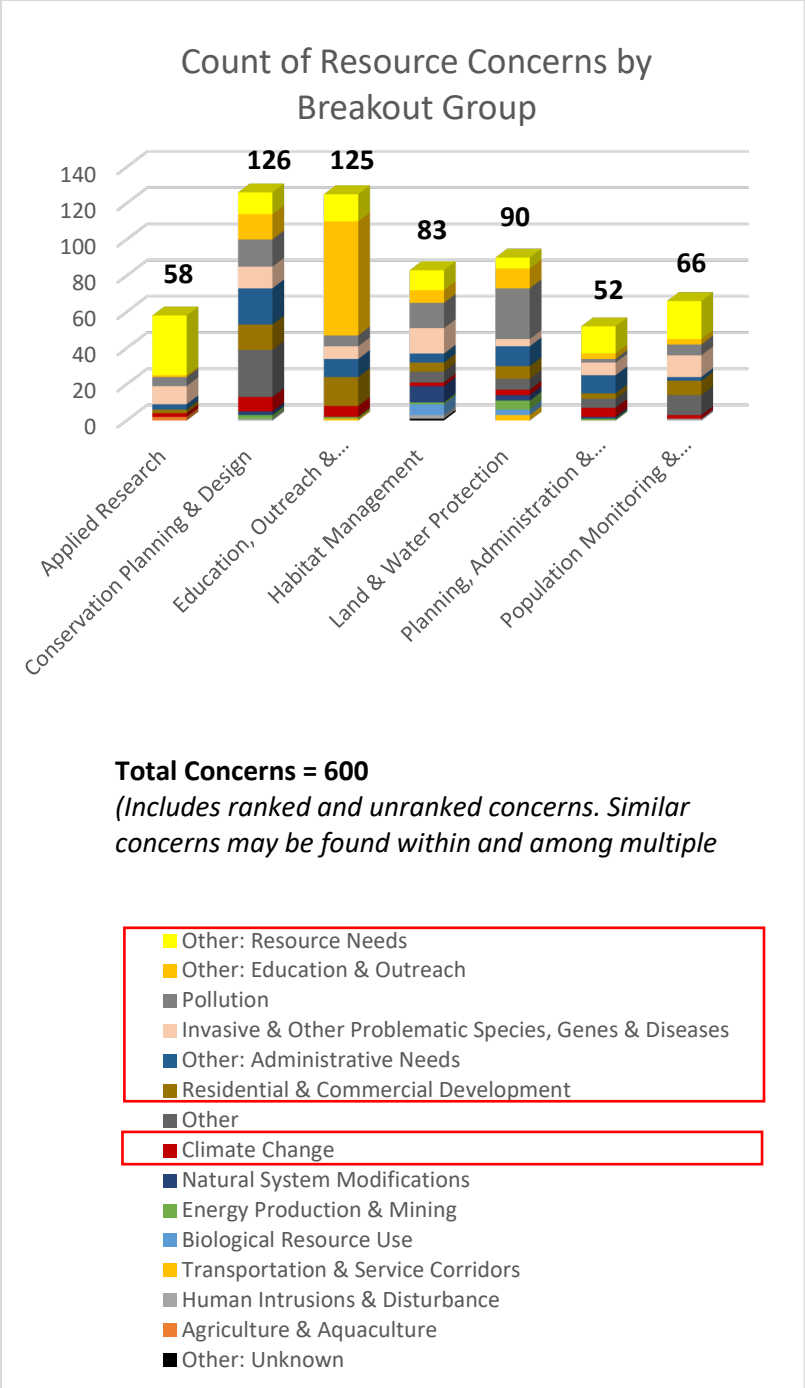


Figure 5. Total resource concerns identified by breakout groups during the 2024 Fish & Wildlife Diversity Forum. Red boxes indicate common concerns identified among all breakout groups.

and Plan Conservation (16%), *Institutional Development* (15%), *Economic and Other Incentives* (14%), and *Legislative and Regulatory Framework or Tools* (7%) (Figure 6). Differences in the number of actions identified by breakout groups is attributable to differential complexity of breakout group topics.

Within each breakout group, priority topics varied. Not surprisingly, the **Applied Research breakout group** indicated *Research and Monitoring* as a priority, encompassing 57% of all topics, followed by *Design and Plan Conservation* (29%) and *Outreach* (8%) (Figure 7). With its broad theme and scope, conservation actions identified by the **Conservation Planning & Design breakout group** fell within all 11 categories, with four categories - *Institutional Development*, *Economic and Other Incentives*, *Design and Plan Conservation*, and *Outreach* - ranging from 15-19% each, encompassing 65% of all 96 actions (Figure 8). The remaining seven action categories contained 3% to 9% each of the identified actions.

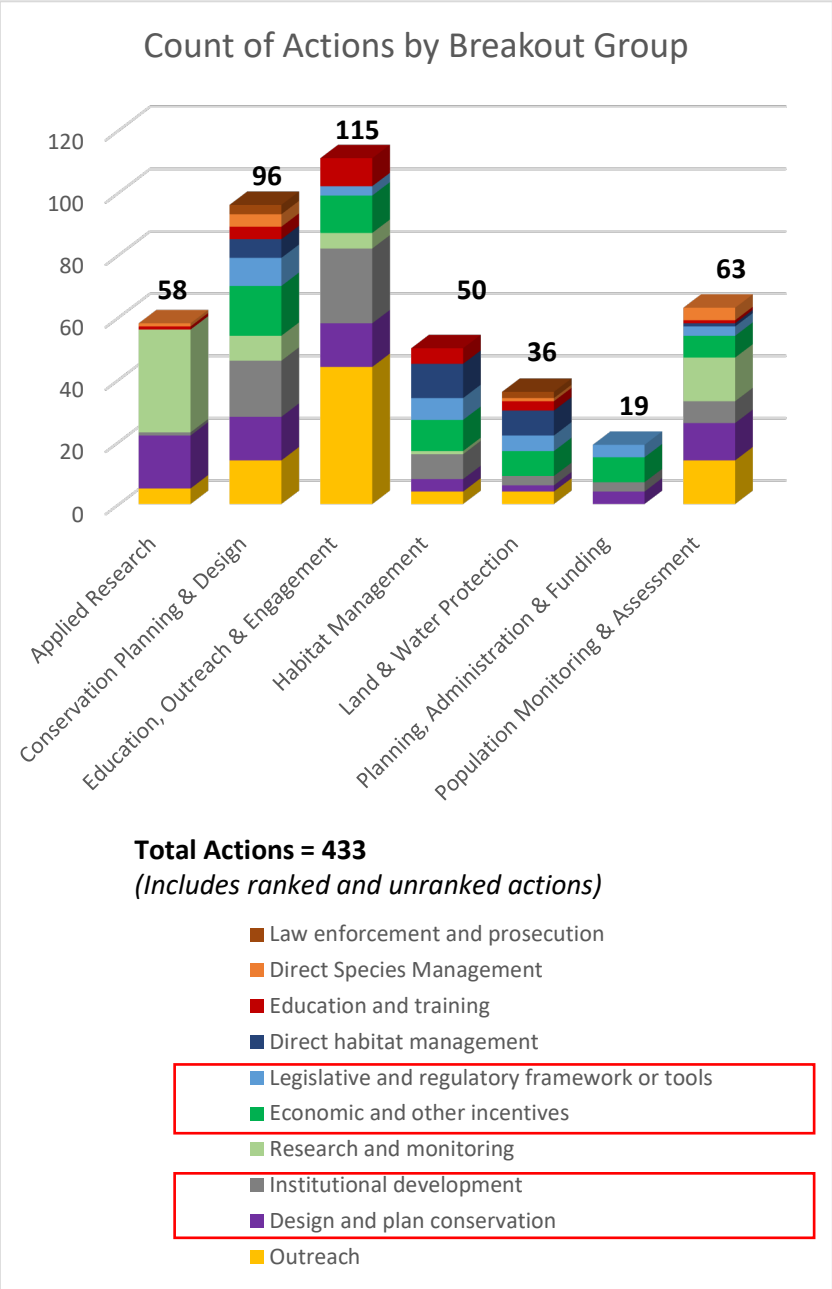


Figure 6. Summary counts of categorically classified conservation actions by breakout groups during the 2024 Fish & Wildlife Diversity Forum. Red boxes indicate Actions common among all breakout groups.

Outreach (38%) actions understandably dominated the **Education, Outreach, and Engagement breakout group**, followed by *Institutional Development* (24%), *Design and Plan Conservation* (12%), and *Economic and Other Incentives* (11%) (Figure 9). The **Habitat Management breakout group** identified 50 actions, with 58% falling within three categories: *Direct Habitat Management* (22%), *Economic and Other Incentives* (20%), and *Institutional Development* (16%) (Figure 10). Within the **Land & Water Protection breakout group**, *Direct Habitat Management* and *Economic and Other Incentives* (22%) led the categories (Figure 11).

Notably, these two categories similarly dominated Habitat Management group actions. Within the **Policy, Administration & Funding breakout group**, *Economic and Other Incentives* accounted for nearly half (42%) of the 19 identified actions (Figure 12). Sixty-three percent (63%) of **Population Monitoring & Assessment breakout group** actions fell within three categories *Outreach*, *Research and Monitoring*, and *Design and Plan Conservation* (Figure 13).

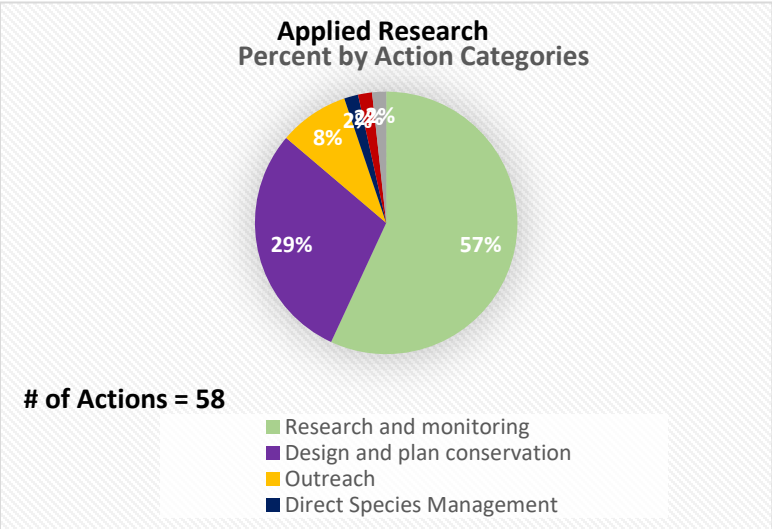


Figure 7. Percent distribution of conservation actions identified by the Applied Research breakout group during the 2024 Fish & Wildlife Diversity Forum.

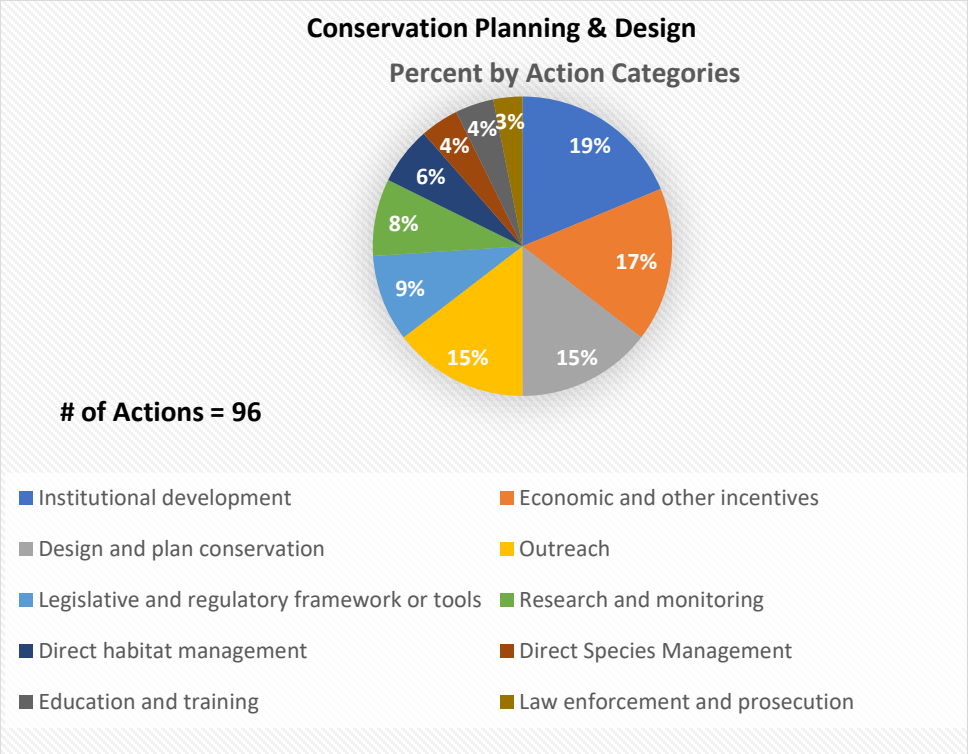


Figure 8. Percent distribution of conservation actions identified by the Conservation Planning & Design breakout group during the 2024 Fish & Wildlife Diversity Forum.

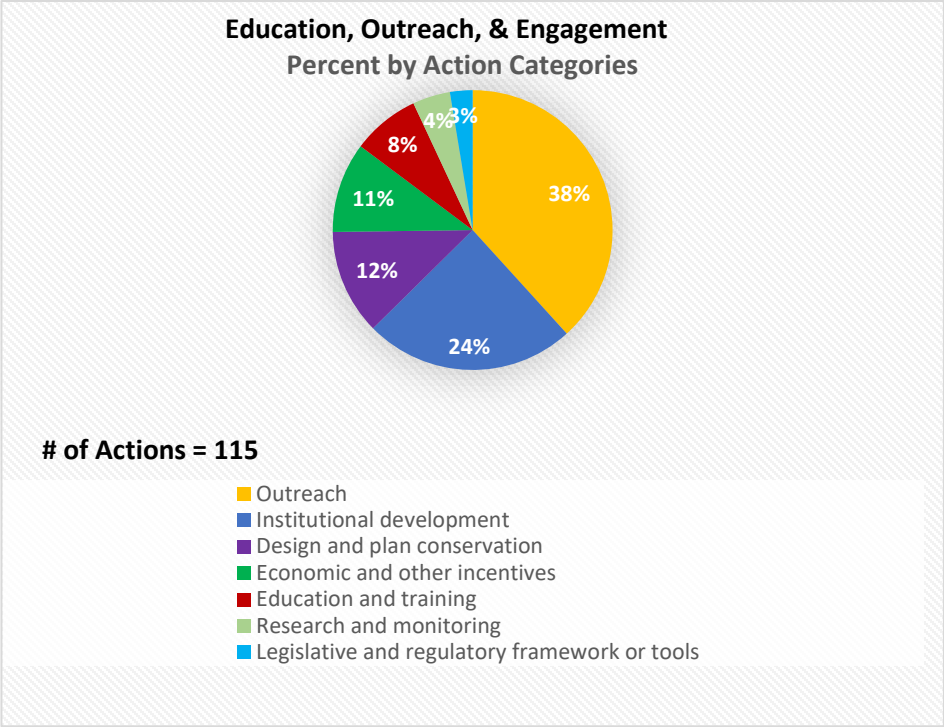


Figure 9. Percent distribution of conservation actions identified by the Education, Outreach & Engagement breakout group during the 2024 Fish & Wildlife Diversity Forum.

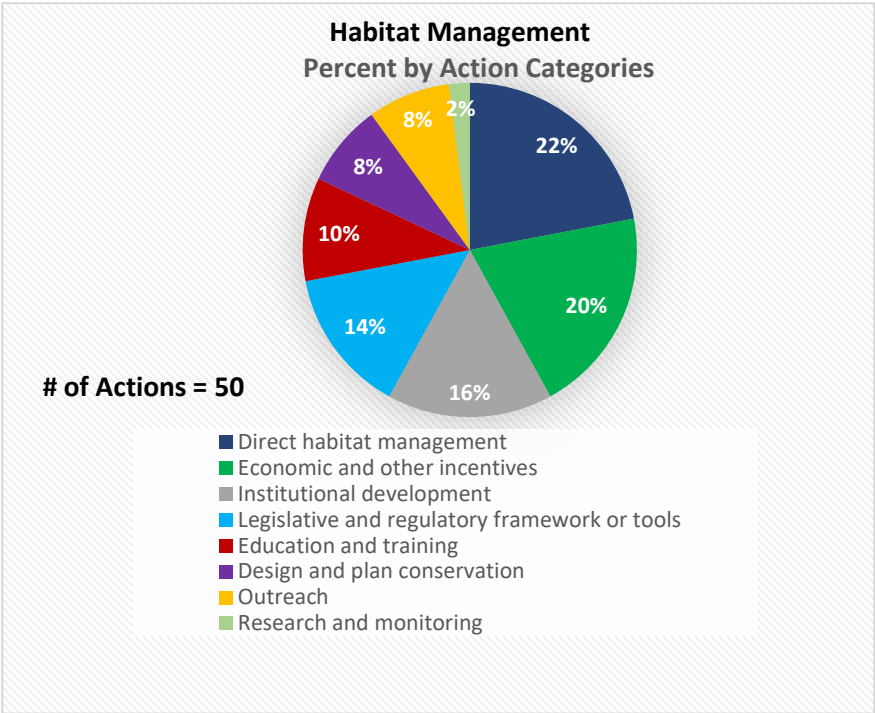


Figure 10. Percent distribution of conservation actions identified by the Habitat Management breakout group during the 2024 Fish & Wildlife Diversity Forum.

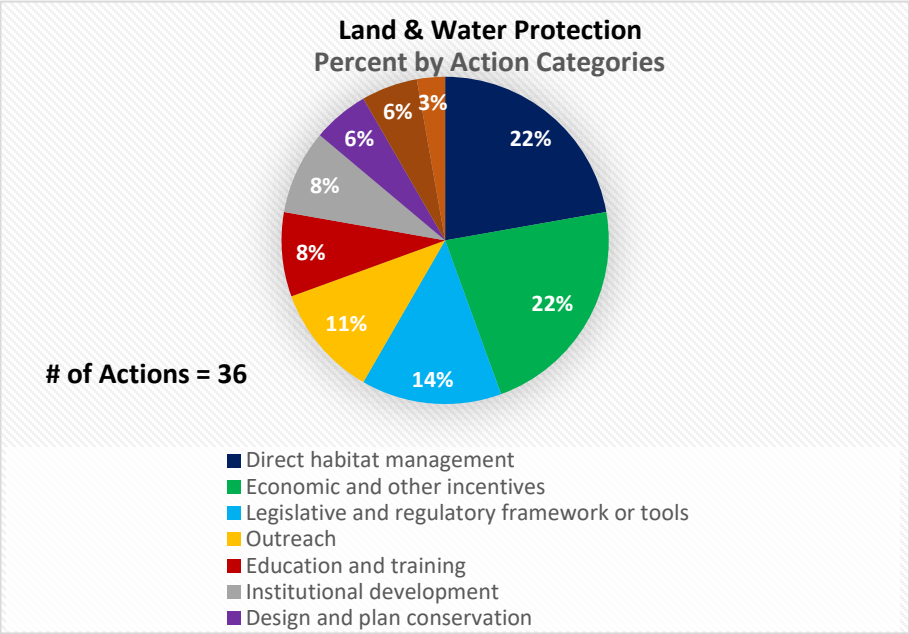


Figure 11. Percent distribution of conservation actions identified by the Land and Water Protection breakout group during the 2024 Fish & Wildlife Diversity Forum.

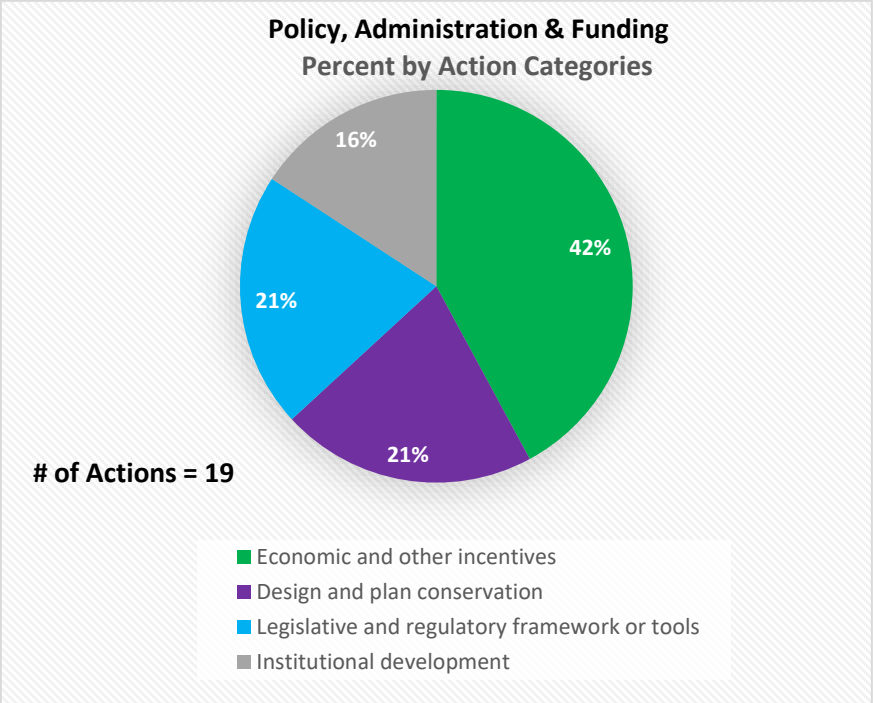


Figure 12. Percent distribution of conservation actions identified by the Policy, Administration & Funding breakout group during the 2024 Fish & Wildlife Diversity Forum.

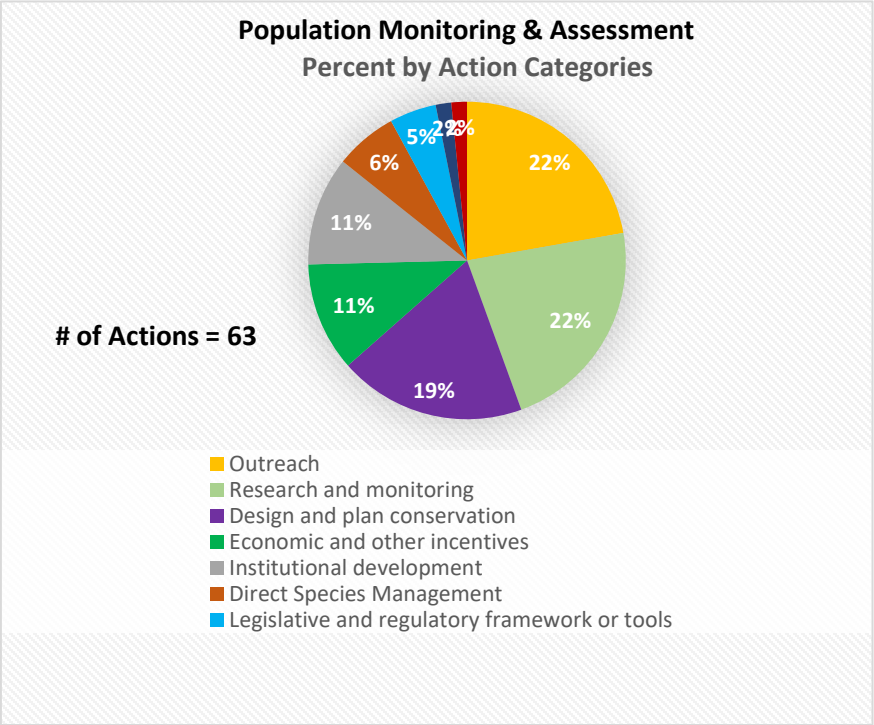


Figure 13. Percent distribution of conservation actions identified by the Population Monitoring & Assessment breakout group during the 2024 Fish & Wildlife Diversity Forum.

Posters

We offered all registrants the opportunity to present a poster on PA WAP relevant topics. Four abstracts were submitted and accepted (Appendix C: Poster abstracts), with posters available for viewing throughout the event and especially during the Thursday evening social when authors were present to answer questions.

Figure 14. Renowned author and biologist Scott Weidensaul provided the keynote presentation at the 2024 Fish & Wildlife Diversity Forum. Photo credit: PFBC.

Banquet Keynote Address

As part of the banquet festivities, Scott Weidensaul delivered a special presentation entitled, "Taking Pennsylvania's Fish and Wildlife to a Brighter Future," in which he noted that fish and wildlife face many challenges to survival, yet technological breakthroughs and informed management strategies are providing hope for recovery (Figure 14). Weidensaul is a renowned author of nearly 30 books on natural history, including the Pulitzer Prize finalist *Living on the Wind* and his latest, the New York Times bestseller *A World on the Wing*. A native of Pennsylvania now living in New Hampshire, he is a contributing editor for Audubon and writes for a variety of other publications, including Bird Watcher's Digest (BWD) and Living Bird. He is a Fellow of the American Ornithological Society and an active field researcher, studying saw-whet owl migration for more than 25 years, as well as winter hummingbirds in the East, bird migration in Alaska, and the winter movements of snowy owls through Project SNOWstorm, which he co-founded.

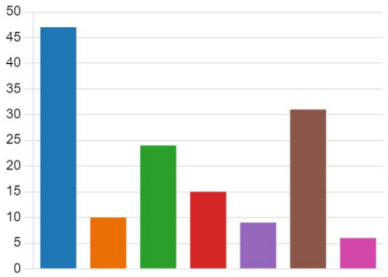
Surveys

To further inform 2025-2035 PA WAP development, we wished to understand *how* registrants use the 2015-2025 PA WAP. Of the available pre-event survey options, respondents could select all that applied. Overall, respondents noted the PA WAP was especially helpful *as a reference to understand species priorities in the state* (47%), *to support grant proposal narratives* (31%), and *to develop research proposals* (24%) (Figure 15). To a lesser extent, the PA WAP has been used *to develop implementation projects* (24%), *for land use planning* (10%), and *to plan habitat treatments* (9%).

Post-Forum Survey

We conducted a post-forum survey to garner registered participant perspectives regarding the PA WAP and on the event. We received 31 responses (37.8% response rate), with over half representing non-

profit organizations (Figure 16). Affiliations of four respondents constituted the "Other" category. For non-profit organizations, we expanded our questioning to inquire about the number of Pennsylvanians collectively represented at the Forum. Non-profit organizations have members who are passionate about natural resources and may be dues-paying members, volunteers, or those simply interested in knowing more about the organization's conservation work. Post-forum survey respondents accounted for a subset of all non-profit organization Forum participants yet represented over 101,000 Pennsylvanians.



PAWAP Uses by registrants	# of responses
As a reference to understand species priorities in the stat	47
Land use planning.	10
Develop research proposals.	24
Develop implementation projects.	15
Plan habitat treatments.	9
Support grant proposal narratives.	31
Other	6

Figure 15. Pre-event survey respondents indicating familiarity with the 2015-2025 Pennsylvania Wildlife Action Plan, were also asked how they used the 2015-2025 Pennsylvania Wildlife Action Plan. Multiple responses were allowed.

As planned, the Forum was structured to expand participant's knowledge about the PA WAP and broader conservation issues with the plenary session offering foundational information for consistent understanding for all participants. At the most basic level, the event was successful in this endeavor with all respondents to the post-Forum survey indicating familiarity with the PA WAP and, collectively, over 93% expressing they were "Very" or "Moderately" familiar with the PA WAP (Figure 17), compared to a combined 65% for the same categories in the pre-Forum responses (Figure 2).

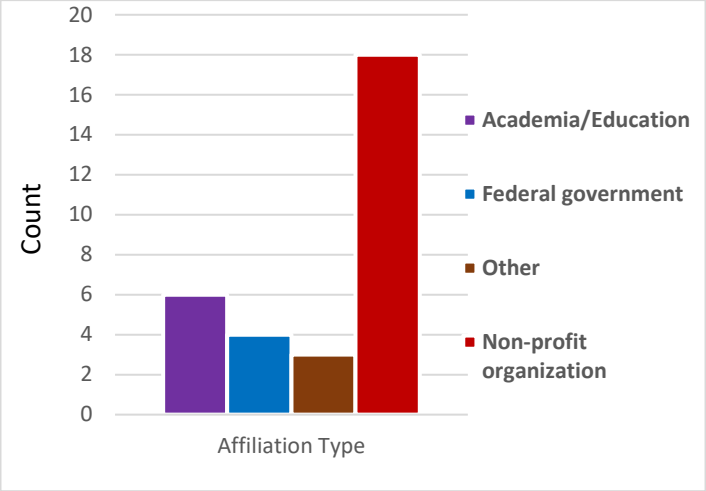


Figure 16. Count of respondents by affiliation type to post-Forum survey.

Increased understanding by participants of key topics was also illustrated through self-assessment of pre- and post- Forum knowledge of PGC and PFBC agency missions, as well as projects supporting SGCN (Appendix E, Questions 9 and 10). All post-Forum respondents had "Moderate" or "Extensive" knowledge of PGC and PFBC missions. Knowledge ratings improved for PGC SGCN projects, increasing from 71% to over 93% for the combined "Moderate" and "Extensive" knowledge categories. Even greater improvement occurred for PFBC SGCN projects, for these same knowledge categories, increasing from a combined 54.9% prior to the event to a cumulative 87% "Moderate" and "Extensive" post-Forum.

For some participants, expectations for the Forum may have been influenced by attendance at the successful 2012 Wildlife Diversity Forum. Other participants were unfamiliar with the PA WAP. So, after attending, we wanted to know to what extent participant's expectations were met. Nearly all post-event survey respondents (96.7%) indicated the event "met" or "exceeded" expectations (Appendix E, questions 5 - 6). Additionally, an anticipated Forum outcome was enhanced collaboration and, similarly (96.7%) of post-Forum survey respondents indicated the event was successful and offered networking opportunities (Appendix E, Questions 7 - 8).

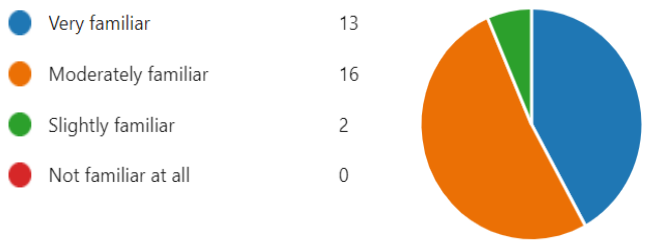


Figure 17. Post-Forum survey responses to the question "How familiar are you with the 2015-2025 Pennsylvania Wildlife Action Plan?"

The 2015-2025 PA WAP - Understanding the Present, Building for the Future

The PGC and PFBC are eager to understand how the PA WAP, as a "living" document, can be more useful to Pennsylvania's conservation community. Thus, recognizing the benefits and constraints of the 2015-2025 PA WAP would be especially helpful for guiding development of the 2025-2035 PA WAP. Overall, respondents agreed the 2015-2025 PA WAP is accessible (74%), easy to use (61%), easy to understand (67%), has useful information (96%), and is relevant to their work (77%) (Appendix E, Questions 13 & 14). Yet, despite positive responses regarding the information and relevancy, respondents expressed difficulty in using and interpreting the 2015-2025 PA WAP. The PGC and PFBC will seriously consider these important and timely comments as the 2025-2035 PA WAP is developed.

From the early days of State Wildlife Action Plans, technological and outreach advances have expanded opportunities for making material in the SWAPs more available and appealing to audiences. So, we asked: *What features or content would increase the likelihood you will use the Wildlife Action Plan?* (Appendix E**,** Question 15). Primarily, respondents noted increased accessibility through interactive tools, searchable keywords, and trainings.

The PGC and PFBC similarly asked about the Conservation Opportunity Area (COA) Tool. For this tool, respondents agreed it was accessible (63%), easy to use (57%), easy to understand (50%), has useful information (80%), and is relevant to my (their) work (58%). As with the PA WAP document, the COA Tool appears most limited in its ease of use and interpretation (Appendix E, Questions 16, 17 & 18). Again, suggestions on how to improve included training, promotion, and marketing. These comments are especially helpful as the PGC and PFBC prepare to adapt the COA Tool to the 2025-2035 PA WAP.

To expand awareness and usefulness of both the PA WAP and COA Tool, respondents provided several suggestions including webinars, use of social media (e.g., Facebook, LinkedIn), public outreach events, links to videos on websites, webinar talks with outreach to new audiences and other options for the PGC and PFBC to consider for the 2025-2035 PA WAP (Appendix C, Question 19).

DISCUSSION AND CONCLUSIONS

Resolving fish and wildlife challenges is beyond the scope or capacity of any single entity, thus collaborating on topics of mutual interest results in more effective conservation and enduring outcomes. The PA WAP is the Commonwealth's comprehensive guide for protecting and recovering SGCN. Acting upon this desire for collaboration, the 2024 Fish & Wildlife Diversity Forum brought together leaders of Pennsylvania's conservation community to elicit their concerns and potential solutions to be considered for the 2025-2035 PA WAP. The PGC and PFBC invited a broad group of agencies and organizations, including industry and tribal representatives with relevance to Pennsylvania's SGCN or their habitats. Not all invitees were able to attend, but, unless otherwise expressed, will continue to receive information for their awareness and can provide feedback on interim PA WAP materials.

Common topics highlighted by event breakout group participants can reflect the current mindset of the conservation community. The seven thematic breakout groups (~8-15 participants per group) were extremely productive, providing a rich and diverse expression of participant's knowledge and experience on complex topics. Though more than a decade has elapsed since the 2012 Wildlife Diversity Forum, habitat loss and fragmentation, pollution, floral and faunal invasive species, climate change, deer browse, staff capacity, and funding limitations remain chronic concerns or needs. Importantly, the frequency of habitat loss and fragmentation mentions may infer a greater sense of action urgency. Emerging concerns may be a contributing factor, such as the rapid pace of land conversion from large-scale solar development and shipping warehouses. Additional common emerging resource concerns or needs included gas and solar decommissioning/site restoration, climate refugee accommodation, understanding/addressing wildlife health threats, thwarting invertebrate declines and adopting orphaned taxa, and establishing long-term monitoring stations statewide. Plastic, light, and noise pollution are more recent concerns identified by several groups. Emphasized during the plenary question and answer session, and expressed in nearly all breakout groups, was concern for the lack of ethnic and racial diversity in the conservation field. Coupled with this lack of diversity is youth apathy and disconnection with nature, leading to fewer skilled conservation professionals in years ahead.

Despite the numerous and significant resource challenges identified, groups met them head-on, developing creative and tangible solutions for the most pressing needs. Several groups noted novel approaches to incentivizing conservation, especially for private landowners. With most of the Pennsylvania land area in private ownership it will be critical to enhance conservation efforts on private land and increase involvement of private landowners as partners in coming years. As expressed by several groups, private lands will be especially important to support resilient landscapes as climate changes. Short- and long-term funding is necessary and critical, particularly expedient access to capitalize quickly on new opportunities. Highlighted were the importance of leveraging partner organizations to pursue conservation funding and a suggestion to include an invasive species line item in the state budget (e.g., support Partnership for Region Invasive Species Management (PRISM)). To address a paucity of ethnic and racial diversity in the conservation field and engage youth, ideas included identifying role models, expanding youth outdoor corps, direct marketing campaigns, offering paid internships, and 'gamifying' conservation.

Discussed above are the proverbial 'tip of the iceberg' regarding Forum results. The expansive record of resource concerns and conservation actions noted in this report (Appendix D: Results) exemplifies the extensive contributions by participants. Group efficiency was supported by PFBC and PGC facilitators and recorders who kept discussions relevant to target topics. The PGC and PFBC will continue synthesizing and analyzing the expansive breakout group input throughout the PA WAP revision process.

Post-event participant survey results indicate we achieved our intended objectives to provide a venue for information exchange and highlight implementation accomplishments, identify critical concerns and actions needed over the next decade, and motivate implementation through networking opportunities. Most attendees increased knowledge of PGC and PFBC missions and projects supporting SGCN, which will hopefully inspire new partnerships. We were pleased that the event met or exceeded expectations of 97% respondents, with many stating they made new contacts with whom they are already pursuing collaborative projects. Survey responses provided essential feedback regarding need for WAP and COA Tool improved accessibility and ease-of-use, which we will strongly consider going forward. New technologies and updated USFWS administrative guidance for paperless SWAPs offer options for the PGC and PFBC to explore so the 2025-2035 PA WAP is more accessible and easier to use.

Overall, and importantly, the knowledge and energy of partners and staff participating in the Forum, and associated surveys, provided valuable feedback on the 2015-2025 PA WAP and information for developing the 2025-2035 PA WAP. As mentioned many times in the plenary session, partnerships are crucial to success of our collective endeavors as we *move fish and wildlife conservation forward into the next decade!*

REFERENCES

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APPENDIX A

2024 Fish & Wildlife Diversity Forum Agenda

2024 Fish & Wildlife Diversity Forum

Moving fish and wildlife conservation forward in the next decade!

Photo by PFBC

Photo by PGC

March 7 & 8, 2024

Ramada Inn and Conference Center
1450 South Atherton Street
State College, PA 16801

AGENDA

THURSDAY, MARCH 7th

8:30	**REGISTRATION/ NETWORKING / POSTER SET UP**	Conference Center Lobby
10:00	**Welcome**	Grand Ballroom

Opening Remarks
Tim Schaeffer, Executive Director, Pennsylvania Fish and Boat Commission

State Wildlife Action Plans – A National Overview
Mark Humpert, Director of Conservation Initiatives, Association of Fish and Wildlife Agencies

P Soup: The Most Valuable Ingredients in Wildlife Recovery
Lisa Williams, Wildlife Recovery Division Chief, Pennsylvania Game Commission

From Data Deficiency to Delisting: Advancing Aquatic Species Recovery
Chris Urban, Natural Diversity Section Chief, Pennsylvania Fish and Boat Commission

Igniting Partnerships for Species and Habitat Recovery [Case Study]
Scott Bearer, Habitat Planning and Development Division Chief, Pennsylvania Game Commission

Motus: A Flightpath to Wildlife Conservation [Case Study]
Sean Murphy, State Ornithologist/Protected Birds Section Chief, Pennsylvania Game Commission

Q & A/ Discussion

12:00	**LUNCH** *(provided)*	Atrium
1:30	**Taking stock of Pennsylvania's conservation landscape: Identifying resource concerns** *Facilitated breakout Session 1*	Breakout Rooms
3:00	**BREAK** *Snacks and beverages provided*	Conference Center Lobby
3:30	**Prioritizing resource concerns and identifying actions** *Facilitated breakout Session 2 (same groups)*	Breakout Rooms
4:30	**BREAK**	Conference Center Lobby
5:00	**Poster session/Social** *Appetizers and non-alcoholic beverages provided. Cash bar.*	Conference Center Lobby
6:00 - 8:00	***~Banquet Dinner & Keynote Presentation~*** **TAKING PENNSYLVANIA'S FISH AND WILDLIFE TO A BRIGHTER FUTURE** *Scott Weidensaul, Ornithologist and New York Times Best Selling Author*	Grand Ballroom

FRIDAY, MARCH 8th

8:00	**DAY 1 RECAP** *Groups share salient points from Day 1 discussions*	Grand Ballroom
8:30	**Prioritizing resource concerns and identifying actions** *Facilitated breakout Session 3 (same groups)*	Breakout Rooms

10:00	**BREAK** *Snacks and beverages provided*	Conference Center Lobby
10:30	**Prioritizing actions** *Facilitated breakout Session 4 (same groups)*	Breakout Rooms
12:00	**LUNCH**	Atrium
1:00	**Wrap-up and Door Prizes**	Grand Ballroom
2:00	**ADJOURN**	Grand Ballroom

THANK YOU FOR ALL YOU DO!

Partial funding for the Fish & Wildlife Diversity Forum has been provided by the federal State & Tribal Wildlife Grants Program administered by the U.S. Fish and Wildlife Service – Northeast Regional Office.

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APPENDIX B

Affiliation and title of attendees (excluding PGC and PFBC staff).

Affiliation	Professional title
Alliance for the Chesapeake Bay	Forest Projects Coordinator
Association of Fish and Wildlife Agencies	Director of Conservation Initiatives
Audubon Mid-Atlantic	Forest Program Manager
Audubon Mid-Atlantic	Director of Conservation
Backcountry Hunters & Anglers	Field Director
Blair County Conservation District	Conservation Education Specialist
Columbia County Conservation District	District Manager
Delaware River Basin Commission	Senior Aquatic Biologist
Delaware Valley University	Associate Professor/Dept. Co-Chair
Eastern PA Coalition for Abandoned Mine Reclamation (EPCAMR)	Executive Director
Erie Bird Observatory	Executive Director
Foundation for PA Watersheds	Executive Director
French Creek Valley Conservancy	Executive Director
Gettysburg College	Associate Professor
Great Lakes Fishery Commission	Sea Lamprey Control Program Manager
Harrisburg University	Associate Professor
Hawk Mountain Sanctuary Association	Director of Conservation Science
Heritage Conservancy	Land Manager
Heritage Conservancy	Conservation Steward
Indiana University of Pennsylvania and American Bird Conservancy	Professor of wildlife Ecology and Conservation
James C Finley Center for Private Forests at Penn State	Director
Middle Susquehanna Riverkeeper Association	Executive Director and Riverkeeper
Natural Lands	Vice President of Conservation
Natural Lands	Assistant Preserve Manager
NatureServe	Director of Spatial Analysis
North Branch Land Trust	Land Conservation and Stewardship Coordinator
PA Association of Environmental Educators; PA Master Naturalist	Program Coordinator
Pennsylvania Biological Survey	President
Pennsylvania Biological Survey	Wildlife Biologist
Pennsylvania DCNR	Director, Applied Climate Science
Pennsylvania DCNR, Pennsylvania Natural Heritage Program	Chief, Natural Heritage Section

Pennsylvania DCNR, Bureau of Forestry	Ecological Program Specialist
Pennsylvania DCNR, Bureau of Forestry	Ecological Resources Division Chief
Pennsylvania DCNR, Bureau of Recreation and Conservation	Land Conversion Specialist
Pennsylvania Department of Environmental Protection	Water Program Specialist
Pennsylvania Environment Council/POWR	Vice President
Pennsylvania Environment Council/POWR	Program Manager, Watershed Outreach
Pennsylvania Natural Heritage Program	Director
Pennsylvania Natural Heritage Program	GIS Coordinator
Pennsylvania Natural Heritage Program/Western PA Conservancy	Vertebrate Zoology Manager
Pennsylvania Recreation and Park Society	CEO
Pennsylvania Sea Grant	Watershed Restoration and Planning Specialist
Pennsylvania SFI Implementation Committee	Program Manager
Pennsylvania State University	Assistant Professor
Private	Writer/Researcher
Purple Martin Conservation Association	Research Manager
Purple Martin Conservation Association	Director of Outreach and Advocacy
Ruffed Grouse Society & American Woodcock Society	Mid-Atlantic Forest Conservation Director
Strategic Stewardship Initiative	Wildlife Conservation Planner
Stroud Water Research Center	Director of Watershed Restoration
Temple University	Associate Professor
The Nature Conservancy	Director of Land Management
The Nature Conservancy	Director of Policy
The Nature Conservancy	Conservation GIS Manager
The Pennsylvania Forestry Association	DCNR Retired
Three Rivers Waterkeeper	Executive Director
Tulpehocken Creek Watershed Association	Conservation planner
U.S. Fish and Wildlife Service	Project Leader
U.S. Fish and Wildlife Service	Wildlife Biologist
U.S. Fish and Wildlife Service-Erie National Wildlife Refuge	Wildlife Refuge Manager
University of Pennsylvania School of Veterinary Medicine - Wildlife Futures Program	Professor of Toxicology
USDA-Forest Service, Allegheny National Forest	Aquatics Program Manager
USDA-NRCS	Acting Wildlife Biologist
USDA-NRCS	Acting State Resource Conservationist
USGS PA Cooperative Fish & Wildlife Research Unit	Assistant Unit Leader
USGS PA Cooperative Fish & Wildlife Research Unit	Wildlife Biologist
USGS PA Cooperative Fish & Wildlife Research Unit	Fisheries Biologist

USGS PA Water Science Center	Hydrologist
Western PA Coalition for Abandoned Mine Reclamation	Regional Coordinator
Western Pennsylvania Conservancy	Senior Director of Aquatic Science
Western Pennsylvania Conservancy	Senior Director, Special Projects
Western Pennsylvania Conservancy	Science Director, Natural Heritage Program
Western Pennsylvania Conservancy	Invertebrate Zoologist
Wildlands Conservancy	Senior Restoration Ecologist
Wildlife Futures Program, PennVet	Postdoctoral Researcher
Wildlife Futures Program, University of Pennsylvania School of Veterinary Medicine	Wildlife Veterinarian
Wildlife Futures Program, University of Pennsylvania	Co-Director, Wildlife Futures Program
Wildlife Leadership Academy	Executive Director
Willistown Conservation Trust	Director of the Watershed Protection Program
Willistown Conservation Trust/Northeast Motus Collaboration	Director of Bird Conservation
Woods and Waters Consulting	Conservation Biologist

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APPENDIX C

Poster Session Abstracts

2024 Fish & Wildlife Diversity Forum

Moving fish and wildlife conservation forward in the next decade!

POSTER SESSION ABSTRACTS

INTEGRATING WILDLIFE HEALTH PRIORITIES IN THE 2025-2035 PENNSYLVANIA WILDLIFE ACTION PLAN

**JULIE C. ELLIS[1], R. Scott Larsen[1], Andrew DiSalvo[2], Sabrina S. Greening[1], Erica Miller[1], Diana Day[3],* and *Catherine D. Haffner[2].* [1]Wildlife Futures Program, Department of Pathobiology, University of Pennsylvania, School of Veterinary Medicine, Kennett Square, Pennsylvania; [2]Pennylvania Game Commission, Harrisburg, Pennsylvania; [3]Pennsylvania Fish and Boat Commission, Harrisburg, Pennsylvania; jellis04@upenn.edu

Wildlife health threats include disease-causing organisms, toxins, and pollutants that may negatively impact species or entire taxonomic orders, potentially leading to ecosystem-wide disruptions. This developing project will identify and prioritize existing and emerging health threats that may lead to population-level impacts for Pennsylvania Species of Greatest Conservation Need (SGCN). It will describe knowledge gaps, identify priorities for surveillance and research, and evaluate management strategies that could mitigate population-level impacts and geographic spread of priority wildlife health threats. The approach to this project includes assembling working and advisory groups, synthesizing literature on known wildlife health threats, and surveying wildlife health professionals and wildlife agencies in the Northeast. Information from literature searches and survey results will be summarized to generate a succinct wildlife health section for the 2025-2035 Pennsylvania Wildlife Action Plan, with a focus on actionable content.

ENVIRONMENTAL DNA (eDNA) ANALYSIS REVEALS PRESENCE OF CHYTRID FUNGUS AND RANAVIRUS DETECTED IN THE SOUTHERN END OF MICHAUX STATE FOREST, PENNSYLVANIA

**J. BERNARDO MESA CRUZ[1], Maurice Lopez-Soliz[2], Jordan Mears[1], Aura Stauffer[3].* [1,2]Harrisburg University, [1]Integrative Sciences, [2]Biotechnology, Harrisburg, Pennsylvania; [3]PA Department of Conservation & Natural Resources, Bureau of Forestry, Ecological Services Section, Harrisburg, Pennsylvania; BMesa@harrisburg.edu

Amphibians can experience population decline due to infectious diseases such as chytrid fungus -*Batrachochytrium dendrobatidis* - (Bd) and ranavirus -*Iridoviridae* - (Rv). Environmental DNA (eDNA) techniques, in conjunction with qPCR, quantify pathogen DNA in aquatic environments. Our objective was to detect and quantify Bd and Rv eDNA, via a multiplex qPCR, from vernal pools in the southern end of Michaux State Forest, Pennsylvania. We collected 33 water samples (~500 mL) from 16 pools in April, May, and August (2022) and March 2023. In the lab, we filtered water (409.5 ± 16.5 mL) through a cellulose nitrate membrane (0.2 µm) within 3.5 h of collection. We stored membranes at -80 °C until DNA extraction. We extracted DNA from membranes using the DNeasy PowerSoil® Pro Kit (Qiagen) according to manufacturer, except for extended vortexing step (2.5-hour). We used a pre-stablished multiplex qPCR for Bd and Rv DNA quantification. Our results indicate Bd positivity rates of 18.75% in April and 0% for May August and March, whereas Rv displayed 0% in March and April, 8.3% in May, and 20% in August. We observed 301.9 ± 105.7 Bd copies/dL and 9.1 ± 8.6 RV copies/µL. Concentrations of Bd were slightly higher compared to previous results in western Pennsylvania, whereas Rv concentrations were similar to previous findings in other areas of the United States. This study is a step forward to refine and broaden biomonitoring approaches, at a landscape scale, in Michaux State Forest and potentially other regions in Pennsylvania. Future efforts should additionally use metabarcoding for amphibian species detection to gain deeper understanding of pathogen/host/disease dynamics.

A CONCEPTUAL FRAMEWORK TO PREDICT ACIDIFICATION IN PENNSYLVANIA HEADWATER STREAMS

**MATT SHANK.* Pennsylvania Department of Environmental Protection, Harrisburg, PA; mattheshan@pa.gov

Surface water acidification is a process characterized by increasing concentrations of hydrogen ions (H^+), which lowers the pH of waterbodies. Acidification is a major stressor in Pennsylvania, with abandoned mine drainage and atmospheric deposition most often to blame. Numerous aquatic species of greatest conservation need (SGCN) are negatively impacted by acidification. Underlying geology, roads, land cover, abandoned mine lands, and wetlands are the major landscape variables that determine a watershed's susceptibility to acidification. This conceptual framework can be used to prioritize restoration of SGCN and increase the availability of cold water refugia across Pennsylvania.

HARE TODAY, GONE TOMORROW: RECENT SNOWSHOE HARE RANGE CONTRACTION IN PENNSYLVANIA

*Amanda L. Zak[1], *DUANE R. DIEFENBACH[2], and Emily S. Boyd[3].* [1]Pennsylvania Cooperative Fish and Wildlife Research Unit, Pennsylvania State University, University Park, Pennsylvania; [2]U.S. Geological Survey, Pennsylvania Cooperative Fish and Wildlife Research Unit, Pennsylvania State University, University Park, Pennsylvania, drd11@psu.edu; [3]Bureau of Wildlife Management, Pennsylvania Game Commission, Harrisburg, Pennsylvania.

The range of the snowshoe hare (*Lepus americanus*) has been contracting northward along its southern boundary over the last century. In Pennsylvania, winter temperatures and snowfall have been identified as key drivers of this range shift; changes in the distribution of hunter harvests in the late twentieth century show a northward contraction to the coldest regions of the state, and spatial variation in snowfall has been found to explain snowshoe hare site occupancy in these areas. In 2023, we used occupancy modeling based on presence-absence data from tracks and fecal DNA to model current snowshoe hare occupancy across northern Pennsylvania, with a goal of assessing whether range contraction had continued as predicted based on occupancy data collected in 2004. The best model indicated that winter snowfall remained an important factor explaining snowshoe hare occupancy, along with the amount of surrounding forest cover and the proportion of that forest cover in the early-successional stage. Using this model to estimate snowshoe hare occupancy probabilities across the study area in 2004 and 2023 showed an overall decline in occupancy, with the total area with a ≥60% predicted probability of occupancy declining by 86%. This contraction is occurring faster than was previously predicted and was not mitigated by increases in the amount of early-successional forest cover in the study area over the last two decades. These findings have negative implications for the persistence of snowshoe hares in Pennsylvania as the decreasing trend in winter snowfall is expected to continue.

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APPENDIX D

Compiled Resource Concerns and Conservation Actions identified by Breakout Groups

Breakout Group Name	
AR - Applied Research	**LWP** - Land & Water Protection
CPD - Conservation Planning & Design	**PAF** - Planning, Administration, & Funding
EOE - Education, Outreach & Engagement	**PM** - Population Monitoring
HM - Habitat Management	

Note: *Residential & Commercial Development* was broadly used to classify habitat fragmentation and loss when the cause of fragmentation or loss was not specified. See Crisfield and NEFWDTC 2022 for classification information.

GROUP NAME	GROUP + CONCERNS #	CONCERN CATEGORY	CONCERNS	CONCERN SCORE	ACTION CATEGORY	ACTION DESCRIPTION	ACTION SCORE
AR	AR 10	Other: Resource Needs	BMP-Data management to promote integrated ecosystem assessment	**30.0**	Design and plan conservation	Standardize format for data storage	**26.7**
AR	AR 10	Other: Resource Needs	BMP-Data management to promote integrated ecosystem assessment	**30.0**	Design and plan conservation	Inventory current state of the data POC's	**25.0**
AR	AR 19	Other: Administrative Needs	BMP-Integrate monitoring programs with management programs	**30.0**	Design and plan conservation	Provide guidelines for accomplishing this	**25.0**
AR	AR 10	Other: Resource Needs	BMP-Data management to promote integrated ecosystem assessment	**30.0**	Design and plan conservation	Minimum common metric	**23.3**
AR	AR 10	Other: Resource Needs	BMP-Data management to promote integrated ecosystem assessment	**30.0**	Design and plan conservation	Standardize taxa list	**20.0**
AR	AR 21	Pollution	R-Ag management considerations	**28.8**	Research and monitoring	What are the research needs, sublethal impacts of pesticides, herbicide, pollutants, waterway impairment	**30.0**
AR	AR 21	Residential & Commercial Development	R-Ag management considerations	**28.8**	Research and monitoring	Research reclamation BMPs for industrial lands	**30.0**
AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Research and monitoring	evaluate the effectiveness of management approaches	**28.3**

AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Design and plan conservation	Symbiosis of natives and invasives	**28.3**
AR	AR 15	Other: Administrative Needs	BMP-Prioritize monitoring programs	**28.8**	Education and training	Best practice document	**28.3**
AR	AR 21	Agriculture & Aquaculture	R-Ag management considerations	**28.8**	Research and monitoring	Research on alternative BMPs for ag through a fish and wildlife conservation lens	**28.3**
AR	AR 21	Residential & Commercial Development	R-Ag management considerations	**28.8**	Research and monitoring	Research ways to minimize/mitigate effects on fish and wildlife, on active industrial lands	**28.3**
AR	AR 4	Other: Resource Needs	R- Stay relevant with emerging technologies	**28.8**	Design and plan conservation	See the remote sensing statement	**28.3**
AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Design and plan conservation	Pivot from eradication of invasives to niche replacement	**26.7**
AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Design and plan conservation	What are the mechanisms that allow native species to be inclusive to invasive species	**26.7**
AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Outreach	Get the public onboard and educated on invasives	**26.7**
AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Research and monitoring	Understanding long-term relationship	**25.0**

AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Research and monitoring	detect potential invaders early	**25.0**
AR	AR 4	Other: Resource Needs	R- Stay relevant with emerging technologies	**28.8**	Design and plan conservation	Utilize machine learning to allow increase scale and data management	**25.0**
AR	AR 4	Other: Resource Needs	R- Stay relevant with emerging technologies	**28.8**	Design and plan conservation	Manage data to facilitate use in machine learning	**25.0**
AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Research and monitoring	To understand the vectors of introduction and habitat suitability for the invasives	**23.3**
AR	AR 1	Invasive & Other Problematic Species, Genes & Diseases	TM-Invasive Species	**28.8**	Design and plan conservation	Build resilience into the system	**21.7**
AR	AR 21	Agriculture & Aquaculture	R-Ag management considerations	**28.8**	Design and plan conservation	Are there target species that will respond well to ag reclamation	**20.0**
AR	AR 20	Other: Resource Needs	BMP-What are our research questions and what are we hoping to get out of research?	**27.5**	Design and plan conservation	Best practice document	**23.3**
AR	AR 18	Pollution	TM-Keeping an eye out for new emerging pollutants	**26.3**	Research and monitoring	Understanding the sublethal effects	**30.0**
AR	AR 3	Climate Change	CC- Be more specific with proximate causes and components of Climate Change impacts	**26.3**	Outreach	CC- Be more specific with proximate causes and components of Climate Change impacts	**30.0**
AR	AR 18	Pollution	TM-Keeping an eye out for new emerging pollutants	**26.3**	Research and monitoring	Understand how pollutants move around, how pollutants are introduced, interaction with other sources, sublethal effects	**28.3**

AR	AR 12	Other: Resource Needs	TM-Phylogeography for management units and scale	**26.3**	Research and monitoring	Research population structure of target X to better understand management response	**25.0**
AR	AR 12	Other: Resource Needs	TM-Phylogeography for management units and scale	**26.3**	Research and monitoring	Identify priority species and vulnerability factors	**25.0**
AR	AR 18	Pollution	TM-Keeping an eye out for new emerging pollutants	**26.3**	Institutional development	Build a shared monitoring clearinghouse with clear objectives	**23.3**
AR	AR 18	Pollution	TM-Keeping an eye out for new emerging pollutants	**26.3**	Research and monitoring	Explore the anomalies/outliers	**20.0**
AR	AR 5	Other: Resource Needs	TM-Prioritizing Conservation of Habitat	**25.0**	Research and monitoring	Develop a better Habitat Map that identifies transitional habitats in PA	**30.0**
AR	AR 5	Other: Resource Needs	TM-Prioritizing Conservation of Habitat	**25.0**	Design and plan conservation	Use remote sensing tools and emerging technology	**28.3**
AR	AR 5	Other: Resource Needs	TM-Prioritizing Conservation of Habitat	**25.0**	Research and monitoring	Ground truthing needed to create a crosswalk between data and management	**28.3**
AR	AR 6	Other: Resource Needs	IG- Aquatic Impairment Understanding	**25.0**	Research and monitoring	Broaden our understanding of sources and impacts and interactions	**28.3**
AR	AR 9	Other: Resource Needs	BMP - Partnering with social scientists and colleagues on conservation values, scopes, and philosophy	**25.0**	Research and monitoring	Research to get stakeholders to act (change behavior)	**26.7**
AR	AR 14	Other: Education & Outreach	R-Find new ways to translate research and understanding to the public to generate support	**25.0**	Outreach	See partner with social scientist topic	**25.0**
AR	AR 5	Other: Resource Needs	TM-Prioritizing Conservation of Habitat	**25.0**	Research and monitoring	Understanding relationships and how they impact each other	**25.0**

AR	AR 16	Climate Change	CC - How to determine resilience against climate change	**25.0**	Research and monitoring	CC - How to determine resilience against climate change	**23.3**
AR	AR 9	Other: Resource Needs	BMP - Partnering with social scientists and colleagues on conservation values, scopes, and philosophy	**25.0**	Outreach	Produce opinion and rebuttal papers	**23.3**
AR	AR 5	Other: Resource Needs	TM-Prioritizing Conservation of Habitat	**25.0**	Design and plan conservation	Identify high priority areas for remote sensing	**21.7**
AR	AR 8	Other: Resource Needs	CC- Having better tools to make predictions of future habitat conditions	**25.0**	Research and monitoring	CC- Having better tools to make predictions of future habitat conditions	**20.0**
AR	AR 9	Other: Resource Needs	BMP - Partnering with social scientists and colleagues on conservation values, scopes, and philosophy	**25.0**	Research and monitoring	Research new drivers of culture, such as social media	**18.3**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	Better understanding of functional guilds and impacts of their collapse	**30.0**
AR	AR 2	Other: Resource Needs	IG -Soil Health fossorial fungi/Ecology	**23.8**	Research and monitoring	Understanding spatial scale and assemblages of below ground communities	**26.7**
AR	AR 2	Other: Resource Needs	IG -Soil Health fossorial fungi/Ecology	**23.8**	Research and monitoring	Research functional relationships with below and above ground communities	**26.7**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	Understanding effects of neonics on animals (sublethal effects)	**25.0**

AR	AR 2	Other: Resource Needs	IG -Soil Health fossorial fungi/Ecology	**23.8**	Research and monitoring	Understand changes in soil communities with habitat management and succession	**25.0**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	PA level study of insect collapse (historical vs present)	**23.3**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	Are there hot spots of concern?	**23.3**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	Understanding subsurface vibrations, effects, and scale on inverts	**21.7**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	Understand insect - plant interactions	**21.7**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	Understanding Light pollution	**20.0**
AR	AR 13	Other: Resource Needs	TM-Develop a better understanding of invertebrate collapse and drivers and mitigation	**23.8**	Research and monitoring	Understanding noise pollution	**20.0**
AR	AR 11	Other: Administrative Needs	BMP-Being creative with funding and collaborations to achieve long term goals	**22.5**	Outreach	Best practice document	**23.3**
AR	AR 7	Other: Resource Needs	IG- Assessing wildlife health	**22.5**	Design and plan conservation	Define metrics of health	**20.0**
AR	AR 22	Other: Resource Needs	H-Matching the scale of habitat management and frequency to natural disturbances	**21.3**	Research and monitoring	Evaluate spatial extent of management practices to identify thresholds and limits to wildlife response	**26.7**

AR	AR 17	Invasive & Other Problematic Species, Genes & Diseases	TM-Continue looking for innovative ways to manage deer problem	**21.3**	Direct Species Management	Behavioral changes, modification to browse intensity	**16.7**
CPD	CPD 19	Other: Administrative Needs	Orphaned species problem (no one has jurisdiction of insects, fungi)	**30.0**	Legislative and regulatory framework or tools	Legislative action	**0.0**
CPD	CPD 19	Other: Administrative Needs	Orphaned species problem (no one has jurisdiction of insects, fungi)	**30.0**	Direct Species Management	Accommodating the needs of orphaned species within current tools and structures	**0.0**
CPD	CPD 51	Other	Decline of "common" species	**30.0**	Research and monitoring	The act of determining which common species are at risk	**0.0**
CPD	CPD 51	Other	Decline of "common" species	**30.0**	Direct Species Management	Taking proactive actions to preserve at-risk "common" species	**0.0**
CPD	CPD 51	Other	Decline of "common" species	**30.0**	Research and monitoring	Promote and use community science data	**0.0**
CPD	CPD 72	Other: Administrative Needs	Plant and fungi SGCN not in Wildlife Action Plan	**30.0**	Legislative and regulatory framework or tools	Determine strategies to include plants and fungi in the WAP and include provisions for funding and resources. (Ultimate goal is biodiversity)	**0.0**
CPD	CPD 72	Other: Administrative Needs	Plant and fungi SGCN not in Wildlife Action Plan	**30.0**	Research and monitoring	We need comprehensive data (status assessments for fungi)	**0.0**
CPD	CPD 4	Residential & Commercial Development	Loss of habitat (Lack of open green spaces) (Spatial extent)(Quantity)	**29.2**	Design and plan conservation	Public land acquisition	**0.0**
CPD	CPD 4	Residential & Commercial Development	Loss of habitat (Lack of open green spaces) (Spatial extent)(Quantity)	**29.2**	Economic and other incentives	Private land conservation and funding for it	**0.0**
CPD	CPD 4	Residential & Commercial Development	Loss of habitat (Lack of open green spaces) (Spatial extent)(Quantity)	**29.2**	Design and plan conservation	Determine how we define protection of aquatic ecosystems	**0.0**

CPD	CPD 4	Residential & Commercial Development	Loss of habitat (Lack of open green spaces) (Spatial extent)(Quantity)	**29.2**	Direct habitat management	Contribute to national 30x30 protection goals by increasing the amount of protected land and water	**0.0**
CPD	CPD 4	Residential & Commercial Development	Loss of habitat (Lack of open green spaces) (Spatial extent)(Quantity)	**29.2**	Design and plan conservation	Assess the current status of protected land and determine feasibility of protection	**0.0**
CPD	CPD 9	Invasive & Other Problematic Species, Genes & Diseases	Establishment and spread of aquatic and terrestrial invasive species	**29.2**	Education and training	Education and outreach. Promotional campaign to stress how important humans are in terms of being vectors.	**0.0**
CPD	CPD 9	Invasive & Other Problematic Species, Genes & Diseases	Establishment and spread of aquatic and terrestrial invasive species	**29.2**	Law enforcement and prosecution	Identify responsible agency for outdoor domestic cats.	**0.0**
CPD	CPD 9	Invasive & Other Problematic Species, Genes & Diseases	Establishment and spread of aquatic and terrestrial invasive species	**29.2**	Research and monitoring	Research to determine ways to control invasives	**0.0**
CPD	CPD 9	Invasive & Other Problematic Species, Genes & Diseases	Establishment and spread of aquatic and terrestrial invasive species	**29.2**	Economic and other incentives	Dedicated funding stream for early detection and rapid response for each state agency (PFBC, PGC, DCNR, AG, DEP, Health, PennDOT, DCED) to control invasives.	**0.0**
CPD	CPD 9	Invasive & Other Problematic Species, Genes & Diseases	Establishment and spread of aquatic and terrestrial invasive species	**29.2**	Economic and other incentives	Dedicated funding stream for PRISM to allow agencies, non-profits, etc. to work together	**0.0**
CPD	CPD 9	Invasive & Other Problematic Species, Genes & Diseases	Establishment and spread of aquatic and terrestrial invasive species	**29.2**	Institutional development	One Health approach (transdisciplinary)	**0.0**

CPD	CPD 9	Invasive & Other Problematic Species, Genes & Diseases	Establishment and spread of aquatic and terrestrial invasive species	**29.2**	Institutional development	Comprehensive tool to prioritize treatment locations and target species	**0.0**
CPD	CPD 52	Other	Degradation of habitat (quality).	**29.1**	Institutional development	Create a public BMP Clearinghouse for habitat management	**0.0**
CPD	CPD 52	Other	Degradation of habitat (quality).	**29.1**	Institutional development	Create a directory of habitat managers	**0.0**
CPD	CPD 52	Other	Degradation of habitat (quality).	**29.1**	Research and monitoring	Statewide high-resolution assessment of habitat quality specific to each broad habitat. (LIDAR, remote sensing, etc.)	**0.0**
CPD	CPD 52	Other	Degradation of habitat (quality).	**29.1**	Law enforcement and prosecution	Enforce existing regulations	**0.0**
CPD	CPD 52	Other	Degradation of habitat (quality).	**29.1**	Economic and other incentives	Fund regulatory agencies	**0.0**
CPD	CPD 52	Other	Degradation of habitat (quality).	**29.1**	Economic and other incentives	Funding for private land management and/or ability for state agencies to work on private land	**0.0**
CPD	CPD 53	Other: Administrative Needs	old 51 - Important to have landscape-level planning relative to WAP species. Cooperation between agencies for landscape-style planning (e.g., Marcellus restoration (Cooperation between agencies)	**28.2**	Institutional development	Agency leadership must prioritize landscape-level planning and cooperation.	**0.0**
CPD	CPD 53	Other: Administrative Needs	old 51 - Important to have landscape-level planning relative to WAP species. Cooperation between agencies for landscape-style planning (e.g., Marcellus restoration (Cooperation between agencies)	**28.2**	Institutional development	Establish regional interagency teams to track WAP progress and address emerging concerns.	**0.0**

CPD	CPD 57	Invasive & Other Problematic Species, Genes & Diseases	old 59 - Deer management to maximize wildlife diversity and healthy populations	**28.2**	Economic and other incentives	Incentivize donation of venison to local food banks	**0.0**
CPD	CPD 57	Invasive & Other Problematic Species, Genes & Diseases	old 59 - Deer management to maximize wildlife diversity and healthy populations	**28.2**	Direct Species Management	Facilitate volunteer or professional culling of deer herd.	**0.0**
CPD	CPD 57	Invasive & Other Problematic Species, Genes & Diseases	old 59 - Deer management to maximize wildlife diversity and healthy populations	**28.2**	Outreach	Outreach to educate the public about need to manage deer populations.	**0.0**
CPD	CPD 73	Other: Administrative Needs	old 120 - Need for cooperative plan to build and maintain remote sensing data (LIDAR and remote sensing)(PAMAP program, GIS basemap)	**28.2**	Economic and other incentives	Provide sustainable funding for PAMAP program. (line item in state budget)	**0.0**
CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Institutional development	Sustainable recreation. Resource first recreation.	**0.0**
CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Institutional development	Enhancing PA Department of Education environmental education standards	**0.0**
CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Outreach	Harnessing new technology to connect with younger people	**0.0**
CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Outreach	Gamify conservation (SGCN version of Pokémon Go)	**0.0**

CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Outreach	Agency outreach needs to go beyond consumptive use.	**0.0**
CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Outreach	Create and promote volunteer activities. (river clean ups, invasives management, community science, etc.)	**0.0**
CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Outreach	Engage with groups conservationists have not ordinarily engaged with (probation and parole)(environmental justice areas)	**0.0**
CPD	CPD 1	Other: Education & Outreach	Engaging younger generations and the public in a way that allows for the conservation of species	**27.7**	Outreach	Expand and partner with existing (Outdoor Corp/Landforce/Climate Corps)(Scouting, 4H, FFA)	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Legislative and regulatory framework or tools	Increased regulation of pesticides	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Law enforcement and prosecution	Increased enforcement of existing laws and regulations	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Research and monitoring	Increased funding of research on impacts of pollutants	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Research and monitoring	Broadening the understanding of impacts of pollutants on all SGCNs as a group and strategic outreach.	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Direct habitat management	Restore and maintain new and existing riparian buffers.	**0.0**

CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Outreach	Outreach regarding impacts of residential pesticide use.	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Research and monitoring	Restore pesticide monitoring efforts	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Direct habitat management	implement AMD abatement on public and private lands	**0.0**
CPD	CPD 11	Pollution	Management of pollutants	**27.7**	Direct habitat management	implement nutrient and sediment BMPs with a resiliency factor to projected climatic conditions	**0.0**
CPD	CPD 6	Other	Reduced resilience and health of species (animal or habitat)	**27.7**	Direct Species Management	Implement the SWAP	**0.0**
CPD	CPD 49	Other: Administrative Needs	old 38 - Coordination of science research between agencies, institutions, and across state boundaries.	**27.3**	Design and plan conservation	COA Tool Tracker (currently in development) use	**0.0**
CPD	CPD 49	Other: Administrative Needs	old 38 - Coordination of science research between agencies, institutions, and across state boundaries.	**27.3**	Institutional development	Establish regional interagency teams to track WAP progress and address emerging concerns.	**0.0**
CPD	CPD 49	Other: Administrative Needs	old 38 - Coordination of science research between agencies, institutions, and across state boundaries.	**27.3**	Institutional development	Support open data and open access publications to the maximum extent possible.	**0.0**
CPD	CPD 54	Pollution	old 57 - Pollution of ground and surface water, especially as result of energy extraction activities.	**27.3**	Legislative and regulatory framework or tools	Prevent infiltration of pollutants. (this is related to road salt). Seek alternatives to road salt usage.	**0.0**
CPD	CPD 54	Pollution	old 57 - Pollution of ground and surface water, especially as result of energy extraction activities.	**27.3**	Legislative and regulatory framework or tools	Updating existing sewage treatment systems (Combined Sewer Overflows)	**0.0**
CPD	CPD 56	Residential & Commercial Development	old 62 - Rate of habitat loss faster than what we can mitigate	**27.3**	Institutional development	Streamline, facilitate the transfer of properties, particularly to the federal government.	**0.0**

CPD	CPD 58	Other	old 60 - Economic development at the cost of wildlife conservation	**27.3**	Legislative and regulatory framework or tools	Uphold Art 1, Section 27 at all levels of government	**0.0**
CPD	CPD 68	Residential & Commercial Development	old 98 - Overpopulation and suburban sprawl	**27.3**	Design and plan conservation	Statewide education on the importance of local planning and zoning. Promote sustainable design.	**0.0**
CPD	CPD 68	Residential & Commercial Development	old 98 - Overpopulation and suburban sprawl	**27.3**	Legislative and regulatory framework or tools	Use existing toolbox to enhance local zoning. (The "Official Map")	**0.0**
CPD	CPD 77	Other: Administrative Needs	Government inefficiencies at all levels hindering progress	**27.3**	Institutional development	Work with partners who can cut through red tape.	**0.0**
CPD	CPD 29	Other: Resource Needs	Lack of resources to address emerging concerns	**26.9**	Education and training	Develop and implement job training/apprenticeship programs (Like Outdoor Corps)	**0.0**
CPD	CPD 29	Other: Resource Needs	Lack of resources to address emerging concerns	**26.9**	Institutional development	See example action(s) under invasives (Rapid response teams, tabletop exercises, regional SWAP implementation teams)	**0.0**
CPD	CPD 3	Other: Education & Outreach	Lack of outreach to private landowners to help biodiversity	**26.9**	Outreach	Provide education and outreach to private landowners.	**0.0**
CPD	CPD 3	Other: Education & Outreach	Lack of outreach to private landowners to help biodiversity	**26.9**	Economic and other incentives	Incentivize stewardship on private lands	**0.0**
CPD	CPD 50	Other	old 34 - Identify habitat management conflicts and identify management techniques to decrease those conflicts. ("It's not mine" mentality)	**26.4**	Institutional development	USFWS, PGC, and PFBC senior leaders host regular/annual conferences/meetings to foster other land-mngt senior leaders in their own agencies and others (USFS, DCNR, etc.) to take a more active role in conserving and restoring PA's T&E and SGCN species	**0.0**

CPD	CPD 50	Other	old 34 - Identify habitat management conflicts and identify management techniques to decrease those conflicts. ("It's not mine" mentality)	**26.4**	Design and plan conservation	USFWS, PGC, and PFBC 'permitters' should stress the need to conserve and restore PA's T&E and SGCN species ... NOT just avoid impacts	**0.0**
CPD	CPD 50	Other	old 34 - Identify habitat management conflicts and identify management techniques to decrease those conflicts. ("It's not mine" mentality)	**26.4**	Design and plan conservation	Provide venues for and promote multi-partner/joint projects and planning initiatives	**0.0**
CPD	CPD 67	Other: Administrative Needs	old 95 - Need for land use planning-legislation to prioritize specific lands & habitats for conservation-conservation zoning	**26.4**	Outreach	Create resources explaining the value of habitat preservation at local municipal level. Conservation by design principles as well.	**0.0**
CPD	CPD 67	Other: Administrative Needs	old 95 - Need for land use planning-legislation to prioritize specific lands & habitats for conservation-conservation zoning	**26.4**	Education and training	Provide opportunities for officials at the local, county, regional, and state level to increase knowledge regarding the importance of land and habitat conservation	**0.0**
CPD	CPD 16	Other	Threat complexity. Difficulty of capturing threat interactions in a WAP.	**26.2**			**0.0**
CPD	CPD 61	Other: Administrative Needs	old 66 - regulations aimed at species may not be as effective as regulations aimed at habitats (protecting a species is regulated but we don't have regulations over habitats…Indiana bat vs core forest)	**25.5**	Economic and other incentives	Incentivize the protection and enhancement of habitats of conservation concern	**0.0**
CPD	CPD 21	Other: Resource Needs	Data gaps	**25.4**	Economic and other incentives	funding needed at State and Fed levels to focus surveys on closing these where they are significant	**0.0**

CPD	CPD 21	Other: Resource Needs	Data gaps	**25.4**	Economic and other incentives	Identify existing gaps and provide capacity/funding to acquire the desired information	**0.0**
CPD	CPD 23	Residential & Commercial Development	Development of open space (Incentivizing redevelopment)	**25.4**	Education and training	Provide opportunities for officials at the local, county, regional, and state level to increase knowledge regarding sustainable redevelopment and conservation design	**0.0**
CPD	CPD 23	Residential & Commercial Development	Development of open space (Incentivizing redevelopment)	**25.4**	Economic and other incentives	Incentivize local municipalities to priorities habitat and densify existing built environment	**0.0**
CPD	CPD 25	Climate Change	Amplification of existing threats by climate change	**25.4**			**0.0**
CPD	CPD 39	Other: Education & Outreach	Change in generational values (disconnect from nature)(kids on iPads)	**25.4**	Design and plan conservation	embrace new tech (e.g., smart trail systems with wifi and interactive activities)	**0.0**
CPD	CPD 39	Other: Education & Outreach	Change in generational values (disconnect from nature)(kids on iPads)	**25.4**	Economic and other incentives	Increase funding available to educators/school districts to engage youth in the outdoors/cover increased field trip costs	**0.0**
CPD	CPD 10	Other: Resource Needs	Inability to work on conservation at a landscape level (forest management)	**24.6**	Institutional development	establish and foster landscape/watershed level working groups focused on species or groups of species cons/recov	**0.0**
CPD	CPD 10	Other: Resource Needs	Inability to work on conservation at a landscape level (forest management)	**24.6**	Economic and other incentives	Increase available funding and provide venue that engages all active public and private resource managers within the desired landscape	**0.0**

CPD	CPD 28	Energy Production & Mining	Implications of transitioning to a carbon-free economy (contributions to habitat loss and fragmentation)(direct kill from windmills)	**24.6**	Legislative and regulatory framework or tools	Develop policies and best management practices for energy generation, transmission, and associated actions (i.e. carbon capture and storage, etc.)	**0.0**
CPD	CPD 30	Other	Paralysis by analysis - fear of a bigger failure	**24.6**	Outreach	encourage science-based action by resource agencies (don't just avoid impacts, take action)	**0.0**
CPD	CPD 30	Other	Paralysis by analysis - fear of a bigger failure	**24.6**	Design and plan conservation	Develop regional matrices that clearly identifies who is responsible for coordinating action to each existing and emerging threat	**0.0**
CPD	CPD 44	Climate Change	Frequency and severity of storm events	**24.6**	Design and plan conservation	Design aquatic habitat improvement projects with a resilience factor to accommodate increased water levels, flow rates, inundation, etc.	**0.0**
CPD	CPD 64	Climate Change	old 78 - Not focusing on ecosystem function; focus on species; in light of climate change	**24.5**			**0.0**
CPD	CPD 26	Invasive & Other Problematic Species, Genes & Diseases	Introduced pathogens	**23.8**			**0.0**
CPD	CPD 31	Other: Administrative Needs	Lack of landscape-level jurisdiction - Lots of local governments in PA.	**23.8**	Design and plan conservation	Promote multi-municipal and regional planning/management efforts	**0.0**

CPD	CPD 31	Other: Administrative Needs	Lack of landscape-level jurisdiction - Lots of local governments in PA.	**23.8**	Institutional development	Create a committee/taskforce/board of all relevant partners; state agencies, county, and local to be in the same room and understand the importance of working together while also providing a place to share ideas and work together	**0.0**
CPD	CPD 35	Pollution	Plastics pollution	**23.8**	Direct habitat management	Identify and install litter traps/booms in priority locations	**0.0**
CPD	CPD 41	Natural System Modifications	Dams	**23.8**	Legislative and regulatory framework or tools	require fish ladders or regular species relocations (below to above) whenever government owned dams are repaired or retrofitted	**0.0**
CPD	CPD 7	Other	Retaining genetic variability in SGCN	**23.8**			**0.0**
CPD	CPD 75	Other	Uncertainty	**23.8**	Outreach	encourage science-based action TODAY, uncertainty will always exist	**0.0**
CPD	CPD 15	Climate Change	Impacts of heat stress on wildlife	**23.1**	Design and plan conservation	Prioritize tree canopy conservation in locations with the populations most susceptible to heat stress	**0.0**
CPD	CPD 2	Climate Change	Changing climate envelopes and ranges; unintentional consequences of assisted migration	**23.1**			**0.0**
CPD	CPD 5	Climate Change	Volatility in hydrologic regimes	**23.1**			**0.0**
CPD	CPD 14	Other	Future threats and repercussions of those threats. (Risk analysis)(not thinking far enough ahead)	**22.3**			**0.0**
CPD	CPD 34	Pollution	Light pollution	**22.3**			**0.0**

CPD	CPD 48	Other	old 32 cumulative impacts of different activities on wildlife	**21.8**			**0.0**
CPD	CPD 65	Other: Administrative Needs	old 79 - Building guilds and communities of species as a management approach (need to expand this approach)	**21.8**			**0.0**
CPD	CPD 66	Other: Resource Needs	old 87 - Developing a mechanism (funding, infrastructure) to facilitate for partnerships and to build upon and sustain partnerships that are working	**21.8**	Institutional development	Develop a grant program that requires multi-partner collaboration and projects that address resource management concerns across multiple disciplines	**0.0**
CPD	CPD 66	Other: Resource Needs	old 87 - Developing a mechanism (funding, infrastructure) to facilitate for partnerships and to build upon and sustain partnerships that are working	**21.8**	Institutional development	Similar stakeholder meeting as discussed in row 97, need to create a space for all these people to be together from all levels	**0.0**
CPD	CPD 18	Other: Administrative Needs	Need for prioritization of habitats	**21.5**	Design and plan conservation	Prioritize habitats of conservation concern by region/landscape	**0.0**
CPD	CPD 32	Other: Administrative Needs	Dependency on North American funding model (angler and hunter license sales)	**21.5**			**0.0**
CPD	CPD 74	Other	Disagreement over targets/ baseline/optimal/reference conditions and goals	**21.5**			**0.0**
CPD	CPD 46	Other	old 26 - What constitutes "habitat" of a species. Need to better elucidate the habitat preference and use by species. (Getting info out to decision makers/managers.)	**20.9**			**0.0**
CPD	CPD 27	Climate Change	Do we have climate refugia? Can we protect climate refugia?	**20.8**			**0.0**

CPD	CPD 55	Invasive & Other Problematic Species, Genes & Diseases	old 58 - Hemlock wooly adelgid degraded forest habitats and an inability to react to this threat	**20.0**			**0.0**
CPD	CPD 60	Other	old 65 - Conflicting objectives and management needs at a site level between species/habitat (massasauga vs waterfowl, young forest vs old growth)	**20.0**			**0.0**
CPD	CPD 69	Other: Education & Outreach	Lack of political support for public land (active opposition from policy makers)	**19.2**	Outreach	Provide opportunities to engage government officials at every level (local, county, regional, state, and federal) and provide a lasting experience that enhances value of public lands and the numerous benefits they provide to constituents	**0.0**
CPD	CPD 47	Other: Education & Outreach	old 6 - Educate Private Non-Industrial Forest landowners about programs available to help them manage their forests. Current programs have no continuity, ephemeral programs, changing over time (Getting info out about changing programs and opportunities.)	**19.1**			**0.0**
CPD	CPD 63	Other: Resource Needs	old 76 - Reapplication of existing BMPs to new problems; Using past lessons learned (expand it to info overload)	**19.1**	Design and plan conservation	Develop an interactive tool that combines existing and new BMP technologies by project type and allows the user to determine which option will be most effective long term	**0.0**

CPD	CPD 13	Residential & Commercial Development	Lack of urban forests and green space	**18.5**	Economic and other incentives	Promote and incentivize conservation design in locations that are targeted for growth but overlap with habitats of conservation concern	**0.0**
CPD	CPD 40	Human Intrusions & Disturbance	Motorized outdoor recreation	**18.5**	Outreach	Similar to "leave no trace" promote "responsible" motorized recreation that focuses on reducing damages to the resource	**0.0**
CPD	CPD 62	Other: Resource Needs	old 69 - need for more creative habitat restorations (i.e., rather than create a generic wetland, design, and create one to benefit SGCN)	**18.2**			**0.0**
CPD	CPD 17	Natural System Modifications	Lack of prescribed fire	**17.7**	Direct habitat management	Promote and support private lands burning for habitat restoration and invasives treatment as well as population control (i.e., ticks)	**0.0**
CPD	CPD 45	Energy Production & Mining	Impact of new technology on wildlife (turbines, solar panels)	**17.7**			**0.0**
CPD	CPD 22	Other	Inaccessibility of private lands	**16.9**	Economic and other incentives	Provide a funding stream for private land stewardship activities and establish relationships with NGOs that have the ability to work effectively on private lands	**0.0**
CPD	CPD 8	Residential & Commercial Development	Habitat loss in northern tier and Great Lakes region due to human migration	**16.2**			**0.0**
CPD	CPD 59	Pollution	old 64 - Chesapeake Bay Protection-Develop and implement better BMPs (i.e., cover crops, tree tubes)	**15.5**			**0.0**
CPD	CPD 33	Pollution	Noise pollution	**15.4**			**0.0**

CPD	CPD 38	Other: Resource Needs	Continuity of knowledge - loss of institutional knowledge (aging out of workforce)	**15.4**			**0.0**
CPD	CPD 37	Other: Resource Needs	Loss of volunteer organizations (aging out of volunteers)	**14.6**			**0.0**
CPD	CPD 42	Residential & Commercial Development	Urbanization and subsequent loss of landscapes. impacts on government representation and in turn funding (hollowing out of rural PA and disconnect from nature)	**13.8**			**0.0**
CPD	CPD 43	Other	Lack of sense of place (increased mobility)	**13.8**			**0.0**
EOE	EOE 10	Residential & Commercial Development	fragmentation and saving least disturbed sites, to prevent them from becoming further fragmented	**30.0**	Design and plan conservation	map and save high priority non-disturbance sites on public and private lands	**30.0**
EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Institutional development	allow funding to go to ongoing work rather than requiring "new, shiny"	**30.0**
EOE	EOE 26	Other: Education & Outreach	lack of diversity representation in the conservation field	**30.0**	Education and training	intentional role models/mentors	**30.0**
EOE	EOE 26	Other: Education & Outreach	lack of diversity representation in the conservation field	**30.0**	Outreach	explore new outreach/recruitment approaches	**30.0**
EOE	EOE 27	Other: Administrative Needs	persistent traditional systematic hiring practices and cultural workplace practices to retain a more diverse workforce	**30.0**	Institutional development	more diversity in hiring and marketing	**30.0**

EOE	EOE 27	Other: Administrative Needs	persistent traditional systematic hiring practices and cultural workplace practices to retain a more diverse workforce	**30.0**	Education and training	reach out to NAACP chapters, Hispanic community, organizations, and other diverse community groups to promote STEM career paths	**30.0**
EOE	EOE 10	Residential & Commercial Development	fragmentation and saving least disturbed sites, to prevent them from becoming further fragmented	**30.0**	Legislative and regulatory framework or tools	require industry/development to return lands to former state through stricter laws and higher penalties	**28.9**
EOE	EOE 13	Other: Education & Outreach	how do we get the public engaged enough to act	**30.0**	Outreach	focus on youth and adult education and actions	**28.9**
EOE	EOE 10	Residential & Commercial Development	fragmentation and saving least disturbed sites, to prevent them from becoming further fragmented	**30.0**	Economic and other incentives	encourage reuse of previously developed land rather than open space	**27.8**
EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Institutional development	assist NGOs in applying and managing grants	**27.8**
EOE	EOE 26	Other: Education & Outreach	lack of diversity representation in the conservation field	**30.0**	Institutional development	fund organizations by agencies that are already diverse to expand their efforts and funding of conservation projects of organizations that serve diverse communities	**27.8**
EOE	EOE 27	Other: Administrative Needs	persistent traditional systematic hiring practices and cultural workplace practices to retain a more diverse workforce	**30.0**	Education and training	design a hiring system for those at the margins to benefit all	**27.8**
EOE	EOE 45	Climate Change	climate change and phenology	**30.0**	Outreach	create information and education information for public using examples	**27.8**

EOE	EOE 13	Other: Education & Outreach	how do we get the public engaged enough to act	**30.0**	Outreach	create place-based programming to engage public	**26.7**
EOE	EOE 13	Other: Education & Outreach	how do we get the public engaged enough to act	**30.0**	Outreach	create and publicize variety of volunteer opportunities with wide range of accessibility by region	**26.7**
EOE	EOE 26	Other: Education & Outreach	lack of diversity representation in the conservation field	**30.0**	Institutional development	partner with and support educational efforts to create spaces of inclusion and belonging - next generation of professionals	**26.7**
EOE	EOE 27	Other: Administrative Needs	persistent traditional systematic hiring practices and cultural workplace practices to retain a more diverse workforce	**30.0**	Education and training	clearly describe job requirements (all skills vs trainability)	**26.7**
EOE	EOE 45	Climate Change	climate change and phenology	**30.0**	Research and monitoring	support, apply, and promote across audiences research that describes change and impact	**25.6**
EOE	EOE 45	Climate Change	climate change and phenology	**30.0**	Research and monitoring	data collection on life cycle timing/host plants	**25.6**
EOE	EOE 10	Residential & Commercial Development	fragmentation and saving least disturbed sites, to prevent them from becoming further fragmented	**30.0**	Design and plan conservation	expand easement/strength partnerships and funding for rapid protections	**24.4**
EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Institutional development	provide NGOs with needs of agencies so they can become stronger advocates for funding at the state level and federal level	**24.4**
EOE	EOE 45	Climate Change	climate change and phenology	**30.0**	Outreach	promote community/citizen science engagement on tracking phenology	**24.4**
EOE	EOE 10	Residential & Commercial Development	fragmentation and saving least disturbed sites, to prevent them from becoming further fragmented	**30.0**	Economic and other incentives	implement incentives for maintaining intact large land parcels (e.g., tax breaks)	**23.3**

EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Institutional development	provide training and certifications for NGOs to better assist with capacity and resource issues	**23.3**
EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Institutional development	just say 'no' or at least 'not yet' need support from leadership to 'do less with less' (respect capacity and acknowledge fewer staff=less work)	**23.3**
EOE	EOE 26	Other: Education & Outreach	lack of diversity representation in the conservation field	**30.0**	Education and training	start early! (e.g., elementary schools)	**23.3**
EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Institutional development	provide a portion of grants to NGOs as active partners on projects	**22.2**
EOE	EOE 26	Other: Education & Outreach	lack of diversity representation in the conservation field	**30.0**	Education and training	building belonging	**22.2**
EOE	EOE 45	Climate Change	climate change and phenology	**30.0**	Research and monitoring	conduct more studies on migration timing	**22.2**
EOE	EOE 10	Residential & Commercial Development	fragmentation and saving least disturbed sites, to prevent them from becoming further fragmented	**30.0**	Design and plan conservation	expand legacy planning and outreach and resources (land trusts)	**20.0**
EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Institutional development	utilize citizen/community service	**18.9**
EOE	EOE 22	Other: Resource Needs	agencies and other organizations lack appropriate resources to cover current workload while workload is increasing	**30.0**	Economic and other incentives	designate .01% of sales tax for conservation to fiscally enfranchise all citizens	**16.7**
EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	target outreach to urban centers	**30.0**

EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	create experiences that are meaningful, close to home, backyard wildlife, local waterways, trails not just parks, SGL, SP and forests	**30.0**
EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	create experiential learning opportunities	**30.0**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Institutional development	support the creation of a functional social safety net to help meet basic needs	**30.0**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Design and plan conservation	provide access to nature or areas close to where people are/live	**30.0**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Design and plan conservation	use conservation as a solution to crises - i.e., water scarcity, foraging in cities	**30.0**
EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	bring the natural world to the people	**28.9**
EOE	EOE 34	Other: Resource Needs	monitoring for SWAP project success	**29.0**	Outreach	involve community science	**28.9**
EOE	EOE 34	Other: Resource Needs	monitoring for SWAP project success	**29.0**	Design and plan conservation	creative comprehensive (viewable, accessible) structure for aggregating across efforts	**28.9**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Economic and other incentives	create place-based action plans (urban problems/social stressors different than rural plans and problems)	**28.9**
EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	identify what people care about and find a way to connect it to nature	**27.8**

EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	increase/promote accessibility to parks	**27.8**
EOE	EOE 34	Other: Resource Needs	monitoring for SWAP project success	**29.0**	Outreach	work with schools on campaign to keep common species common - integrate community science projects	**27.8**
EOE	EOE 34	Other: Resource Needs	monitoring for SWAP project success	**29.0**	Research and monitoring	fund real-time monitoring systems to help establish baseline and pre/post monitoring results	**27.8**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Design and plan conservation	provide easy actions that can be done without significant time or expense	**27.8**
EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	marketing to general public on how to connect w/nature and benefits	**25.6**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Outreach	PR campaign by agencies connecting conservation items and actions needs to social issues specifically	**23.3**
EOE	EOE 34	Other: Resource Needs	monitoring for SWAP project success	**29.0**	Design and plan conservation	identify gaps and fund monitoring projects	**22.2**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Outreach	promote community garden (food security) ideas in urban areas on blighted/abandoned lots	**21.1**
EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	create a sense of ownership over natural world find touchpoint species or actions	**20.0**
EOE	EOE 34	Other: Resource Needs	monitoring for SWAP project success	**29.0**	Outreach	create platform/media campaign to celebrate successes and increase interest in monitoring	**18.9**

EOE	EOE 21	Other: Education & Outreach	people disconnected to natural world	**29.0**	Outreach	redefine what the 'right way" to be connected means	**17.8**
EOE	EOE 41	Other: Education & Outreach	conservation priorities are competing with other large social issues	**29.0**	Outreach	recruit influencers to share the message about the importance of conservation to everyone	**15.6**
EOE	EOE 17	Other: Education & Outreach	habitat owners don't recognize or know their role in managing/creating habitat for a diversity of PA native species	**28.0**	Economic and other incentives	incentivize landowners to manage/create habitats (property tax breaks for conservation values)	**30.0**
EOE	EOE 17	Other: Education & Outreach	habitat owners don't recognize or know their role in managing/creating habitat for a diversity of PA native species	**28.0**	Outreach	create awareness and education to public on use of SWAP	**26.7**
EOE	EOE 17	Other: Education & Outreach	habitat owners don't recognize or know their role in managing/creating habitat for a diversity of PA native species	**28.0**	Outreach	create a targeted education campaign for awareness and access to BMPs and materials to manage landscape	**25.6**
EOE	EOE 17	Other: Education & Outreach	habitat owners don't recognize or know their role in managing/creating habitat for a diversity of PA native species	**28.0**	Outreach	identify species specific habitat BMPs and communicate to landowners	**25.6**
EOE	EOE 17	Other: Education & Outreach	habitat owners don't recognize or know their role in managing/creating habitat for a diversity of PA native species	**28.0**	Outreach	landowner workshops on land management goals and practices	**24.4**
EOE	EOE 17	Other: Education & Outreach	habitat owners don't recognize or know their role in managing/creating habitat for a diversity of PA native species	**28.0**	Design and plan conservation	have communities create or give input on plans to work together (i.e., as a block or as a whole neighborhood)	**24.4**
EOE	EOE 17	Other: Education & Outreach	habitat owners don't recognize or know their role in managing/creating habitat for a diversity of PA native species	**28.0**	Outreach	create and distribute physical promotional materials	**22.2**

EOE	EOE 39	Other: Administrative Needs	no state agency in PA has jurisdiction of terrestrial invertebrates	**25.0**	Institutional development	develop a plan to have one of the agencies to be responsible for this segment with funding for it	**30.0**
EOE	EOE 42	Residential & Commercial Development	won't protect enough open space for habitat	**25.0**	Design and plan conservation	develop open space plans that are multi-county or multi-municipal to keep greenway and habitat corridors intact for connectivity	**30.0**
EOE	EOE 42	Residential & Commercial Development	won't protect enough open space for habitat	**25.0**	Design and plan conservation	identify important areas that may become available and set aside money for acquisition	**30.0**
EOE	EOE 42	Residential & Commercial Development	won't protect enough open space for habitat	**25.0**	Outreach	develop and strengthen partnerships between NGOs, federal and state agencies for acquisitions and easements	**30.0**
EOE	EOE 2	Other: Education & Outreach	industry and developers are not part of the conversation	**25.0**	Institutional development	Incorporate Wildlife Habitat Council into initiative	**28.9**
EOE	EOE 39	Other: Administrative Needs	no state agency in PA has jurisdiction of terrestrial invertebrates	**25.0**	Outreach	contact state elected officials and encourage them to support state agency efforts to collaborate on terrestrial conservation	**27.8**
EOE	EOE 2	Other: Education & Outreach	industry and developers are not part of the conversation	**25.0**	Institutional development	ask for a seat at the table during initial development planning and environmental assessment/permit reviews to provide them with community benefits, alternative restorations, reclamations needs, land-water improvements unmet in the community	**26.7**

EOE	EOE 40	Other: Education & Outreach	lack of local elected official education and advocacy	**25.0**	Outreach	improve how scientific goals are communicated to policy makers, adjust jargon to increase understanding of lay audience	**26.7**
EOE	EOE 40	Other: Education & Outreach	lack of local elected official education and advocacy	**25.0**	Outreach	attend meetings/provide info on conservation issues	**25.6**
EOE	EOE 40	Other: Education & Outreach	lack of local elected official education and advocacy	**25.0**	Education and training	create and offer a training program about conservation values to be offered as part of onboarding new officials	**25.6**
EOE	EOE 2	Other: Education & Outreach	industry and developers are not part of the conversation	**25.0**	Outreach	be proactive in supplying information	**22.2**
EOE	EOE 2	Other: Education & Outreach	industry and developers are not part of the conversation	**25.0**	Economic and other incentives	create incentives for developers to have conversations	**22.2**
EOE	EOE 42	Residential & Commercial Development	won't protect enough open space for habitat	**25.0**	Economic and other incentives	support initiatives to expand knowledge on return on environment studies (ROE)	**21.1**
EOE	EOE 2	Other: Education & Outreach	industry and developers are not part of the conversation	**25.0**	Outreach	hold webinars with consultants and industry reps	**20.0**
EOE	EOE 40	Other: Education & Outreach	lack of local elected official education and advocacy	**25.0**	Education and training	create a community education network for local officials, EAC member, etc., marketed directly to municipalities	**20.0**
EOE	EOE 42	Residential & Commercial Development	won't protect enough open space for habitat	**25.0**	Legislative and regulatory framework or tools	state legislation for ordinance/regulations for ecologically meaningful acquisition	**20.0**
EOE	EOE 2	Other: Education & Outreach	industry and developers are not part of the conversation	**25.0**	Outreach	invite them to coordination meetings	**18.9**
EOE	EOE 2	Other: Education & Outreach	industry and developers are not part of the conversation	**25.0**	Economic and other incentives	ask about philanthropic arms to support projects	**15.6**

EOE	EOE 40	Other: Education & Outreach	lack of local elected official education and advocacy	**25.0**	Institutional development	become an elected official	**15.6**
EOE	EOE 40	Other: Education & Outreach	lack of local elected official education and advocacy	**25.0**	Outreach	Targeted outreach by agencies to all state, county leadership	**10.0**
EOE	EOE 23	Other: Education & Outreach	disconnect between general public and hunting/fishing agencies, limits relevancy to the public	**24.0**	Institutional development	consider name change of PGC to Wildlife Commission or at least change Game Warden name	**30.0**
EOE	EOE 29	Invasive & Other Problematic Species, Genes & Diseases	infiltration of non-native genetics (species, subspecies, populations, genetics) in native populations	**24.0**	Education and training	train power company and PENNDOT employees to identify invasives and control their spread	**30.0**
EOE	EOE 29	Invasive & Other Problematic Species, Genes & Diseases	infiltration of non-native genetics (species, subspecies, populations, genetics) in native populations	**24.0**	Outreach	educate public on detrimental effects of non-native species on natives using specific examples	**30.0**
EOE	EOE 29	Invasive & Other Problematic Species, Genes & Diseases	infiltration of non-native genetics (species, subspecies, populations, genetics) in native populations	**24.0**	Outreach	work with plant nurseries and box stores to avoid or minimize sale of invasive plants (and be aware of invasive insects on plants)	**30.0**
EOE	EOE 44	Pollution	address pollution and litter	**24.0**	Outreach	improve and increase interagency and NGO partnerships for pollution focused projects, utilize/piggyback off existing campaigns	**30.0**
EOE	EOE 44	Pollution	address pollution and litter	**24.0**	Economic and other incentives	create and support local recycling programs to make it easy and affordable to the public including less easy recyclable items. Increase awareness of local recycling ordinances	**30.0**

EOE	EOE 23	Other: Education & Outreach	disconnect between general public and hunting/fishing agencies, limits relevancy to the public	**24.0**	Outreach	more advertising that PGC, PFBC, DCNR are open to all public - highlighting a variety of activities on state lands	**28.9**
EOE	EOE 23	Other: Education & Outreach	disconnect between general public and hunting/fishing agencies, limits relevancy to the public	**24.0**	Outreach	have a stronger non-game presence in outreach	**28.9**
EOE	EOE 23	Other: Education & Outreach	disconnect between general public and hunting/fishing agencies, limits relevancy to the public	**24.0**	Institutional development	facilitate increased diversity in hunting/fishing community	**28.9**
EOE	EOE 44	Pollution	address pollution and litter	**24.0**	Outreach	prepare pollution prevention tips for various outreach methods (ex. Don't dump chemicals in storm drains)	**28.9**
EOE	EOE 44	Pollution	address pollution and litter	**24.0**	Economic and other incentives	fund and advertise volunteer clean ups through PFBC and PGC	**28.9**
EOE	EOE 23	Other: Education & Outreach	disconnect between general public and hunting/fishing agencies, limits relevancy to the public	**24.0**	Institutional development	ensure flexible agencies that allow their staff to engage as partners, educators, advocates instead of just experts	**27.8**
EOE	EOE 29	Invasive & Other Problematic Species, Genes & Diseases	infiltration of non-native genetics (species, subspecies, populations, genetics) in native populations	**24.0**	Design and plan conservation	implement pre-cautionary principle (research before touch) - consider consequences	**27.8**
EOE	EOE 23	Other: Education & Outreach	disconnect between general public and hunting/fishing agencies, limits relevancy to the public	**24.0**	Outreach	hiring of diverse PR firms by agencies to help develop messaging to/for the public and reflective of the demographic regions of the state	**26.7**
EOE	EOE 44	Pollution	address pollution and litter	**24.0**	Institutional development	create a volunteer program in SGLs and PFBC access areas to conduct clean ups	**26.7**

EOE	EOE 44	Pollution	address pollution and litter	**24.0**	Outreach	keep promoting SMART Angler program	**23.3**
EOE	EOE 23	Other: Education & Outreach	disconnect between general public and hunting/fishing agencies, limits relevancy to the public	**24.0**	Outreach	have WCOs and PGC Game Wardens give out wildlife and fish trading cards to kids to give the feelings of safety and education being provided to the public	**12.2**
EOE	EOE 28	Other: Education & Outreach	lack of listening and incorporating traditional and community cultural knowledge ((traditional ecological knowledge (TEK))	**23.0**	Institutional development	elevate the voices of members of these communities who are willing to share TEK. Make the space for them to be heard and valued, inclusion of local people	**30.0**
EOE	EOE 28	Other: Education & Outreach	lack of listening and incorporating traditional and community cultural knowledge ((traditional ecological knowledge (TEK))	**23.0**	Institutional development	require consultation with existing elders, representatives - invitation into decision making	**30.0**
EOE	EOE 3	Residential & Commercial Development	lights/tall buildings (bird collisions and other wildlife)	**23.0**	Institutional development	agencies identify ongoing lights out initiatives and explore supporting them and identifying where they are needed where they aren't taking place	**30.0**
EOE	EOE 3	Residential & Commercial Development	lights/tall buildings (bird collisions and other wildlife)	**23.0**	Research and monitoring	compile info on bird strike reduction methods and share widely in different ways	**30.0**
EOE	EOE 43	Invasive & Other Problematic Species, Genes & Diseases	outdoor cats!	**23.0**	Outreach	educate the public on consequences of outdoor cats and benefits of keeping them indoors	**30.0**

EOE	EOE 28	Other: Education & Outreach	lack of listening and incorporating traditional and community cultural knowledge ((traditional ecological knowledge (TEK))	**23.0**	Design and plan conservation	agencies review PA landscapes to identify where indigenous people live and intentionally recognize these lands and waterways with the public since we are trying to protect, conserve, reclaim and restore them	**28.9**
EOE	EOE 28	Other: Education & Outreach	lack of listening and incorporating traditional and community cultural knowledge ((traditional ecological knowledge (TEK))	**23.0**	Institutional development	hire indigenous biologist/ecologists, etc.	**28.9**
EOE	EOE 3	Residential & Commercial Development	lights/tall buildings (bird collisions and other wildlife)	**23.0**	Legislative and regulatory framework or tools	require that developers create mitigation plans (think "new stormwater management plan")	**28.9**
EOE	EOE 43	Invasive & Other Problematic Species, Genes & Diseases	outdoor cats!	**23.0**	Economic and other incentives	support programs to spay and neuter feral cat populations	**24.4**
EOE	EOE 3	Residential & Commercial Development	lights/tall buildings (bird collisions and other wildlife)	**23.0**	Design and plan conservation	provide migratory pathway simulations or data to developers through MOTUS and give them locations of major flyways (i.e., Atlantic flyway)	**23.3**
EOE	EOE 3	Residential & Commercial Development	lights/tall buildings (bird collisions and other wildlife)	**23.0**	Economic and other incentives	create financial incentives for developers to use wildlife supportive practices (like alternatives to glass buildings)	**23.3**
EOE	EOE 43	Invasive & Other Problematic Species, Genes & Diseases	outdoor cats!	**23.0**	Institutional development	consider partnerships with NGOs who rescue cats to raise awareness at the adoption level (no second adoptions for owners who let cats roam outside)	**23.3**

EOE	EOE 33	Transportation & Service Corridors	lack of model ordinance for utilities planning	**22.0**			**0.0**
EOE	EOE 35	Other: Education & Outreach	underutilization of community scientists and projects	**22.0**			**0.0**
EOE	EOE 14	Other: Education & Outreach	failures are emphasized, people need more relevant examples of success close to home	**21.0**			**0.0**
EOE	EOE 31	Other: Resource Needs	SWAP jurisdictional agencies lack a prioritization process for allocation of limited resources/fund	**21.0**			**0.0**
EOE	EOE 37	Other: Administrative Needs	lack of DEP inclusion in current conversations	**21.0**			**0.0**
EOE	EOE 15	Other: Education & Outreach	habitat guidelines are inaccessible to lay audience, getting past limitations	**20.0**			**0.0**
EOE	EOE 1	Climate Change	PA is not prepared for the implications of being a climate refugia for many species and humans migration	**19.0**			**0.0**
EOE	EOE 32	Other: Administrative Needs	how resource agencies get involved in project decisions early enough to affect project location	**19.0**			**0.0**
EOE	EOE 24	Other: Education & Outreach	agency enforcement activities limit public comfort with interactions that could improve or conserve wildlife habitat	**18.0**			**0.0**

EOE	EOE 4	Other: Education & Outreach	limiting creativity in land use (discussion and engagement) and not engaging folks already living in area	**18.0**			**0.0**
EOE	EOE 46	Other: Administrative Needs	accessibility of threatened and endangered species information in PNDI for practitioners	**18.0**			**0.0**
EOE	EOE 7	Other: Education & Outreach	people don't save what they don't care about	**17.0**			**0.0**
EOE	EOE 38	Other: Administrative Needs	third of life in PA (fungi) gets no attention	**16.0**			**0.0**
EOE	EOE 11	Energy Production & Mining	solar development, what's the end game, how are they decommissioned	**14.0**			**0.0**
EOE	EOE 47	Other: Administrative Needs	cultural workplace practices to retain a more diverse workforce		Institutional development	be present and build trust	**30.0**
EOE	EOE 47	Other: Administrative Needs	cultural workplace practices to retain a more diverse workforce		Institutional development	recognize diverse generational and cultural approaches to work and create structure that affords flexibility, mentorship and support	**28.9**
EOE	EOE 47	Other: Administrative Needs	cultural workplace practices to retain a more diverse workforce		Institutional development	create remote work opportunities in urban and elsewhere	**25.6**
EOE	EOE 47	Other: Administrative Needs	cultural workplace practices to retain a more diverse workforce		Institutional development	ask new hires for input on workplace practices; check in regularly	**21.1**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Institutional development	Support PISC & PRISM.	**30.0**

HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Legislative and regulatory framework or tools	Policy that prevents the spread.	**29.1**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Outreach	Education. Partner with sister agency.	**26.4**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Economic and other incentives	Access to resources for private landowners.	**26.4**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Institutional development	Capacity to implement.	**26.4**
HM	HM 12	Other: Resource Needs	human capacity (contractors, staff, lack of connections)	**28.9**	Education and training	Develop training programs for contractors	**25.5**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Design and plan conservation	Focus on areas of greatest ecological importance or concern and expand outward.	**25.5**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Institutional development	Continued support for federal funding	**25.5**
HM	HM 12	Other: Resource Needs	human capacity (contractors, staff, lack of connections)	**28.9**	Education and training	create State level licensures for foresters	**24.5**
HM	HM 12	Other: Resource Needs	human capacity (contractors, staff, lack of connections)	**28.9**	Education and training	promote resource management in K-12 and college	**24.5**

HM	HM 12	Other: Resource Needs	human capacity (contractors, staff, lack of connections)	**28.9**	Institutional development	financially competitive with other industries.	**24.5**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Research and monitoring	Biological research	**24.5**
HM	HM 5	Invasive & Other Problematic Species, Genes & Diseases	Invasive species spread, pest, plants. (5)	**28.9**	Direct habitat management	Deer management: preferential browsing can lead to spread of invasive species	**23.6**
HM	HM 12	Other: Resource Needs	human capacity (contractors, staff, lack of connections)	**28.9**	Education and training	paid internships for college students	**21.8**
HM	HM 12	Other: Resource Needs	human capacity (contractors, staff, lack of connections)	**28.9**	Institutional development	supporting organizations capacity to organize and manage volunteers	**14.5**
HM	HM 9	Other: Education & Outreach	Low public understanding for active ecological restoration. Need to educate public.	**26.7**	Outreach	pass this to outreach education and marketing staff	**30.0**
HM	HM 49	Other	Restoration of already degraded habitat (acid streams, ATVs through streams, drainage tiles on farmlands, well pads, degraded forest)	**26.7**	Direct habitat management	promote whole farm BMPs (nutrient and sediment practices) including regenerative ag practices, riparian buffers, wetlands restoration, increase pollinator habitat, increase grassland habitat	**29.1**
HM	HM 18	Pollution	acid mine drainage	**26.7**	Institutional development	increase partnership with BAMR	**28.2**

HM	HM 48	Climate Change	Climate Change	**26.7**	Design and plan conservation	integrate climate change impacts into all work/projects/research	**28.2**
HM	HM 9	Other: Education & Outreach	Low public understanding for active ecological restoration. Need to educate public.	**26.7**	Education and training	Education: K-12	**28.2**
HM	HM 49	Other	Restoration of already degraded habitat (acid streams, ATVs through streams, drainage tiles on farmlands, well pads, degraded forest)	**26.7**	Direct habitat management	Rehabilitation of degraded forest	**24.5**
HM	HM 18	Pollution	acid mine drainage	**26.7**	Economic and other incentives	remove liability and financial burdens for implementation on private lands	**20.9**
HM	HM 18	Pollution	acid mine drainage	**26.7**	Direct habitat management	support for restoration planning efforts	**20.9**
HM	HM 45	Natural System Modifications	Habitat fragmentation: challenge of connecting public lands. Only islands of quality habitat with private lands often not quality and lack connectivity function. Easements as a possible strategy for addressing connectivity issues. AOP, culvert, Dams	**25.6**	Direct habitat management	Aquatic: AOP on culverts and dam removal. Removal over fish passage. Proactively improve aquatic connectivity bases on ecological needs.	**26.4**
HM	HM 45	Residential & Commercial Development	Habitat fragmentation: challenge of connecting public lands. Only islands of quality habitat with private lands often not quality and lack connectivity function. Easements as a possible strategy for addressing connectivity issues. AOP, culvert, Dams	**25.6**	Direct habitat management	Identify, protect, and improve habitat connectivity ex. Wildlife crossings	**25.5**

HM	HM 45	Residential & Commercial Development	Habitat fragmentation: challenge of connecting public lands. Only islands of quality habitat with private lands often not quality and lack connectivity function. Easements as a possible strategy for addressing connectivity issues. AOP, culvert, Dams	**25.6**	Direct habitat management	Forest: mitigate ex. by buffering fragmentation effects	**22.7**
HM	HM 46	Invasive & Other Problematic Species, Genes & Diseases	Overabundance of animals (deer, feral cats, hogs)- impact on habitat and on other animals	**24.4**	Direct habitat management	Reduce the deer population to avoid negative habitat effects (carrying capacity) through improved policies and other strategies and solutions. (R3)	**28.2**
HM	HM 47	Biological Resource Use	Need for better, sustainable forest management; better forest age class distribution.	**24.4**	Economic and other incentives	incentivize the focus of TA and FA to private landowners (development of forest networks on public/private lands)	**27.3**
HM	HM 3	Residential & Commercial Development	Loss of habitat to development.	**24.4**	Design and plan conservation	providing model guidance on land use planning and zoning	**26.4**
HM	HM 47	Biological Resource Use	Need for better, sustainable forest management; better forest age class distribution.	**24.4**	Legislative and regulatory framework or tools	Policy that prohibits high grading	**25.5**
HM	HM 13	Pollution	Water quality, quantity, connectivity	**24.4**	Economic and other incentives	incentivize ecological components of DEPs storm water management ordinances	**24.5**
HM	HM 13	Pollution	Water quality, quantity, connectivity	**24.4**	Legislative and regulatory framework or tools	improve state law to protect existing riparian buffers and wetlands	**24.5**

HM	HM 46	Invasive & Other Problematic Species, Genes & Diseases	Overabundance of animals (deer, feral cats, hogs)- impact on habitat and on other animals	**24.4**	Legislative and regulatory framework or tools	Laws against feral cats.	**24.5**
HM	HM 47	Biological Resource Use	Need for better, sustainable forest management; better forest age class distribution.	**24.4**	Economic and other incentives	incentives for forest product manufactures to support better forest management (prohibit high grading)	**24.5**
HM	HM 1	Biological Resource Use	Lack of low-grade hardwood wood markets to help implement good forest management on public and private land. (2)	**24.4**	Economic and other incentives	partnering with forest products industry to support low-grade markets	**23.6**
HM	HM 13	Pollution	Water quality, quantity, connectivity	**24.4**	Institutional development	partnering with DEP to include ecological concerns in storm water BMPs manual.	**23.6**
HM	HM 13	Pollution	Water quality, quantity, connectivity	**24.4**	Legislative and regulatory framework or tools	improve state law to require livestock exclusion to streams	**23.6**
HM	HM 13	Pollution	Water quality, quantity, connectivity	**24.4**	Legislative and regulatory framework or tools	protect critical groundwater recharge areas and source water protection areas	**23.6**
HM	HM 3	Residential & Commercial Development	Loss of habitat to development.	**24.4**	Economic and other incentives	money to purchase land or easements	**23.6**
HM	HM 46	Invasive & Other Problematic Species, Genes & Diseases	Overabundance of animals (deer, feral cats, hogs)- impact on habitat and on other animals	**24.4**	Outreach	Nuisance wildlife education	**23.6**

HM	HM 1	Biological Resource Use	Lack of low-grade hardwood wood markets to help implement good forest management on public and private land. (2)	**24.4**	Economic and other incentives	connect this concern with PA's economic development plan	**21.8**
HM	HM 13	Natural System Modifications	Water quality, quantity, connectivity	**24.4**	Legislative and regulatory framework or tools	SRBC to adopt DRBC water withdraw practices and policies	**18.2**
HM	HM 8	Other: Resource Needs	Timely long term financial support for stewardship	**22.2**	Economic and other incentives	change grants to cover long term maintenance and monitoring	**23.6**
HM	HM 41	Other: Administrative Needs	Clean and Green should require planning and implementation to be enrolled or create a different/new "clean and green"	**22.2**			**22.7**
HM	HM 16	Natural System Modifications	Early successional habitat	**20.0**	Direct habitat management	Expand prescribed fire (public/private lands)	**27.3**
HM	HM 16	Natural System Modifications	Early successional habitat	**20.0**	Economic and other incentives	incentivize lawn to pollinator habitat	**27.3**
HM	HM 16	Natural System Modifications	Early successional habitat	**20.0**	Direct habitat management	expansion of grassland and shrub land habitats	**27.3**
HM	HM 16	Natural System Modifications	Early successional habitat	**20.0**	Direct habitat management	incentivize good hardwood silviculture with regen harvest	**27.3**

HM	HM 40	Other: Administrative Needs	Input from broader range of stakeholders but maintain final decision-making authority to conservation experts. One health. (Modification to # 24 from 2012 handout)	**20.0**	Outreach	Seek input from broader range of stakeholders	**23.6**
HM	HM 40	Other: Administrative Needs	Input from broader range of stakeholders but maintain final decision-making authority to conservation experts. One health. (Modification to # 24 from 2012 handout)	**20.0**	Institutional development	advance a One Health initiative	**19.1**
HM	HM 10	Other: Education & Outreach	Communicating to the public regarding climate change is here now. Need to adapt	**17.8**	Design and plan conservation	integrate climate change impacts into all work/projects/research. Involve Outreach Education and Marketing staff	**0.0**
HM	HM 11	Pollution	Thermal pollution	**0.0**			**0.0**
HM	HM 14	Energy Production & Mining	Energy development	**0.0**			**0.0**
HM	HM 15	Natural System Modifications	create more grass land	**0.0**			**0.0**
HM	HM 17	Other	protection of natural wetlands	**0.0**			**0.0**
HM	HM 19	Pollution	acid deposition	**0.0**			**0.0**
HM	HM 2	Other: Education & Outreach	Diminishing human connection to nature	**0.0**			**0.0**
HM	HM 20	Other: Resource Needs	lack of access to trained professionals (unsustainable forest management)	**0.0**			**0.0**
HM	HM 21	Other	overuse of lands	**0.0**			**0.0**

HM	HM 22	Other: Education & Outreach	influences of social media on recreation	**0.0**			**0.0**
HM	HM 23	Biological Resource Use	rare species collection	**0.0**			**0.0**
HM	HM 24	Invasive & Other Problematic Species, Genes & Diseases	challenges to regeneration (deer, invasives, etc.)	**0.0**			**0.0**
HM	HM 25	Other: Education & Outreach	Lack of technical assistance with private landowners	**0.0**			**0.0**
HM	HM 26	Other: Education & Outreach	Lack of connecting private landowners to technical assistance	**0.0**			**0.0**
HM	HM 27	Other: Administrative Needs	Time delays of getting funding to implementation	**0.0**			**0.0**
HM	HM 28	Invasive & Other Problematic Species, Genes & Diseases	Ecological function of the forest changing due to invasive species (pest)	**0.0**			**0.0**
HM	HM 29	Other: Administrative Needs	interagency collaboration (DCNR forestry plan coordinate with SWAP)	**0.0**			**0.0**
HM	HM 30	Other	Consideration of ecosystem outcomes during ecosystem management	**0.0**			**0.0**
HM	HM 31	Climate Change	Shifts in seasonality	**0.0**			**0.0**
HM	HM 32	Pollution	HABs, salinity, microplastics	**0.0**			**0.0**
HM	HM 34	Pollution	Lack of quality stormwater BMPs	**0.0**			**0.0**
HM	HM 35	Residential & Commercial Development	policy to require development to install better "green" BMPs.	**0.0**			**0.0**
HM	HM 36	Other: Resource Needs	Providing money for green BMPs	**0.0**			**0.0**

HM	HM 37	Human Intrusions & Disturbance	balance outdoor rec needs with habitat and species requirements	**0.0**			**0.0**
HM	HM 38	Other	Finding the balance between game and non-game management	**0.0**			**0.0**
HM	HM 39	Human Intrusions & Disturbance	Considering the unintended impacts of UAS (drones)	**0.0**			**0.0**
HM	HM 4	Other: Unknown	Uncertain in planning processes. How/can we incorporate into decision making process. Uncertainty in ecological process	**0.0**			**0.0**
HM	HM 42	Natural System Modifications	AOP Culverts and dams	**0.0**			**0.0**
HM	HM 43	Natural System Modifications	Development of multi-functional buffers that is managed to be harvested	**0.0**			**0.0**
HM	HM 44	Other: Resource Needs	Lack of resource professionals	**0.0**			**0.0**
HM	HM 6	Pollution	Pollution toxin used on landscape. Pesticides	**0.0**			**0.0**
HM	HM 7	Other: Resource Needs	Staff to manage habitat	**0.0**			**0.0**
LWP	LWP 15	Residential & Commercial Development	habitat loss	**30.0**	Economic and other incentives	incentivize protection of public & private land; incentivize redevelopment of existing infrastructure; funding/supporting collaboration b/w conservation partners & county planning initiatives;	**30.0**
LWP	LWP 15	Residential & Commercial Development	habitat loss	**30.0**	Direct habitat management	protection of critical habitat (incl core areas like talus, hibers, etc)	**30.0**

LWP	LWP 15	Residential & Commercial Development	habitat loss	**30.0**	Direct habitat management	acquire/protect land now	**30.0**
LWP	LWP 2	Pollution	restore polluted waters	**30.0**	Direct habitat management	construct treatment systems; maintain existing treatment systems; remediate waste coal piles, etc. (reclamation)	**30.0**
LWP	LWP 2	Pollution	restore polluted waters	**30.0**	Economic and other incentives	funding needed for stream bank fencing; increase standards for buffer widths; fund riparian improvement projects; fund wetland restoration projects; education needed for best agriculture practices; reduce chemical runoff into waterways; increase incentives to implement agriculture BMP's (many existing programs);	**30.0**
LWP	LWP 2	Pollution	restore polluted waters	**30.0**	Institutional development	increase capacity & monitoring of DEP to enforce existing laws; remove & plug orphan wells; automatic financial penalties for exceedances; classification of fracking waste as hazardous; need policy change to deny industry the same rights as citizens; reevaluation of water quality standards; emerging pollution standards/policy needed; thermal pollution needs evaluated & new standards set (specific to dams);	**27.5**

LWP	LWP 2	Pollution	restore polluted waters	**30.0**	Law enforcement and prosecution	enforcement of E&S plans; funding restoration plans for legacy sediment; increase funding for conservation districts to increase capacity to work on E&S plans/issues; increase immediacy of funding (vs time lag of grants);	**23.3**
LWP	LWP 2	Pollution	restore polluted waters	**30.0**	Economic and other incentives	more funding needed to determine/understand why some streams are impaired; increased monitoring (applies to all); stronger water quality standards;	**22.5**
LWP	LWP 2	Pollution	restore polluted waters	**30.0**	Economic and other incentives	more funding for implementation of MS4 plans for counties & municipalities; more funding for green infrastructure to reduce combined sewer overflows; convert abandoned pkg lots (impervious surfaces); fund/ incentivize individuals to convert their landscape;	**20.0**
LWP	LWP 81	Natural System Modifications	freshwater quality/quantity	**28.3**	Direct habitat management	promote infiltration & capture of rainwater to replenish aquifers; conserving headwater forests; management of reservoir releases; promote source water protection;	**30.0**
LWP	LWP 83	Other: Administrative Needs	land and water conservation from a regional approach (not just PA)	**28.3**	Institutional development	develop & support an Ohio River Basin Commission; bring in national philanthropic funding for land conservation;	**22.5**

LWP	LWP 33	Pollution	plastics (incl microplastics)	**28.3**	Legislative and regulatory framework or tools	ban plastic bags, silverware, straws (single use); bottle/container return program; penalize/create policy to prohibit plastic pollution;	**20.0**
LWP	LWP 36	Climate Change	climate resiliency	**27.5**	Design and plan conservation	prioritize protection of resilient landscapes; incentivize native plantings; incentivize water conservation;	**30.0**
LWP	LWP 35	Energy Production & Mining	oil & gas/fracking (whole process)	**27.5**	Legislative and regulatory framework or tools	ban injection wells;	**28.3**
LWP	LWP 51	Other: Administrative Needs	federal funding programs not user-friendly	**27.5**	Institutional development	reduce layers of bureaucracy	**24.2**
LWP	LWP 83	Energy Production & Mining	oil & gas/fracking (whole process)	**27.5**	Legislative and regulatory framework or tools	develop a policy framework (re: CO2 injections & other aspects of energy hubs)	**22.5**
LWP	LWP 21	Other: Resource Needs	lack of access to readily available pool of $ for land/water conservation *(concern update: speed at which we can conserve lands…cannot compete w/ developers; also, address cap on land preservation monies)*	**26.7**	Economic and other incentives	develop a pool of capital ready to use by NGO's etc. to outcompete developers; remove $400/acre cap on PGC acquiring land (law is outdated);	**30.0**
LWP	LWP 23	Other: Education & Outreach	lack of diverse perspectives & involvement	**26.7**	Outreach	increase educational & intentional engagement activities to public & legislators; promote demonstration areas; create workforce pipelines from diverse communities into various agencies;	**30.0**
LWP	LWP 6	Residential & Commercial Development	habitat fragmentation	**26.7**	Direct habitat management	establish and increase wildlife crossings	**0.0**
LWP	LWP 76	Pollution	wetland protection and management	**26.7**	Law enforcement	increase enforcement	**0.0**

					and prosecution		
LWP	LWP 10	Invasive & Other Problematic Species, Genes & Diseases	invasive species	**25.8**	Direct Species Management	prevention & management of invasive species (need proper funding);	**0.0**
LWP	LWP 12	Natural System Modifications	(lack of) aquatic connectivity	**25.8**	Direct habitat management	restore aquatic activity (daylight streams? Removing/replacing bad culverts & dams; increase open-bottom crossings;	**0.0**
LWP	LWP 52	Other: Resource Needs	lack of funding (in general)	**25.0**	Economic and other incentives	increase funding; legislative approval for increased allocations in tax funds towards conservation (similar to Missouri & Minnesota, maybe Georgia);	**30.0**
LWP	LWP 34	Pollution	waste stream management (incl recycling, medications, etc)	**25.0**	Legislative and regulatory framework or tools	eliminate Halliburton loophole (currently they do not disclose what's in fracking wastewater)	**0.0**
LWP	LWP 44	Other	(lack of/need for more) native species management	**25.0**	Design and plan conservation	supporting hunting; balancing management (b/w humans & wildlife); inc. access for areas where herd reduction is needed; improve zoning plans to require native (& fruiting) species be planted;	**0.0**
LWP	LWP 62	Pollution	buffers on streams/waterways	**25.0**			**0.0**
LWP	LWP 8	Residential & Commercial Development	restore connectivity of (natural) ecosystems through revegetation of disturbed lands	**25.0**	Outreach	promote reforestation efforts (both urban & rest of state)…includes grasslands	**0.0**
LWP	LWP 18	Other: Education & Outreach	lack of capacity/understanding by local govts to support wildlife conservation	**24.2**	Education and training	education specific to local government (dirt & gravel road program example); create a statewide ordinance template for solar, etc.	**0.0**

LWP	LWP 28	Other: Education & Outreach	lack of trust in science (ex: political spin)	**24.2**	Education and training	education needed (incl demonstration areas/projects)…to make relevant; relevant storytelling/testimonials; peer-to-peer convos;	**0.0**
LWP	LWP 67	Pollution	acid mine drainage	**24.2**			**0.0**
LWP	LWP 20	Other	obstacles to new land/water protection	**23.3**	Outreach	landowner-specific education; create at-risk list of areas that may be developed (ex: Montour Preserve); consolidation of mapping of priority areas (WAP perspective, recreation perspective, etc) incl open discussion/objectives b/w groups; address political opposition	**0.0**
LWP	LWP 31	Pollution	(overuse, misuse of) herbicide	**23.3**	Education and training	education and training; investigate if no-till is impacting herps & inverts;	**0.0**
LWP	LWP 61	Pollution	sediment loss/erosion concerns	**23.3**			**0.0**
LWP	LWP 7	Natural System Modifications	dam removals	**23.3**			**0.0**
LWP	LWP 77	Other	corridors & migration pathways	**23.3**	Economic and other incentives	acquiring properties in conservation corridors to expand corridors & migration pathways; communication tools (mapping, reports); reducing light pollution; reduce bird strikes w/ windows (dev a policy for office bldgs, etc use bird-safe glass);	**0.0**

LWP	LWP 29	Pollution	pesticide use (leading to global decline in inverts)	**22.5**	Direct habitat management	create BMP's for proper use of pesticides; make certain pesticides harder to obtain (or require training before use); promote pollinators & native plantings;	**0.0**
LWP	LWP 3	Pollution	nutrient reduction due to agriculture (into water)	**22.5**	Direct habitat management	reduce nutrients	**0.0**
LWP	LWP 5	Other: Resource Needs	encourage BIL-funded water quality projects (bipartisan infrastructure law)	**22.5**	Economic and other incentives	concern is an action!	**0.0**
LWP	LWP 54	Other: Education & Outreach	more conservation easements (are) needed (to preserve the land)	**22.5**	Outreach	educate private landowners on value of protecting their land	**0.0**
LWP	LWP 66	Pollution	fracking waste used for de-icing	**22.5**	Legislative and regulatory framework or tools	ban it (tighter restrictions); get it classified as 'hazardous waste'; worker safety needs reviewed (OSHA)	**0.0**
LWP	LWP 16	Other: Administrative Needs	current permitting process limits ability to protect the enviro.	**21.7**			**0.0**
LWP	LWP 17	Other: Administrative Needs	local decision-making process is fragmented	**21.7**			**0.0**
LWP	LWP 19	Other: Administrative Needs	decisions not made holistically (currently disjointed)	**21.7**			**0.0**
LWP	LWP 24	Other: Education & Outreach	disconnectedness from nature for underserved populations in state	**21.7**			**0.0**

LWP	LWP 57	Pollution	poor & industrial farming concerns	**21.7**			**0.0**
LWP	LWP 65	Pollution	road salt application	**21.7**			**0.0**
LWP	LWP 26	Other: Education & Outreach	communicate effectively to the public (human dimensions)	**20.8**			**0.0**
LWP	LWP 87	Biological Resource Use	reestablishment of old growth forests	**20.8**			**0.0**
LWP	LWP 9	Invasive & Other Problematic Species, Genes & Diseases	fragmented buffers (invasive species concerns w/ disturbed lands)	**20.8**			**0.0**
LWP	LWP 42	Biological Resource Use	lack of age-class & forest type diversity	**20.0**			**0.0**
LWP	LWP 45	Other	demographic change/decrease in hunting culture	**20.0**			**0.0**
LWP	LWP 46	Other	lack of access for hunters to places to hunt	**20.0**			**0.0**
LWP	LWP 69	Pollution	emerging contaminants	**20.0**			**0.0**
LWP	LWP 30	Biological Resource Use	rodenticide	**19.2**			**0.0**
LWP	LWP 4	Pollution	nutrient reduction due to poor urban infrastructure	**19.2**			**0.0**
LWP	LWP 41	Climate Change	species composition changes (related to climate change)	**19.2**			**0.0**
LWP	LWP 43	Invasive & Other Problematic Species, Genes & Diseases	problematic native species	**19.2**			**0.0**
LWP	LWP 58	Transportation & Service Corridors	minimizing impacts w/ infrastructure projects	**19.2**			**0.0**
LWP	LWP 59	Other: Administrative Needs	lack of connection to economic benefits to land/water protection	**19.2**			**0.0**
LWP	LWP 75	Pollution	consumerism (waste produced from this)	**19.2**			**0.0**

LWP	LWP 86	Transportation & Service Corridors	Wilderness/roadless area creation (or loss of)	**19.2**			**0.0**
LWP	LWP 13	Residential & Commercial Development	human population related to land use impacts	**18.3**			**0.0**
LWP	LWP 39	Other: Administrative Needs	no state endangered species act in PA	**18.3**			**0.0**
LWP	LWP 68	Pollution	light and sound pollution	**18.3**			**0.0**
LWP	LWP 78	Invasive & Other Problematic Species, Genes & Diseases	wildlife diseases	**18.3**			**0.0**
LWP	LWP 80	Energy Production & Mining	wind energy	**18.3**			**0.0**
LWP	LWP 14	Residential & Commercial Development	promote naturalistic landscapes in areas of development	**17.5**			**0.0**
LWP	LWP 25	Other: Education & Outreach	general apathy and acceptance of status quo	**17.5**			**0.0**
LWP	LWP 38	Other: Administrative Needs	lack of enforcement of enviro protection laws	**17.5**			**0.0**
LWP	LWP 48	Other: Administrative Needs	bringing everyone to same table (collaborations; partnerships; incl public)	**17.5**			**0.0**
LWP	LWP 55	Other: Resource Needs	better access and coordination incentives for restoring and enhancing properties	**17.5**			**0.0**
LWP	LWP 82	Other: Administrative Needs	need for federal good Samaritan protection (for NGO's)	**17.5**			**0.0**
LWP	LWP 85	Transportation & Service Corridors	management of roadsides/ROW's to benefit wildlife	**17.5**			**0.0**
LWP	LWP 37	Climate Change	sea level rise	**16.7**			**0.0**
LWP	LWP 47	Other: Education & Outreach	letting past go (accepting new normal): concerned	**16.7**			**0.0**

			that this is not happening.				
LWP	LWP 70	Pollution	transportation of dangerous/hazardous materials	**16.7**			**0.0**
LWP	LWP 74	Other	population shift/change/growth	**16.7**			**0.0**
LWP	LWP 22	Other: Administrative Needs	no coordinated Natural Areas program that's aimed at SGCN need on public and private lands (management needs for rarest species)	**15.8**			**0.0**
LWP	LWP 32	Pollution	medications	**15.8**			**0.0**
LWP	LWP 60	Other: Education & Outreach	Open mindedness	**15.8**			**0.0**
LWP	LWP 79	Energy Production & Mining	solar projects	**15.8**			**0.0**
LWP	LWP 49	Other: Education & Outreach	backyard conservation (increase education)	**15.0**			**0.0**
LWP	LWP 11	Other: Resource Needs	invasive species inventory	**14.2**			**0.0**
LWP	LWP 56	Other: Resource Needs	tax incentives for donating land	**14.2**			**0.0**
LWP	LWP 63	Pollution	acid rain	**14.2**			**0.0**
LWP	LWP 64	Pollution	algal & bacterial blooms	**13.3**			**0.0**
LWP	LWP 40	Other: Education & Outreach	public more comfortable w/ managed outdoor spaces (vs natural)	**12.5**			**0.0**
LWP	LWP 72	Pollution	technology-based energy uses	**12.5**			**0.0**
LWP	LWP 73	Energy Production & Mining	rare earth element extraction	**11.7**			**0.0**
LWP	LWP 71	Pollution	Bitcoin mining	**10.0**			**0.0**

PAF	PAF 13	Invasive & Other Problematic Species, Genes & Diseases	Dedicated statewide funding for invasive species prevention and control.	**30.0**	Legislative and regulatory framework or tools	Create a line item in the state budget for invasive species prevention and control through a dedicated funding source, for example by increasing tipping fees. For use on public and private lands.	**0.0**
PAF	PAF 4	Residential & Commercial Development	Fragmentation. Partnerships to look at landscape scale conservation to deal with fragmentation, under the auspices of climate change	**30.0**	Design and plan conservation	Expand the conservation focal landscapes model. Expand state funding and investment, partnership.	**0.0**
PAF	PAF 4	Residential & Commercial Development	Fragmentation. Partnerships to look at landscape scale conservation to deal with fragmentation, under the auspices of climate change	**30.0**	Design and plan conservation	Identify target landscapes, develop, and fund partnerships to advocate for and implement conservation strategies within those landscapes.	
PAF	PAF 4	Residential & Commercial Development	Fragmentation. Partnerships to look at landscape scale conservation to deal with fragmentation, under the auspices of climate change	**30.0**	Design and plan conservation	Influence townships and municipalities to consider fragmentation within their land use planning.	
PAF	PAF 1	Invasive & Other Problematic Species, Genes & Diseases	We need to prioritize wildlife health threats, determine gaps in knowledge needing research, and implement meaningful management actions to mitigate those threats.	**28.0**	Institutional development	Prioritize and integrate a wildlife health division within PFBC.	**0.0**
PAF	PAF 2	Other: Resource Needs	Need for maintenance (facilities infrastructure and species and habitat management) funding in order to sustain gains that we make.	**28.0**	Legislative and regulatory framework or tools	Support RAWA	**0.0**

PAF	PAF 1	Invasive & Other Problematic Species, Genes & Diseases	We need to prioritize wildlife health threats, determine gaps in knowledge needing research, and implement meaningful management actions to mitigate those threats.	**28.0**	Legislative and regulatory framework or tools	Revise statutory authority to facilitate One Health approaches.	
PAF	PAF 1	Invasive & Other Problematic Species, Genes & Diseases	We need to prioritize wildlife health threats, determine gaps in knowledge needing research, and implement meaningful management actions to mitigate those threats.	**28.0**	Economic and other incentives	Establish sustainable and predictable funding for wildlife health. Create a line item for One Health and wildlife health.	
PAF	PAF 1	Invasive & Other Problematic Species, Genes & Diseases	We need to prioritize wildlife health threats, determine gaps in knowledge needing research, and implement meaningful management actions to mitigate those threats.	**28.0**	Economic and other incentives	Increase funding for emergency disease research and surveillance with political will to implement policy	
PAF	PAF 2	Other: Resource Needs	Need for maintenance (facilities infrastructure and species and habitat management) funding in order to sustain gains that we make.	**28.0**	Economic and other incentives	Identify alternate governmental and private funding sources for maintenance and stewardship on public and private lands.	
PAF	PAF 2	Other: Resource Needs	Need for maintenance (facilities infrastructure and species and habitat management) funding in order to sustain gains that we make.	**28.0**	Economic and other incentives	Continue efforts to maintain high levels of SWG funding	
PAF	PAF 2	Other: Resource Needs	Need for maintenance (facilities infrastructure and species and habitat management) funding in order to sustain gains that we make.	**28.0**	Economic and other incentives	Identify emergency response funding (e.g., spongy moth, high hazard dam removal)	
PAF	PAF 41	Other	Restoration of habitat	**26.0**	Design and plan conservation	Prioritize land and water acquisition and management for species of concern	**0.0**

PAF	PAF 50	Other: Administrative Needs	Agency silos created by legislative mandate creating authority & scope. Limited ability to work on things holistically. Cutting down on red tape.	**26.0**			**0.0**
PAF	PAF 6	Climate Change	Effects of climate change, connectivity, habitat. Beneficial to have a policy/incentive allowing private lands to be conserved allowing for connectivity.	**26.0**	Economic and other incentives	Have a mechanism for people to obtain money to prevent their land from being developed.	**0.0**
PAF	PAF 7	Climate Change	What are the limits of what biodiversity can endure as far as climate change? What is PA's contribution to the whole of climate change? Our emissions must decline nationally/as a state.	**26.0**	Economic and other incentives	Invest in public transportation infrastructure	**0.0**
PAF	PAF 41	Other	Restoration of habitat	**26.0**	Economic and other incentives	Increase resources devoted to capacity for habitat restoration (increase complement cap)	
PAF	PAF 6	Climate Change	Effects of climate change, connectivity, habitat. Beneficial to have a policy/incentive allowing private lands to be conserved allowing for connectivity.	**26.0**	Institutional development	Improve PA's process for Forest Legacy participation, including expanding participating counties to increase opportunity.	
PAF	PAF 6	Climate Change	Effects of climate change, connectivity, habitat. Beneficial to have a policy/incentive allowing private lands to be conserved allowing for connectivity.	**26.0**	Legislative and regulatory framework or tools	Remove the provision for county preapproval for Forest Legacy participation of lands within the county and examine other restrictions on the program that may be limiting growth (e.g., parcel size).	

PAF	PAF 7	Climate Change	What are the limits of what biodiversity can endure as far as climate change? What is PA's contribution to the whole of climate change? Our emissions must decline nationally/as a state.	**26.0**	Institutional development	Join and implement Regional Greenhouse Gas Initiative; reinvest revenues into climate resilient conservation activities	
PAF	PAF 14	Other: Education & Outreach	Relevance - Making conservation priorities relevant to the general public. (Outreach & Education)	**24.0**			**0.0**
PAF	PAF 24	Other: Resource Needs	Add plant species as standalone SGCN that would add funding for plants.	**24.0**			**0.0**
PAF	PAF 38	Other: Resource Needs	Fund NatureServe and Natural Heritage Programs	**24.0**			**0.0**
PAF	PAF 42	Other: Administrative Needs	Lack of comprehensive planning regarding development (residential, industrial, energy, etc.)	**24.0**			**0.0**
PAF	PAF 43	Other: Education & Outreach	Recognizing economic impacts of outdoor recreation and conservation	**24.0**			**0.0**
PAF	PAF 48	Other: Resource Needs	Fund regional and global aspects associated with conservation of PA's biodiversity. Full life cycle conservation.	**24.0**			**0.0**
PAF	PAF 51	Energy Production & Mining	Energy development continues. Improved coordination with energy development corporations. We need planning procedures, incentives, & capacity to design & site energy projects properly for conservation compatibility	**24.0**			**0.0**
PAF	PAF 53	Pollution	Pollution in all of its ways - how does it affect fish and wildlife?	**24.0**			**0.0**

PAF	PAF 11	Other: Administrative Needs	Better partnering with townships and municipalities when making land use decisions.	**22.0**			**0.0**
PAF	PAF 15	Other: Resource Needs	There are a lot of rules on the books, some of which are not well enforced. Work on enforcing existing rules and funding staff to carry out that work.	**22.0**			**0.0**
PAF	PAF 19	Other: Resource Needs	Need for social scientists. Insufficient investment in human dimensions - understanding how we interface with people in general; how do we get people involved with wildlife?	**22.0**			**0.0**
PAF	PAF 36	Other: Administrative Needs	Data sharing. Bringing data together from states and private sector to gain an understanding of status of species, while protecting PII.	**22.0**			**0.0**
PAF	PAF 39	Other: Administrative Needs	Integrated professionalism. More cooperation between disciplines and political boundaries.	**22.0**			**0.0**
PAF	PAF 52	Other: Administrative Needs	Need clearer authorities and funding representing all taxa, including "orphaned taxa"	**22.0**			**0.0**
PAF	PAF 31	Other: Resource Needs	Explore alternate sources of funding (non-governmental). Make dedicated funding untouchable to other uses.	**20.0**			**0.0**
PAF	PAF 37	Other: Resource Needs	Funding for baseline and long-term monitoring	**20.0**			**0.0**

PAF	PAF 44	Invasive & Other Problematic Species, Genes & Diseases	Too many deer	**20.0**			**0.0**
PAF	PAF 49	Other: Resource Needs	Workforce development. Agencies are struggling to fill positions. What are we doing to diversify the people who enter the conservation field and/or spend time outside? Need competitive wages.	**20.0**			**0.0**
PAF	PAF 26	Other: Education & Outreach	Declining environmental literacy and concern for the environment (Outreach & Education)	**18.0**			**0.0**
PAF	PAF 27	Other	Need for headwater and wetland protections in PA	**18.0**			**0.0**
PAF	PAF 35	Invasive & Other Problematic Species, Genes & Diseases	Stable and adequate support for statewide surveillance programs across multiple taxa and species for disease and contaminants that affect wildlife and human health.	**18.0**			**0.0**
PAF	PAF 47	Other: Administrative Needs	Need project management tool to facilitate cooperation between all organizations; Encourage use of the tool. Conservation Action Tracker.	**18.0**			**0.0**
PAF	PAF 5	Other	Conflicting uses example: Recreational needs of people vs habitat protection vs resource extraction. Conflicting users: Sunday hunters vs hikers, ATV users, etc.	**18.0**			**0.0**

PAF	PAF 9	Pollution	Stream miles impacted by AMD. Opportunity & funding ($300M for 15 yrs) available to remediate AMD. Active systems, passive systems.	**18.0**			**0.0**
PAF	PAF 12	Natural System Modifications	Support for local departments of transportation to replace culverts & bridges to the 100 yr flood standard for both aquatic and terrestrial organism passage. Human and wildlife benefit.	**16.0**			**0.0**
PAF	PAF 16	Other: Resource Needs	Funding for resilient and connected public and private lands. We keep slicing the funding pie in different ways. Need a revision of our funding model?	**16.0**			**0.0**
PAF	PAF 17	Other: Administrative Needs	We don't have a fair way of financing conservation. We need a system to identify who is causing the most harm to biodiversity.	**16.0**			**0.0**
PAF	PAF 3	Other: Resource Needs	Create incentives to support conservation friendly actions undertaken by municipal and/or other state agencies.	**16.0**			**0.0**
PAF	PAF 45	Other: Resource Needs	The challenges of finding matching funds	**12.0**			**0.0**
PAF	PAF 21	Other: Administrative Needs	Work with the federal flood insurance program for buyouts after flooding/storms to "undevelop" flood plains and coastal areas.	**10.0**			**0.0**

PAF	PAF 34	Other: Administrative Needs	Rethinking grant metrics. No way to measure establishing relationships. Better metrics concerning outreach and inclusion.	**10.0**			**0.0**
PAF	PAF 8	Other	We're not sufficiently leveraging technology to help us think about innovation.	**10.0**			**0.0**
PM	PM 44	Other	Decline in invertebrate populations	**30.0**	Outreach	engage private landowners	**0.0**
PM	PM 44	Other	Decline in invertebrate populations	**30.0**	Legislative and regulatory framework or tools	reduce pesticides on the landscape	**0.0**
PM	PM 44	Other	Decline in invertebrate populations	**30.0**	Direct habitat management	restoration of beneficial plant communities	**0.0**
PM	PM 41	Other: Resource Needs	lack of information about terrestrial invertebrate populations	**28.5**	Research and monitoring	increased surveys (community science, eDNA, long term monitoring stations)	**0.0**
PM	PM 15	Other: Resource Needs	Research needed on spatial and temporal variability in populations	**27.7**	Research and monitoring	systematic long-term monitoring stations across the state for multi-taxa	**0.0**
PM	PM 15	Other: Resource Needs	Research needed on spatial and temporal variability in populations	**27.7**	Research and monitoring	Analysis of data to differentiate noise from trends	**0.0**
PM	PM 2	Other: Resource Needs	Data deficiency/lack of monitoring	**27.7**	Research and monitoring	systematic long-term monitoring stations across the state for multi-taxa	**0.0**
PM	PM 2	Other: Resource Needs	Data deficiency/lack of monitoring	**27.7**	Research and monitoring	engage community science	**0.0**
PM	PM 2	Other: Resource Needs	Data deficiency/lack of monitoring	**27.7**	Education and training	Training next generation taxonomic professionals	**0.0**

PM	PM 20	Other	Collaboration and conservation beyond our borders	**27.7**	Institutional development	funding and support from state agencies to build, participate, and take action in regional and international networks	**0.0**
PM	PM 34	Other: Resource Needs	Lack of monitoring outcomes of management	**27.7**	Design and plan conservation	Incorporate adaptive management in project plans	**0.0**
PM	PM 34	Other: Resource Needs	Lack of monitoring outcomes of management	**27.7**	Research and monitoring	Identify sustainable, repeatable, long-term outcome monitoring habitat managers and project partners must take	**0.0**
PM	PM 11	Other	Habitat degradation	**26.9**	Research and monitoring	Identify, protect, restore, and monitor critical habitats	**0.0**
PM	PM 28	Invasive & Other Problematic Species, Genes & Diseases	CATS	**26.9**	Legislative and regulatory framework or tools	Policy change	**0.0**
PM	PM 28	Invasive & Other Problematic Species, Genes & Diseases	CATS	**26.9**	Outreach	Public outreach	**0.0**
PM	PM 30	Other: Resource Needs	Synthesizing monitoring data	**26.9**	Design and plan conservation	Plan for data synthesis from start of project	**0.0**
PM	PM 31	Other: Education & Outreach	Outreach and dissemination of data	**26.9**	Institutional development	capacity building (social scientists, science communicators)	**0.0**
PM	PM 31	Other: Education & Outreach	Outreach and dissemination of data	**26.9**	Design and plan conservation	Plan for outreach/dissemination from start of project	**0.0**
PM	PM 37	Other	Restoration, reintroductions	**26.9**	Direct Species Management	Do more, be **bold**	**0.0**
PM	PM 37	Other	Restoration, reintroductions	**26.9**	Research and monitoring	Post action monitoring	**0.0**
PM	PM 12	Residential & Commercial Development	Habitat fragmentation	**26.2**	Design and plan conservation	Identify ways to reconnect habitat and minimize impacts from fragmenting features	**0.0**

PM	PM 12	Residential & Commercial Development	Habitat fragmentation	**26.2**	Outreach	Outreach to private landowners and local municipalities	**0.0**
PM	PM 19	Other: Resource Needs	Development of monitoring tools for the future	**25.4**	Economic and other incentives	Encourage innovation	**0.0**
PM	PM 27	Human Intrusions & Disturbance	Human disturbance/interaction	**25.4**	Outreach	Education, outreach, signage, law enforcement	**0.0**
PM	PM 8	Invasive & Other Problematic Species, Genes & Diseases	Disease	**24.6**	Research and monitoring	Prevention and surveillance	**0.0**
PM	PM 8	Invasive & Other Problematic Species, Genes & Diseases	Disease	**24.6**	Design and plan conservation	Develop response plans	**0.0**
PM	PM 8	Invasive & Other Problematic Species, Genes & Diseases	Disease	**24.6**	Institutional development	Capacity building (personnel and research support to understand pathogen biology and disease intervention)	**0.0**
PM	PM 9	Climate Change	Climate change	**23.1**	Research and monitoring	Identify threats and impacts due to climate change	**0.0**
PM	PM 9	Climate Change	Climate change	**23.1**	Direct Species Management	Mitigate for threats and impacts due to climate change	**0.0**
PM	PM 32	Other: Resource Needs	Data accessibility, archives	**22.3**	Institutional development	Remove barriers to data sharing	**0.0**
PM	PM 32	Other: Resource Needs	Data accessibility, archives	**22.3**	Institutional development	Increase capacity (data managers and infrastructure)	**0.0**
PM	PM 6	Residential & Commercial Development	Habitat loss due to development	**22.3**	Economic and other incentives	Increased funding for land conservation	**0.0**
PM	PM 6	Residential & Commercial Development	Habitat loss due to development	**22.3**	Economic and other incentives	Expedite land purchase process	**0.0**
PM	PM 6	Residential & Commercial Development	Habitat loss due to development	**22.3**	Outreach	Education, outreach, signage	**0.0**

PM	PM 6	Residential & Commercial Development	Habitat loss due to development	**22.3**	Economic and other incentives	Agency and partner engagement in easements	**0.0**
PM	PM 6	Residential & Commercial Development	Habitat loss due to development	**22.3**	Design and plan conservation	Supporting practices that benefit biodiversity on working landscapes	**0.0**
PM	PM 17	Invasive & Other Problematic Species, Genes & Diseases	Invasive species	**21.5**	Outreach	Public outreach and policy change	**0.0**
PM	PM 17	Invasive & Other Problematic Species, Genes & Diseases	Invasive species	**21.5**	Research and monitoring	Prevention and surveillance	**0.0**
PM	PM 17	Invasive & Other Problematic Species, Genes & Diseases	Invasive species	**21.5**	Economic and other incentives	new and sustained funding and coordination	**0.0**
PM	PM 21	Other: Resource Needs	Lack of beneficial management practices	**21.5**	Design and plan conservation	development of beneficial management practices	**0.0**
PM	PM 33	Invasive & Other Problematic Species, Genes & Diseases	Deer overabundance	**21.5**	Direct Species Management	Alternative deer management	**0.0**
PM	PM 33	Invasive & Other Problematic Species, Genes & Diseases	Deer overabundance	**21.5**	Direct Species Management	Exclude deer from critical habitats	**0.0**
PM	PM 33	Invasive & Other Problematic Species, Genes & Diseases	Deer overabundance	**21.5**	Outreach	Recruit more hunters	**0.0**

PM	PM 33	Invasive & Other Problematic Species, Genes & Diseases	Deer overabundance	**21.5**	Outreach	Develop content for outreach to private landowners and local municipalities	**0.0**
PM	PM 35	Other: Resource Needs	Need to fill info gaps in PNDI	**21.5**	Economic and other incentives	funding for long term surveys	**0.0**
PM	PM 35	Other: Resource Needs	Need to fill info gaps in PNDI	**21.5**	Design and plan conservation	using new methods, models, technology	**0.0**
PM	PM 35	Other: Resource Needs	Need to fill info gaps in PNDI	**21.5**	Institutional development	updating the PNDI system to incorporate data generated from methods other than traditional occurrences (eDNA, models)	**0.0**
PM	PM 35	Other: Resource Needs	Need to fill info gaps in PNDI	**21.5**	Outreach	Outreach and education	**0.0**
PM	PM 35	Other: Resource Needs	Need to fill info gaps in PNDI	**21.5**	Outreach	continued engagement with scientific collectors	**0.0**
PM	PM 35	Other: Resource Needs	Need to fill info gaps in PNDI	**21.5**	Design and plan conservation	Environmental review summit to discuss processes	**0.0**
PM	PM 25	Other: Resource Needs	Baseline population genetics	**20.8**	Research and monitoring	collect genetic samples during routine sampling	**0.0**
PM	PM 25	Other: Resource Needs	Baseline population genetics	**20.8**	Design and plan conservation	develop standardized protocols to collect and archive samples across taxa	**0.0**
PM	PM 43	Other: Education & Outreach	Public accessibility to community science	**20.8**	Outreach	education and outreach	**0.0**
PM	PM 7	Pollution	Environmental contaminants	**20.8**	Research and monitoring	sustained support for surveillance and new method development	**0.0**
PM	PM 7	Pollution	Environmental contaminants	**20.8**	Design and plan conservation	Develop mitigation methods and strategies	**0.0**
PM	PM 7	Pollution	Environmental contaminants	**20.8**	Outreach	Public outreach and education	**0.0**

PM	PM 7	Pollution	Environmental contaminants	**20.8**	Legislative and regulatory framework or tools	Policy change and enforcement	**0.0**
PM	PM 22	Other	Can't recover individual species fast enough	**20.0**	Design and plan conservation	need to focus on suites of species across taxonomic groups	**0.0**
PM	PM 29	Residential & Commercial Development	Window strikes	**19.2**	Outreach	Outreach and education to promote bird-safe communities	**0.0**
PM	PM 36	Other	Cumulative effects of nonlethal impacts	**19.2**	Economic and other incentives	funding for long-term, coordinated research	**0.0**
PM	PM 42	Other: Administrative Needs	Resource management conflicts	**17.7**	Institutional development	promote cooperation and collaboration in management planning between agencies and other large landowners	**0.0**
PM	PM 38	Pollution	light and noise pollution	**16.9**	Outreach	Outreach and education	**0.0**
PM	PM 38	Pollution	light and noise pollution	**16.9**	Research and monitoring	Promote research to understand impacts	**0.0**
PM	PM 26	Other	Phenotypic changes due to disease/climate change	**15.4**			**0.0**
PM	PM 40	Other	complexity of big data sets	**14.6**			**0.0**
PM	PM 1	Other: Administrative Needs	Who all is collecting data? Are the commissions aware of all data that exists?	**12.3**			**0.0**

[End of Breakout Group Results.]

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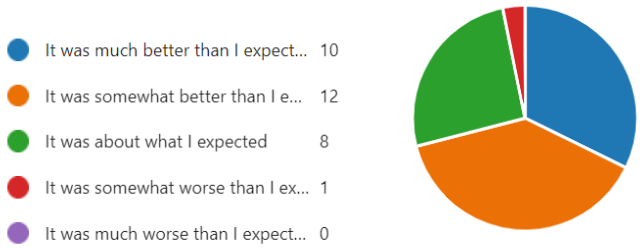
APPENDIX E

Post Forum Survey

Summary graphs and comments from the post-Forum survey conducted from April 4 to April 19, 2024.

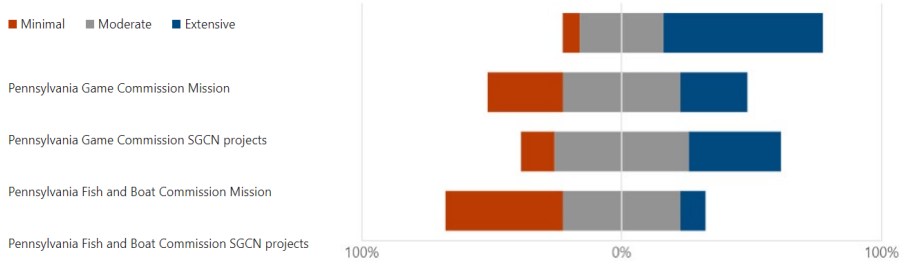


5. Number and distribution of responses to the question, "**Overall, how did the Fish & Wildlife Diversity Forum meet your expectations?**"

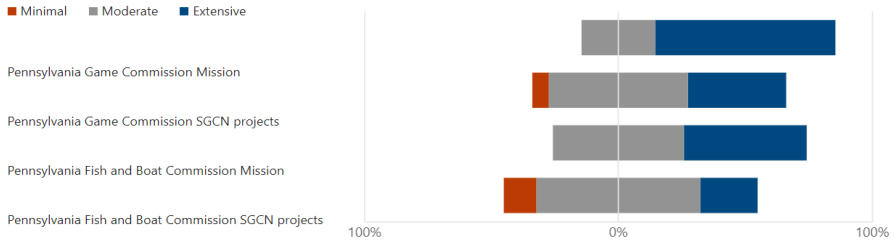
6. COMMENTS: Overall, how did the Fish & Wildlife Diversity Forum meet your expectations?
I was not sure of the process or value of the effort until I actually participated in it. After getting the background from the previous forum and participating in this forum, I learned a great deal on the objectives and purpose of the forum, thank you!
Wonderful platform to discuss resource management concerns, goals, and solutions
I didn't have any expectations about the break-outs, and they were great.
When we had to assess priorities, and aquatic and terrestrial spp were in the same discussion, we had to rate conservation of aquatic vs terrestrial spp.
As I had never been to this before, it was hard to know what to expect, but I it was good. I am nor sure if this planned, but having access to the presentations would be beneficial, as there were many great details in them that I was not able to copy down.
I was asked to be a representative for PAEE as I serve on the board, but wasn't entirely sure what to expect when I originally agreed to participate. I really appreciated the brainstorming sessions and working with other colleagues to develop ideas on how to protect our wildlife
I thoroughly enjoyed this conference! Plenary talks were outstanding, the breakout sessions interesting, and the networking with peers amazing!
I really didn't know what it would be about, so interested in the process and excited to see how you all pull this all together.
I expected it to be great and it was
The forum provided a great opportunity for discussion amongst stakeholders
It would have been good to have clearer guidelines on what was to be discussed by each panel, I think there ended up being too much overlap
Excellent discussion in the various breakout sessions.
Well organized and not onerous
I really enjoyed how the sessions were facilitated and the diversity of the organizations at the table.
I expected it to go well and it did.

7. Number and distribution of responses to the question, "**How did the Fish & Wildlife Diversity Forum meet your networking/partnership building expectations ?**"

8. COMMENTS: Networking/Partnership Building: How did the Fish & Wildlife Diversity Forum meet your networking/partnership building expectations?
I happened to sit down at lunch with someone who I am now collaborating with on a future grant.
Since my interests are in fungi at present. this did not happen, nor did I expect it.
I don't believe we had enough time to network and develop partnerships because the focus was on keeping groups in their group the entire two days and we didn't get to interact with the other groups. For example, Educators and Non-Traditional Educators didn't get to interact with other groups that were a part of other breakout sessions at all. That limited our ability to meet other professionals from other areas of interest. There should have been a more formal training or educational opportunities provided to environmental conservation professionals who attended.
good time to share thoughts and values with others to make connections
Forum provided a great opportunity to strengthen existing and build new connections throughout the state
As someone from the outside, it was somewhat difficult to network, especially not knowing who was there. Having a list of participants beforehand would have made networking a lot easier.
the small group sessions were a great way to meet and learn from others working in similar situations across the state. I met a lot of people I didn't know.
Networking was OUTSTANDING! Loved seeing so many folks working together!
Good group of people there.
Made some new contacts that are very beneficial to my work.
Ample time to chat with numerous conservation partners.
I made several great contacts and pursuing a project already with a contact made at the forum.
I expected it to go well and it did.

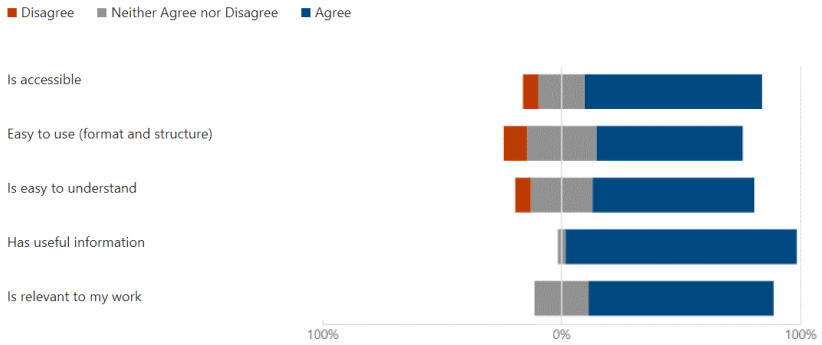


9. Post-forum survey responses to self-assessment regarding knowledge of the following **BEFORE** attending the Fish & Wildlife Diversity Forum. (SGCN = Species of Greatest Conservation Need)



10. Post-forum survey responses to self-assessment regarding knowledge of the following **AFTER** attending the Fish & Wildlife Diversity Forum. (SGCN = Species of Greatest Conservation Need)

13. Overall, the 2015-2025 Pennsylvania Wildlife Action Plan is:



14. COMMENTS: If you selected "Disagree" for any of the above selections, we'd love to hear how we can improve:
The link of the PFBC link to the SWAP from the PGC website does not work. There does not seem to be a place where you can download the whole document.

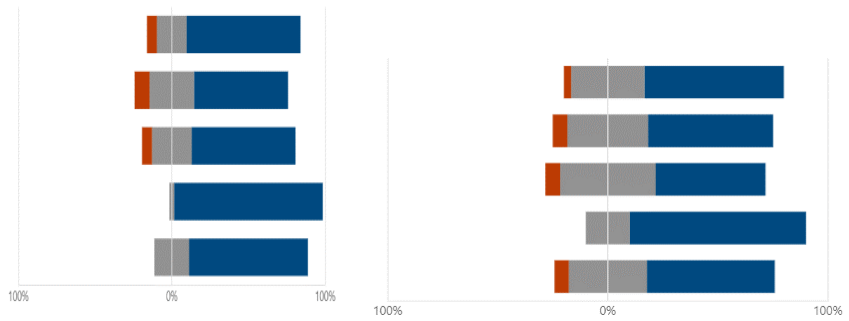
Need to inform non-profit organizations on how best to institute the plan and reference it in future grant projects and proposals that should be given consideration and priority if they are implementing recommendations that are found in the PA Wildlife Action Plan.
Honestly, the COA tool bumps all of these up to "Agree", but without the COA tool, the plan on it's own... it's as good as it can be, but you can't really say it's "easy to understand".
The online PDFs are easy to find but hard to navigate and use.
The plan is accessible if you know where to look for it—more marketing and promotion is needed for the greater public.

15. COMMENTS: What features or content would increase the likelihood you will use the Wildlife Action Plan?

Increased interactive abilities as would be possible with web content rather than a series of static PDF documents
"National Geographic Society, which recently added funga to its definition of "wildlife" ....
Incorporate the PA WAP into grant projects and coordination by community groups and not just research projects by the state agencies.
Competitive funding available to NGO's to implement priority action items
Interactive features
I wonder about the potential of a step-down plan. We're doing sub-regional plans in NJ that feel like a great way to make things more accessible - but I don't know how useful that would be in PA. In NJ, it helps because it separates the portion of the WAP that is marine, vs. highlands, vs. pinelands, etc and turns them into separate SWAPs that are more relevant to people in each part of the state.
online accessibility is key; public trainings on the plan and how to use the tool
make it searchable by section for keywords or species, or key parts , hard to zero in on spp when need to do so.
Continue to focus on species that are in decline, even if they are still common. I would love to have the human dimension aspects integrated more into the conservation piece. Not a "one size fits all," but a guide to facilitating conservation at local levels. Virginia Tech has an amazing social science department that helps conservation agencies deal with this issue. Other state agencies are hiring these types of folks for the non-game conservation departments. Would LOVE to see this happen at PAGC!

Very useable now.
Interactive online tools
The ability to use GIS mapping products for conservation of SGCN species.
Accessibility, extensive promotion. Would really like to see an effort to tie in DCNR, PGC, PF&BC and DEP into one extensive cohesive statewide plan. Get over interagency competition and pushback and cooperatively bring it ALL together! Shameful that DCNR was not there and that their forestry plan is not part of this effort, or that this effort is not part of their forestry plan. One comprehensive plan between all these agencies would shine nationwide as an informed, cooperative and effective effort to keep in the forefront of conservation and sustainability.

16. The Conservation Opportunity Area (COA) Tool is (agree/disagree):



17. COMMENTS: re: COA Tool---If you selected "Disagree" for any of the above selections, we'd love to hear how we can improve:2
I didn't even know this tool existed prior to the workshop.
Funga conservation is excluded. Fungi are extremely important for both plants and animals. The exclusion of funga (even minimally) excludes the important impacts of an entire Kingdom consisting of more species than plants and vertebrates combined.
Maybe do a webinar training on how to use the Conservation Area Opportunity Tool.
Same as for the SWAP, the tool is accessible if you know where to look for it—more marketing and promotion is needed for greater public knowledge. While I understand that the tool was developed for professionals, it greatly needs simplification if you are interested in including private landowners, especially smaller landowners, and the general public to have the ability to use the tool. A 17-page Quick Guide is not quick.

18. COMMENTS: What features or content would increase the likelihood you will use the Conservation Opportunity Area Tool?

Will not use it; do not need too.
Is there any overlapping layers that might be useful to include like the Eastern Brook Trout Joint Venture data? Are there similar layers for waterfowl like the American Black Duck?
None
Interface of this tool with other databases
I love the COA tool - but I am a bit of a power user and maybe a bit off the peak of the bell curve. I can see that some people might find it intimidating.
links to organizations who are working on conservation related to specific SGCN so I know who to contact about collaborations (but I understand that is nearly impossible to maintain)
not sure
My work does not directly concern land management, so I do not see myself using this tool
If there were conservation opportunities on my property beyond having a sustainably managed working forest.
Connection to funding to assist with private lands management

19. COMMENTS: Raising awareness about the Wildlife Action Plan, to inspire action, has been a challenge. What has your organization found to be the most effective communication tool(s)/format(s) and outlets for...

Social media & snail mail
A Wildlifer's Journal
Non-profit groups could use more trainings and certifications in various aspects of the WAP and species that are of greatest concern. Coordinate with PA DCNR who does a lot of Educator Trainings. PGC and PAF&BC should partner more with them to put on workshops and trainings and or hikes with non-profit community leaders and organizations that can help reach more audiences in their local communities when they are developing watershed plans, restoration plans, habitat improvement projects for both fish and wildlife, and when they are assessing stream corridors and wetland habitats and flyways.
Webinars
It's required to be used as a step in the planning process, depending on what we are planning.
this is a tough one and definitely the biggest issue. Social media is really the best way to engage with people.
Establishing regional communication and action networks

Scientific publications, public outreach events
Social media
website, weekly enewsletter, Facebook, Linkedin
Social Media, Live NestCam on YouTube & Twitch, Educational YouTube videos
availability of online trainings is helpful to reach a broad group of people. email is our primary method of communication with people already connected with us and our website/Facebook page is how we connect with the public.
social media. links to videos on websites and social media. webinar talks with outreach to new audiences; flyers.
We use the information to write grants, which is where this is most helpful. It also helps us guide our research projects since we're based in PA.
Penn State Extension webinars, publications aimed at forest landowner audience (e.g., PFA magazine, Forest Leaves)
Classroom
digital newsletters, social media, email and our website
I think this depends on the audience you are trying to engage with but hiring someone who specializes in communications has been invaluable!
WPC has an excellent Communications department that uses high quality images and text to excite people with online content.
Our monthly newsletter and quarterly magazine.
Knowing our core audience and how they receive information. While we use a large number of social media tools, our core audience skews older, as are most comfortable with Facebook and printed materials.
Well produced short videos
Creating a shared communication strategy with partners where we highlight each other's work to expand audience reach.

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