

Delaware Wildlife Action Plan

Taxa Issues and Actions Summary

Birds

All Birds

Issue 1	Residential and commercial development: Habitat loss	Rank: 1.2
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Identify, manage, and protect critical areas for birds, especially networks of large patches of priority habitats, for immediate conservation.</i>	<i>Rank: 1.5</i>
Issue 2	Residential and commercial development; Housing and urban areas: Habitat loss and fragmentation	Rank: 1.2
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Conservation area designation: Identify, manage, and protect critical areas for birds, especially networks of large patches of priority habitats, for immediate conservation.</i>	<i>Rank: 1.7</i>
Issue 3	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species:	Rank: 1.3
<i>Action 1</i>	<i>Technical Assistance; Environmental review; Review of proposed policies and plans: Assess threats from invasive plants on habitat quality for birds, and define appropriate management strategies ranging from education and control to eradication.</i>	<i>Rank: 2.5</i>
<i>Action 2</i>	<i>Coordination and Administration; Incentives: Private lands cost share programs for managing invasive species (e.g. phragmites control program)</i>	<i>Rank: 2.5</i>
Issue 4	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: Negative impacts of invasive plants on vital bird habitats	Rank: 1.3
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Assess threats from invasive plants on habitat quality for birds, and define appropriate management strategies ranging from education and control to eradication.</i>	<i>Rank: 2.0</i>
Issue 5	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of coordination and sharing of information among regional, state and national data collectors for migrating species within the flyway that utilize habitats in a broad geographical range.	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management: Complete a survey that will be summarized to (1) evaluate how well Delaware is meeting NABCI's avian best management practices and standards; (2) identify Delaware's bird data management capacity and needs; and 3) identify bottlenecks to integrating data among states for regional and national scale analyses.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Database development and management; Database development: Partner with a centralized database (e.g., Avian Knowledge Network) that will enhance Delaware's ability to manage and conserve wide ranging species across broad and biologically meaningful geographic areas. The exchange and integration of avian data into a permanent centralized data management system is a priority action to be accomplished by 2020.</i>	<i>Rank: 1.7</i>

Issue 6	Residential and commercial development: Buildings	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with architects, building owners and managers to develop design standards to minimize the impacts of window glass on SGCN, utilizing the resources of the Building and Birds Forum and others.</i>	<i>Rank: 1.7</i>
Issue 7	Invasive and other problematic species genes and diseases; Diseases of unknown cause: Infectious diseases	Rank: 1.8
<i>Action 1</i>	<i>Education; Educator/instructor training: Provide training for DFW staff in procedures for responding to disease outbreaks</i>	<i>Rank: 1.7</i>
<i>Action 2</i>	<i>Planning; Organizational strategic and CMS planning; Organizational strategic and operational planning: Establish an early detection and rapid response system to react to new invasions</i>	<i>Rank: 2.0</i>
Issue 8	Resource management needs; Resource information collection needs: Need for better information regarding population status, trends, resource and habitat needs for SGCN.	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis: Generate a list of surveys, monitoring, etc. that volunteers could assist with.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Outreach: Work with birding groups to recruit birders to assist with survey/monitoring.</i>	<i>Rank: 1.5</i>
Issue 9	Pollution; Excess energy; Light pollution: Buildings	Rank: 2.0
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities and building code officials to develop education and outreach for building owners and managers to minimize the impacts of building lights on SGCN, modeled after the "Lights Out", FLAP, WINGS or "Project Safe Flight" programs.</i>	<i>Rank: 1.7</i>
Issue 10	Climate change and severe weather; Habitat shifting or alteration: Change in arrival, nesting times and migration routes due to climate and weather pattern changes.	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Monitor phenology of extant SGCN occurrences to determine alteration to migration patterns, arrival on nesting grounds, changes in nesting habits and trends. Conduct surveys for additional occurrences in potential habitats.</i>	<i>Rank: 2.5</i>
Issue 11	Transportation and service corridors; Utility and service lines: Communications towers and high-tension electric lines	Rank: 2.0
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Support research on improving the design of towers and lines to minimize impacts to SGCN</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with utilities to develop standards for the placement of towers and lines to minimize impacts to SGCN nesting colonies, roosts, migration routes, movement corridors, and other critical areas</i>	<i>Rank: 1.7</i>
Issue 12	Pollution; Excess energy; Light pollution: Outdoor lighting	Rank: 2.0
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities and building code and public safety officials to develop design standards for outdoor lighting that minimizes stray light</i>	<i>Rank: 1.7</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities to develop education and outreach for homeowners, business owners and municipalities to promote reduced use of outdoor lighting during nesting, peak migration and other critical times</i>	<i>Rank: 1.7</i>

Issue 13	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: predation by pets and subsidized predators	Rank: 2.0
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Non governmental organization: Work with retailers and NGOs to develop education and outreach for pet owners to minimize the impacts of pets on SGCN, such as "Cats Indoors."</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Education; Student training; Wildlife education: Develop education and outreach for the general public about the impacts of subsidized predators on SGCN.</i>	<i>Rank: 1.7</i>
<i>Action 3</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Work with conservation partners to control subsidized predators on public and NGO conservation lands by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 1.7</i>
<i>Action 4</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Strengthen enforcement of leash laws for dogs to protect SGCN.</i>	<i>Rank: 2.0</i>
<i>Action 5</i>	<i>Coordination and Administration; Incentives: Provide incentives for landowners to control subsidized predators on private property by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 2.7</i>
Issue 14	Energy production and mining; Renewable energy: wind farm collisions	Rank: 2.0
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with energy companies to develop standards for the placement of wind energy towers to avoid SGCN nesting colonies, roosts, migration routes, movement corridors and other critical areas.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Support research for improving the design of wind energy towers to minimize impacts to SGCN.</i>	<i>Rank: 2.3</i>
Issue 15	Resource management needs; Resource information collection needs: Wind turbine development - lack of information about sounds from vibration at base, electromagnetic field disruptions, placement (migration paths, dredging).	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of wind turbines on movement and populations.</i>	<i>Rank: 1.5</i>
Issue 16	Education Outreach needs; Outreach needs; Need to develop and/or maintain a broad base of support for agency goals and objectives: Education and outreach needs	Rank: 2.2
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.2</i>
<i>Action 2</i>	<i>Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions.</i>	<i>Rank: 2.2</i>
Issue 17	Biological resource use; Fishing and harvesting aquatic resources; Persecution/control: predator control for aquaculture, commercial and recreational fisheries	Rank: 2.3
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Research economic or ecological impact of locally super-abundant waterbirds, and monitor impacts of management actions.</i>	<i>Rank: 2.0</i>

All Waterbirds

Issue 1	Climate change and severe weather; Habitat shifting or alteration: Habitat loss	Rank: 1.0
<i>Action 1</i>	<i>Direct Management of Natural Resources; Create new habitat or natural processes: Control erosion, impede vegetative succession or create new habitat for beach-nesting birds using "clean" dredged materials.</i>	<i>Rank: 2.5</i>
Issue 2	Climate change and severe weather; Sea level rise: sea level rise	Rank: 1.0
<i>Action 1</i>	<i>Direct Management of Natural Resources; Living shorelines; Erosion control structures: Control erosion, impede vegetative succession or create new habitat for beach-nesting birds using "clean" dredged materials.</i>	<i>Rank: 2.5</i>
Issue 3	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: predation by pets and subsidized predators	Rank: 1.2
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Work with conservation partners to control subsidized predators on public and NGO conservation lands by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Non governmental organization: Work with retailers and NGOs to develop education and outreach for pet owners to minimize the impacts of pets on SGCN, such as "Cats Indoors."</i>	<i>Rank: 1.5</i>
<i>Action 3</i>	<i>Education; Student training; Wildlife education: Develop education and outreach for the general public about the impacts of subsidized predators on SGCN.</i>	<i>Rank: 1.7</i>
<i>Action 4</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Strengthen enforcement of leash laws for dogs to protect SGCN.</i>	<i>Rank: 2.0</i>
<i>Action 5</i>	<i>Coordination and Administration; Incentives: Provide incentives for landowners to control subsidized predators on private property by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 2.8</i>
Issue 4	Invasive and other problematic species genes and diseases; Problematic native species diseases; Unspecified species: predation by subsidized predators- native species whose populations have increased due to resources provided directly or indirectly by humans	Rank: 1.2
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control subsidized predators of beach-nesting birds by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Research activities of nocturnal predators of beach-nesting birds through the use of specialized equipment (night binoculars and video cameras) and expansion of monitoring to include nighttime hours.</i>	<i>Rank: 2.0</i>
Issue 5	Pollution; Industrial and military effluents; Oil spills: contaminants (oil spills) having lethal or sub-lethal effects	Rank: 1.7
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Improve oil spill prevention and emergency response.</i>	<i>Rank: 1.8</i>

Issue 6	Pollution; Industrial and military effluents; Type unknown: contaminants causing SAV reduction from water quality degradation	Rank: 1.7
<i>Action 1</i>	<i>Direct Management of Natural Resources; Planting seeding; Submerged aquatic vegetation: Re-establish SAV beds for waterfowl in areas where they formerly occurred and where water quality has improved since their disappearance.</i>	<i>Rank: 2.0</i>
Issue 7	Pollution; Agricultural and forestry effluents; Type unknown: Pollution impacts on waterbirds (e.g heavy metals)	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Age size and sex structure: Research waterbird contaminant loads and effects; maintain long-term data and tissue repositories.</i>	<i>Rank: 2.2</i>
Issue 8	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: Degraded food resources and habitat for migrating and over-wintering freshwater birds	Rank: 1.8
<i>Action 1</i>	<i>Direct Management of Natural Resources; Create new habitat or natural processes: Restore freshwater wetland bird habitats to provide adequate food supply and stopover habitat for migratory birds.</i>	<i>Rank: 2.5</i>
Issue 9	Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: resident Canada geese causing depredation of agricultural crops	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Expand partnerships involving farmers, hunters, conservationists, and public agencies that have been addressing Canada goose depredation issues.</i>	<i>Rank: 1.7</i>
Issue 10	Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: resident Canada geese causing nuisance fecal accumulation and water quality degradation	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Expand partnerships involving farmers, hunters, conservationists, and public agencies that have been addressing Canada goose nuisance issues.</i>	<i>Rank: 1.7</i>
Issue 11	Biological resource use; Fishing and harvesting aquatic resources; Persecution/control: aquaculture predator control	Rank: 2.3
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Enforce Federal predator control regulations.</i>	<i>Rank: 2.5</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Techniques development; Fish and wildlife research survey and management techniques: Use alternative techniques like careful site selection, barriers, bird unfriendly pond construction, colony site translocation, and subsidies to compensate for losses.</i>	<i>Rank: 2.5</i>

All Colonial Waterbirds

Issue 1	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.7</i>

Issue 2	Human intrusions and disturbance; Recreational activities: boats, aircraft, ORVs and other recreational activities causing disturbance	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Reproduction: Research waterbird colony dynamics to determine the factors behind colony abandonment and establishment, including adequate buffer distances around colonies to minimize human disturbance.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Identify, post, protect and patrol all accessible colonial waterbird breeding and roost sites, and implement anti-disturbance policies as needed. Intrusive, disruptive disturbance should be tightly managed and monitored by agencies at all sites where it occurs, especially to minimize disruption of nesting, lowered reproductive success, or abandonment of the breeding site.</i>	<i>Rank: 2.0</i>
Issue 3	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Named species: predation by cats	Rank: 2.0
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control feral cats and keep house cats indoors to protect waterbirds.</i>	<i>Rank: 2.0</i>
Issue 4	Residential and commercial development; Housing and urban areas: residential development causing tidal wetland buffer conversion	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Reproduction: Research waterbird colony dynamics to determine the factors behind colony abandonment and establishment, including adequate buffer distances around colonies to minimize human disturbance.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>
Issue 5	Education Outreach needs; Education needs; Need for improved knowledge of fish and wildlife and their habitats:	Rank: 2.2
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Develop colonial waterbird guides for ecotour operators; interpretive signs and displays at viewing sites and public boats ramps; and educational materials to describe reasons for predator control. Conduct workshops for tour operators to promote responsible tourism viewing.</i>	<i>Rank: 1.8</i>
Issue 6	Pollution; Excess energy; Light pollution: artificial lighting causing disturbance	Rank: 2.2
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Establish and enforce regulatory programs to reduce the adverse effects of lights both on the water and on the shore.</i>	<i>Rank: 2.2</i>
Issue 7	Education Outreach needs; Outreach needs; Need to develop and/or maintain a broad base of support for agency goals and objectives: Need for better information on population status, trends, resource and habitat needs	Rank: 2.2
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>

Colonial Waterbirds - Herons

Issue 1	Resource management needs; Management decision needs; Need to conduct environmental reviews: Pollution impacts on waterbirds	Rank: 1.7
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Establish water quality criteria for fish and wildlife.</i>	<i>Rank: 2.0</i>
Issue 2	Pollution; Industrial and military effluents; Oil spills: contaminants (oil spills) having lethal or sub-lethal effects	Rank: 1.8
<i>Action 1</i>	<i>Outreach; WSFR program subprogram outreach; Displays exhibits kiosks: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions.</i>	<i>Rank: 1.7</i>
<i>Action 2</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Improve oil spill prevention and emergency response.</i>	<i>Rank: 1.7</i>
Issue 3	Pollution; Agricultural and forestry effluents; Type unknown: contaminants from agricultural runoff causing wetland habitat degradation	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Promote BMP's for implementation by agriculture, homeowners, pest control industry, right of way/maintenance, landscape professionals. Increase use of IPM, BMPs through education and outreach.</i>	<i>Rank: 1.8</i>
Issue 4	Pollution; Domestic and urban waste water; Run-off: contaminants from residential runoff causing wetland habitat degradation	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Promote BMP's for implementation by agriculture, homeowners, pest control industry, right of way/maintenance, landscape professionals. Increase use of IPM, BMPs through education and outreach.</i>	<i>Rank: 1.8</i>
Issue 5	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Named species: invasive plant control (for Phragmites) causing wetland alteration (nesting habitat or habitat for prey species)	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Assess benefits and threats to herons from existing invasive plant control programs.</i>	<i>Rank: 2.0</i>
Issue 6	Pollution; Agricultural and forestry effluents; Nutrient loads: nutrients and sediments from agricultural and residential runoff causing wetland habitat degradation due to community composition changes	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Promote BMP's for implementation by agriculture, homeowners, pest control industry, right of way/maintenance, landscape professionals. Increase use of IPM, BMPs through education and outreach.</i>	<i>Rank: 1.8</i>
Issue 7	Residential and commercial development; Housing and urban areas: Residential and commercial development encroaching on habitat	Rank: 1.8
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Land acquisition: Increase public acquisition of land targeted by potential development.</i>	<i>Rank: 2.5</i>
Issue 8	Pollution; Agricultural and forestry effluents; Herbicides and pesticides: contaminants (pesticides) from agricultural runoff or drift having lethal or sub-lethal effects	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Research BMPs for agricultural pesticide use.</i>	<i>Rank: 1.7</i>

Issue 9	Pollution; Domestic and urban waste water; Run-off: contaminants from runoff having lethal or sub-lethal effects	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Techniques development; Habitat restoration methods: Identify, catalog, and rate techniques that reduce runoff.</i>	<i>Rank: 1.8</i>
Issue 10	Pollution; Agricultural and forestry effluents; Type unknown: Pollution impacts on waterbirds (e.g heavy metals)	Rank: 2.0
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Ensure compliance with pesticide use regulations.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Research sources of contaminants in herons.</i>	<i>Rank: 2.0</i>
<i>Action 3</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Restrict open water disposal of contaminated materials.</i>	<i>Rank: 2.0</i>
<i>Action 4</i>	<i>Direct Management of Natural Resources; Hazard or infrastructure removal: Reduce contaminants impacts from industrial and municipal effluents.</i>	<i>Rank: 2.5</i>
Issue 11	Residential and commercial development; Housing and urban areas: residential development causing tidal wetland buffer conversion	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Integrate heron foraging and nesting needs on a seasonal basis with other marsh management</i>	<i>Rank: 1.5</i>
Issue 12	Residential and commercial development; Housing and urban areas: residential development causing wetland habitat conversion leading to shortage of foraging habitat	Rank: 2.0
<i>Action 1</i>	:	<i>Rank:</i>

Beach-nesting Birds

Issue 1	Invasive and other problematic species genes and diseases: predation by subsidized predators- native species (fox, skunk, crows, ghost crabs) whose populations have increased due to resources provided directly or indirectly by humans - or by cats and rats	Rank: 1.2
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control predators of piping plover by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control subsidized predators of migratory shorebirds by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 1.5</i>
<i>Action 3</i>	<i>Data Collection and Analysis; Techniques development; Fish and wildlife research survey and management techniques: Develop and test new predator management techniques to protect piping plover nests and chicks.</i>	<i>Rank: 2.0</i>
Issue 2	Resource management needs; Resource information collection needs: Need for better informations on population status, trends, resource and habitat needs	Rank: 1.3
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.7</i>

Issue 3	Human intrusions and disturbance; Recreational activities: recreational beach use causing death or disturbance	Rank: 1.3
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Reduce disturbance to piping plover caused by humans and pets.</i>	<i>Rank: 1.2</i>
<i>Action 2</i>	<i>Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions.</i>	<i>Rank: 1.5</i>
<i>Action 3</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 1.8</i>
<i>Action 4</i>	<i>Planning; Species and habitat management planning; Species management planning: Implement species and habitat management for any beach-nesting birds that do not yet have one in place (e.g., fencing and posting of nests) on state lands (and Federal, NGO and private lands as appropriate), focusing on extant and historic occurrences; determine the efficacy of different management practices.</i>	<i>Rank: 2.0</i>
Issue 4	Natural system modifications; Other ecosystem modifications: beach replenishment causing beach habitat degradation	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Reproduction: Research effects of beach replenishment projects on piping plovers.</i>	<i>Rank: 2.0</i>
Issue 5	Pollution; Industrial and military effluents; Oil spills: contaminants (oil spills) having lethal or sub-lethal effects	Rank: 1.5
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Improve oil spill prevention and emergency response.</i>	<i>Rank: 1.7</i>
Issue 6	Resource management needs; Management decision needs; Need to provide technical assistance: Habitat loss, degradation and fragmentation	Rank: 1.5
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Establish partnerships with government agencies, conservation organizations, businesses and private landowners to protect, manage and restore extant and historical SGCN occurrences and key wildlife habitats.</i>	<i>Rank: 1.5</i>
Issue 7	Residential and commercial development; Housing and urban areas: loss of natural beach dynamics from residential development causing beach habitat degradation	Rank: 1.7
<i>Action 1</i>	<i>Direct Management of Natural Resources; Living shorelines; Beach renourishment: Maintain or restore natural beach dynamics that perpetuate high quality breeding habitat for piping plover.</i>	<i>Rank: 2.2</i>
Issue 8	Human intrusions and disturbance; Recreational activities: ORVs causing death or disturbance	Rank: 1.7
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Educate the public about SGCN and effects of disturbance on nesting</i>	<i>Rank: 1.2</i>
<i>Action 2</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Enforce closed nesting areas</i>	<i>Rank: 1.5</i>

Issue 9	Education Outreach needs; Education needs; Need for improved knowledge of fish and wildlife and their habitats:	Rank: 1.8
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions.</i>	<i>Rank: 1.5</i>
Issue 10	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Named species: dogs off leash causing death or disturbance	Rank: 1.8
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Educate dog owners about SGCN and effects of dogs on nesting</i>	<i>Rank: 1.7</i>
<i>Action 2</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Enforce leash laws</i>	<i>Rank: 1.8</i>
Issue 11	Resource management needs; Resource information collection needs: Need for better information regarding population status, trends, resource and habitat needs	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.5</i>
Issue 12	Resource management needs; Management decision needs; Need to provide technical assistance: Need for improved safe monitoring methods for piping plovers	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Techniques development; Fish and wildlife research survey and management techniques: Develop safe techniques for marking piping plovers.</i>	<i>Rank: 1.5</i>
Issue 13	Residential and commercial development; Housing and urban areas: residential development causing beach habitat conversion	Rank: 2.0
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>

Black Skimmer

Rynchops niger

Issue 1	Resource management needs; Resource information collection needs:	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis: Research how to create suitable nesting habitat for this species.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Data Collection and Analysis: Research the importance of Delaware habitats to non-breeding flocks seen here in the summer and how to manage for them.</i>	<i>Rank: 1.8</i>
Issue 2	Resource management needs; Resource information collection needs: Lack of information about species nesting in Delaware.	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis: Determine why this species doesn't nest here more commonly.</i>	<i>Rank: 1.8</i>
Issue 3	Human intrusions and disturbance; Recreational activities: recreational beach use causing death or disturbance	Rank: 1.7
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Implement species and habitat management for black skimmer - e.g. fencing and posting of nests - on state lands (and Federal, NGO and private lands as appropriate), focusing on extant and historic occurrences; determine the efficacy of different management practices.</i>	<i>Rank: 1.8</i>

Issue 4 Human intrusions and disturbance; Recreational activities: boats and ORVs causing disturbance **Rank: 1.8**

Action 1 Data Collection and Analysis; Research survey or monitoring utilization; Human dimensions: Research effects of disturbance from boats and ORVs on black skimmer. **Rank: 2.0**

Common Tern

Sterna hirundo

Issue 1 Human intrusions and disturbance; Recreational activities: boats and ORVs causing disturbance **Rank: 1.8**

Action 1 Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions. **Rank: 1.7**

Action 2 Law Enforcement; Law Enforcement; Law Enforcement: Work with law enforcement to curtail effects of disturbance on common tern from boats. **Rank: 2.0**

Issue 2 Human intrusions and disturbance; Recreational activities: contaminants (pollution from boats, power plants, etc.) having sublethal effects **Rank: 1.8**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Research the effects of contaminants on common tern. **Rank: 2.0**

Issue 3 Human intrusions and disturbance; Recreational activities: recreational beach use causing disturbance **Rank: 1.8**

Action 1 Education; Student training; Wildlife education: Post key common tern nesting areas with signs and work with landowners (including other state agencies) to limit public access. **Rank: 1.2**

Issue 4 Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs **Rank: 2.0**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats. **Rank: 1.7**

Freshwater Marsh Birds

Issue 1 Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs **Rank: 1.7**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats. **Rank: 1.8**

Issue 2 Resource management needs; Resource information collection needs: agriculture causing wetland buffer conversion **Rank: 2.0**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Reproduction: Assess threats to sedge wren, including contaminants in eggs and water, human disturbance to nesting birds, and habitat loss and destruction. **Rank: 2.2**

Action 2 Planning; State Wildlife Action planning: Develop management practices for SGCN, key habitats and abatement of threats on public and private lands; measure the effectiveness of different management practices and adapt as necessary. **Rank: 2.2**

Issue 3	Natural system modifications; Dams and water management use; Abstraction of ground water (unknown use): groundwater withdrawals causing wetland habitat degradation	Rank: 2.0
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Develop a conservation plan for freshwater wetland birds, to include recovery goals, habitat development, and restoration consistent with North American Waterbird Conservation Plan.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>
<i>Action 3</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Food habits: Research feeding habitats, home ranges and patch size requirements of freshwater wetland birds.</i>	<i>Rank: 2.0</i>
<i>Action 4</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Research freshwater wetland bird habitat evaluation criteria based on review of literature and assessment of current distribution.</i>	<i>Rank: 2.0</i>
<i>Action 5</i>	<i>Direct Management of Natural Resources; Create new habitat or natural processes; Habitat conversion: Restore freshwater wetland bird habitats to provide adequate food supply and stopover habitat for migratory birds.</i>	<i>Rank: 2.5</i>
Issue 4	Pollution; Agricultural and forestry effluents; Nutrient loads: nutrients and sediments from agricultural and residential runoff causing wetland habitat degradation due to community composition changes	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Reproduction: Research factors influencing nest success and productivity of freshwater wetland birds, including population dynamics and habitat selection.</i>	<i>Rank: 2.0</i>
Issue 5	Invasive and other problematic species genes and diseases; Problematic native species diseases; Unspecified species: Predation by domestic animals and subsidized predators due to residential and commercial development encroaching on habitat	Rank: 2.0
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Establish American bittern management/protection guidelines for breeding populations on private lands, and where possible, provide incentives for participation in the protection of breeding sites.</i>	<i>Rank: 2.3</i>
Issue 6	Natural system modifications; Dams and water management use; Abstraction of surface water (unknown use): surface water diversions causing wetland habitat degradation	Rank: 2.0
<i>Action 1</i>	:	<i>Rank:</i>
Issue 7	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 2.2
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.8</i>

Freshwater Waterfowl

Issue 1	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: invasive plants causing wetland habitat degradation	Rank: 1.5
<i>Action 1</i>	<i>Direct Management of Natural Resources; Create new habitat or natural processes; Habitat conversion: Enhance/restore degraded wetlands and adjacent upland habitats (including buffers).</i>	<i>Rank: 2.3</i>
Issue 2	Residential and commercial development; Housing and urban areas: residential development causing wetland buffer conversion	Rank: 1.5
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Land acquisition: Acquire title to or easement on priority high-quality habitats including nesting, migratory stopover, and wintering areas, and the upstream headwaters and adjacent buffer habitats throughout the watershed that are central to their integrity.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Planning; Land use planning: Maintain or improve hydrologic connections (e.g. restore tidal flow in estuarine systems) when maintaining or constructing buildings, railroads, and highways adjacent to rivers, lakes or wetlands.</i>	<i>Rank: 2.0</i>
Issue 3	Transportation and service corridors; Roads and railroads: roads, railroads, etc. impair hydrologic connections	Rank: 1.5
<i>Action 1</i>	<i>Planning; Land use planning: Maintain or improve hydrologic connections (e.g. restore tidal flow in estuarine systems) when maintaining or constructing buildings, railroads, and highways adjacent to rivers, lakes or wetlands.</i>	<i>Rank: 2.2</i>
Issue 4	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases: predation by cats and rats	Rank: 1.8
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control feral cats and rats to protect waterfowl (and other species).</i>	<i>Rank: 2.2</i>
<i>Action 2</i>	<i>Education: Education the public about the importance of keeping cats indoors to protect waterfowl (and other species).</i>	<i>Rank: 2.2</i>
Issue 5	Invasive and other problematic species genes and diseases; Problematic species diseases of unknown origin; Named species: pathogens (botulism, fowl cholera, AI, etc.)	Rank: 2.0
<i>Action 1</i>	<i>Direct Management of Natural Resources; Wildlife disease management: Reduce or control the effect of diseases where the intensity and frequency of occurrence threatens species or populations.</i>	<i>Rank: 2.2</i>

Pelagic Birds

Issue 1	Biological resource use; Fishing and harvesting aquatic resources; Unintentional effects (large scale): commercial fisheries bycatch	Rank: 1.7
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Enact international regulation of high seas fishing.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Planning; Species and habitat management planning; Species management planning: Develop a pelagic bird conservation plan consistent with North American Waterbird Conservation plan.</i>	<i>Rank: 2.0</i>
<i>Action 3</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Develop guidelines and/ or regulations to reduce commercial fisheries bycatch of pelagic birds.</i>	<i>Rank: 2.0</i>

<i>Action 4</i>	<i>Data Collection and Analysis; Research survey or monitoring utilization; Human dimensions: Research commercial fisheries impacts on pelagic birds.</i>	<i>Rank: 2.0</i>
Issue 2	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 2.0</i>
Issue 3	Pollution; Garbage and solid waste: trash ingestion	Rank: 1.8
<i>Action 1</i>	<i>Direct Management of Natural Resources; Hazard or infrastructure removal; Solid waste removal: Remove trash as soon as possible.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Prohibit dumping of debris, used line, and nets and enforce the prohibition.</i>	<i>Rank: 2.2</i>
Issue 4	Pollution; Garbage and solid waste: trash ingestion or commercial fishing gear entanglement	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Techniques development; Fish and wildlife research survey and management techniques: Develop non-persistent lines, nets and traps, and research the use of lead sinkers and their effects on waterbird mortality rates.</i>	<i>Rank: 2.0</i>
Issue 5	Energy production and mining; Renewable energy: wind farm collisions	Rank: 2.0
<i>Action 1</i>	<i>Technical Assistance; Environmental review; Review of proposed projects: Develop standards for placement of wind energy towers to minimize impacts on pelagic birds.</i>	<i>Rank: 2.3</i>
Issue 6	Education Outreach needs; Education needs; Lack of aquatic resources and wildlife education facilities: Education and outreach needs	Rank: 2.2
<i>Action 1</i>	<i>Education; Educator/instructor training: Develop a "species profile" brochure for pelagic birds. Develop and conduct workshops for tour boat operators to promote responsible pelagic bird tourism/ viewing. Develop pelagic bird outreach materials for Cape May Lewis ferry. Develop opportunities for pelagic bird ecotourism in shore communities that have tour boat operators.</i>	<i>Rank: 1.5</i>

Saltmarsh Birds

Issue 1	Climate change and severe weather; Sea level rise: Loss of high marsh and conversion of low marsh to open water as a result of sea level rise.	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat: Identify, manage, and protect critical areas for saltmarsh birds, especially networks of large patches of priority habitats that facilitate marsh migration, for immediate conservation.</i>	<i>Rank: 2.0</i>
Issue 2	Natural system modifications; Other ecosystem modifications: insect control with OMWM and impoundment management causing wetland habitat degradation	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Research impacts of OMWM and impoundment management on SGCN species and habitats.</i>	<i>Rank: 2.0</i>

Issue 3 Natural system modifications; Other ecosystem modifications: insect control with OMWM causing wetland habitat degradation **Rank: 1.7**

Action 1 Direct Management of Natural Resources; Create new habitat or natural processes; Habitat conversion: Modify OMWM practices to prevent impacts to SGCN species and key habitats; restore key habitats that have been treated. **Rank: 2.5**

Issue 4 Residential and commercial development; Housing and urban areas: residential development causing wetland buffer conversion **Rank: 1.8**

Action 1 Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions. **Rank: 1.7**

Action 2 Land and Water Rights Acquisition and Protection; Land acquisition: Prioritize areas for acquisition to protect the most threatened breeding populations. **Rank: 1.7**

Action 3 Coordination and Administration; Incentives: Implement cost-share programs, tax reform, market mechanisms and other incentives to encourage SGCN and key habitat management and restoration on private lands. **Rank: 2.8**

Issue 5 Agriculture and aquaculture; Annual and perennial nontimber crops; Scale unknown: agriculture causing wetland buffer conversion **Rank: 2.0**

Action 1 Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions. **Rank: 1.8**

Action 2 Land and Water Rights Acquisition and Protection; Land acquisition: Prioritize areas for acquisition to protect the most threatened breeding populations. **Rank: 1.8**

Action 3 Coordination and Administration; Incentives: Implement cost-share programs, tax reform, market mechanisms and other incentives to encourage SGCN and key habitat management and restoration on private lands. **Rank: 3.0**

American Black Duck

Anas rubripes

Issue 1 Residential and commercial development; Housing and urban areas: Residential and commercial development encroaching on habitat **Rank: 1.7**

Action 1 Data Collection and Analysis; Research survey or monitoring habitat: Identify, manage, and protect critical habitat for black ducks to support wintering populations. **Rank: 2.0**

Shrubland Birds

Issue 1 Transportation and service corridors; Utility and service lines: Communications towers and high-tension electric lines **Rank: 1.8**

Action 1 Technical Assistance; Technical assistance; Technical assistance: Support research on improving the design of towers and lines to minimize impacts to SGCN **Rank: 1.5**

Action 2 Outreach; Partner stakeholder engagement; Others: Work with utilities to develop standards for the placement of towers and lines to minimize impacts to SGCN nesting colonies, roosts, migration routes, movement corridors, and other critical areas **Rank: 1.5**

Migratory Shorebirds

Issue 1	Education Outreach needs; Outreach needs; Need to develop and/or maintain a broad base of support for agency goals and objectives:	Rank: 1.0
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Increase awareness of the importance of Delaware Bay as a major migratory stopover and the importance of the shorebird-horseshoe crab relationship.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Promote sister city concept for international shorebird protection</i>	<i>Rank: 1.7</i>
<i>Action 3</i>	<i>Outreach; Partner stakeholder engagement; Government agency: Provide added support for Just Flim 'Em, HSC Sactuaries, and Sister Shorebirds.</i>	<i>Rank: 2.2</i>
Issue 2	Biological resource use; Fishing and harvesting aquatic resources; Intentional use (large scale): commercial fisheries over-harvesting of prey (horseshoe crabs)	Rank: 1.2
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Increase awareness of the importance of Delaware Bay as a major migratory stopover and the importance of the shorebird-horseshoe crab relationship.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Technical Assistance; Environmental review; Review of proposed policies and plans: Continue to work with ASMFC to manage HSC havest for shorebirds.</i>	<i>Rank: 1.7</i>
<i>Action 3</i>	<i>Education; Student training; Wildlife education: Increase awareness of the importance of Delaware Bay as a major migratory stopover and the importance of the shorebird-horseshoe crab relationship.</i>	<i>Rank: 1.7</i>
Issue 3	Pollution; Industrial and military effluents; Oil spills: contaminants (oil spills) having lethal or sub-lethal effects	Rank: 1.2
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Supply Shorebird Team with oil spill response kits and ensuer team leaders have oil spill response training.</i>	<i>Rank: 1.3</i>
<i>Action 2</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Improve oil spill prevention and emergency response.</i>	<i>Rank: 1.7</i>
Issue 4	Residential and commercial development; Housing and urban areas: Habitat loss	Rank: 1.2
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Land acquisition: Identify and protect important habitats including foraging, roosting, and staging areas.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Government agency: Work with appropriate agencies to restore coastal habitats.</i>	<i>Rank: 2.0</i>
Issue 5	Human intrusions and disturbance; Recreational activities: recreational beach use causing death or disturbance	Rank: 1.2
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Work with appropriate agencies to reduce disturbance.</i>	<i>Rank: 1.5</i>
Issue 6	Human intrusions and disturbance; Recreational activities: recreational beach use causing death or disturbance	Rank: 1.2
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>

Issue 7	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: predation by pets and subsidized predators (i.e., cats, dogs, racoons, red fox, etc.)	Rank: 1.2
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Develop education and outreach for the general public about the impacts of subsidized predators on SGCN.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Work with conservation partners to control subsidized predators on public and NGO conservation lands by reducing subsidies (refuges, food sources) or by removal of individuals.</i>	<i>Rank: 1.5</i>
<i>Action 3</i>	<i>Outreach; Partner stakeholder engagement; Non governmental organization: Work with retailers and NGOs to develop education and outreach for pet owners to minimize the impacts of pets on SGCN, such as "Cats Indoors."</i>	<i>Rank: 1.5</i>
<i>Action 4</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control subsidized predators of migratory shorebirds by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 2.0</i>
<i>Action 5</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Strengthen enforcement of leash laws for dogs to protect SGCN.</i>	<i>Rank: 2.0</i>
<i>Action 6</i>	<i>Coordination and Administration; Incentives: Provide incentives for landowners to control subsidized predators on private property by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 2.8</i>
Issue 8	Human intrusions and disturbance; Recreational activities: boats causing disturbance	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring utilization; Human dimensions: Research boat disturbance on migratory shorebirds to develop guidelines for buffering nesting and feeding birds from disturbance.</i>	<i>Rank: 1.8</i>
Issue 9	Residential and commercial development; Housing and urban areas: Habitat loss	Rank: 1.5
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Land acquisition: Identify and protect important habitats including foraging, roosting, and staging areas.</i>	<i>Rank: 2.0</i>
Issue 10	Invasive and other problematic species genes and diseases; Diseases of unknown cause: Infectious diseases	Rank: 1.5
<i>Action 1</i>	<i>Education; Educator/instructor training: Continue to provide training for DFW staff in procedures for responding to disease outbreaks</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Planning; Organizational strategic and CMS planning; Organizational strategic and operational planning: Establish an early detection and rapid response system to react to new invasions</i>	<i>Rank: 1.8</i>
Issue 11	Agriculture and aquaculture; Annual and perennial nontimber crops; Scale unknown: Habitat loss	Rank: 1.7
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Land acquisition: Identify and protect important habitats including foraging, roosting, and staging areas.</i>	<i>Rank: 2.0</i>

Issue 12 Natural system modifications; Other ecosystem modifications: insect control with impoundment management causing wetland habitat degradation **Rank: 1.7**

Action 1 Direct Management of Natural Resources; Create new habitat or natural processes; Waterfowl impoundment creation: Improve impoundment management for migratory shorebirds, and coordinate habitat availability throughout the bay. **Rank: 1.8**

Issue 13 Climate change and severe weather: SLR, storm damage, erosion, etc. **Rank: 1.7**

Action 1 Data Collection and Analysis: Consider historical data, spawning grounds, and site specific information to rank sites for restoration/replenishment needs (beyond just Mispillion and Port Mahon). **Rank: 1.7**

Action 2 Direct Management of Natural Resources: Restore appropriate beaches for shorebird and HSC benefits (beyond just Mispillion and Port Mahon). **Rank: 1.7**

Ruddy Turnstone

Arenaria interpres

Issue 1 Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Continue to monitor bird movements, including color marked and radio-tagged individuals, to identify patterns of habitat use, including yearly fluctuations in important foraging/roosting/staging areas. **Rank: 1.8**

Action 2 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Age size and sex structure: Continue to monitor turnstone weight gains during the stopover period as a measure of flock condition and health of the stopover. **Rank: 1.8**

Action 3 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Continue to monitor turnstone with aerial and boat surveys and by resighting color-marked individuals to develop data for population and survival estimates. **Rank: 1.8**

Sanderling

Calidris alba

Issue 1 Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Continue to monitor bird movements, including color marked and radio-tagged individuals, to identify patterns of habitat use, including yearly fluctuations in important foraging/roosting/staging areas. **Rank: 1.8**

Action 2 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Age size and sex structure: Continue to monitor sanderling weight gains during the stopover period as a measure of flock condition and health of the stopover. **Rank: 1.8**

Action 3 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Continue to monitor sanderling with aerial and boat surveys and by resighting color-marked individuals to develop data for population and survival estimates. **Rank: 1.8**

Issue 2 Residential and commercial development; Housing and urban areas: residential development **Rank: 1.5**

Action 1 Outreach; Partner stakeholder engagement; Government agency: Work with appropriate agencies to restore coastal habitats. **Rank: 2.0**

Issue 3 Residential and commercial development; Housing and urban areas: Residential and commercial development encroaching on habitat **Rank: 1.7**

Action 1 Outreach; Partner stakeholder engagement; Government agency: Work with appropriate agencies to reduce disturbance. Rank: 1.7

Red Knot

Calidris canutus

Issue 1 Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Reproduction: Continue to monitor horseshoe crab egg density as an index of food availability and the health of migratory shorebird stopover sites. Work with ASMFC to re-establish dredge survey which is used in the ARM. Rank: 1.7

Action 2 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Age size and sex structure: Continue to monitor red knot weight gains during the stopover period as a measure of flock condition and health of the stopover. Rank: 1.7

Action 3 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Continue to monitor red knot with ground, aerial, and boat surveys and by resighting color-marked individuals to develop data for population and survival estimates. Rank: 1.7

Action 4 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Continue to monitor bird movements, including color marked, geolocator, and radio-tagged individuals, to identify patterns of habitat use, including yearly fluctuations in important foraging/roosting/staging areas. Rank: 1.8

Whimbrel

Numenius phaeopus

Issue 1 Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs **Rank: 2.0**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Continue to monitor whimbrel with aerial and ground surveys to determine population trends. Monitor trends in migratory habitat quality. Rank: 2.2

Peregrine Falcon

Falco peregrinus

Issue 1 Pollution; Agricultural and forestry effluents; Herbicides and pesticides: contaminants having sublethal effects **Rank: 2.2**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Reproduction: Research contaminants in peregrine eggs and prey remains to identify contaminant threats. Rank: 2.2

Issue 2 Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs **Rank: 2.2**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats. Rank: 1.7

Neotropical Passage Migrants

Issue 1	Residential and commercial development: Buildings	Rank: 1.2
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with architects, building owners and managers to develop design standards to minimize the impacts of window glass on SGCN, utilizing the resources of the Building and Birds Forum and others.</i>	<i>Rank: 1.5</i>
Issue 2	Transportation and service corridors; Utility and service lines: Communications towers and high-tension electric lines	Rank: 1.3
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with utilities to develop standards for the placement of towers and lines to minimize impacts to SGCN nesting colonies, roosts, migration routes, movement corridors, and other critical areas</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Support research on improving the design of towers and lines to minimize impacts to SGCN</i>	<i>Rank: 1.7</i>
Issue 3	Pollution; Excess energy; Light pollution: Buildings	Rank: 1.5
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities and building code officials to develop education and outreach for building owners and managers to minimize the impacts of building lights on SGCN, modeled after the "Lights Out", FLAP, WINGS or "Project Safe Flight" programs.</i>	<i>Rank: 1.5</i>
Issue 4	Education Outreach needs; Outreach needs; Need to develop and/or maintain a broad base of support for agency goals and objectives: International threats - e.g. destruction of cerulean warbler winter habitat due to cocaine production in S. America.	Rank: 1.7
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Promote sister city concept for international songbird protection</i>	<i>Rank: 1.8</i>

Cavity-nesting Birds

Issue 1	Residential and commercial development; Housing and urban areas: residential development causing conversion of forests containing snags	Rank: 1.3
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Create new habitat or natural processes; Habitat conversion: Implement species and habitat management for cavity-nesting birds - e.g. retaining/creating snags - on state lands (and Federal, NGO and private lands as appropriate), focusing on extant and historic occurrences; determine the efficacy of different management practices.</i>	<i>Rank: 2.0</i>
Issue 2	Biological resource use; Logging and wood harvesting: Habitat loss, degradation and fragmentation due to forestry operation practices	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Assess threats to cavity-nesting birds, including habitat loss and destruction and silvicultural practices.</i>	<i>Rank: 2.0</i>

Issue 3 **Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs** **Rank: 1.8**

Action 1 *Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.* *Rank: 1.8*

Issue 4 **Education Outreach needs; Outreach needs; Need to develop and/or maintain a broad base of support for agency goals and objectives: residential development** **Rank: 2.2**

Action 1 *Outreach; Partner stakeholder engagement; Government agency: Establish partnerships with government agencies, conservation organizations, businesses and private landowners to protect, manage and restore extant and historical SGCN occurrences and key wildlife habitats.* *Rank: 1.8*

Aerial Invertivores

Issue 1 **Transportation and service corridors; Roads and railroads: Transportation construction and infrastructure** **Rank: 1.8**

Action 1 *Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Assess threats to cliff swallow, including habitat loss/conversion and bridge maintenance.* *Rank: 2.0*

Issue 2 **Human intrusions and disturbance: Anthropogenic nest disturbance.** **Rank: 2.0**

Action 1 *Education: Educate builders and the general public about the sensitivity of the Common Nighthawk to nest disturbance, and offer suggestions of time of year to avoid nesting areas.* *Rank: 1.7*

Issue 3 **Resource management needs; Resource information collection needs: Disappearance of suitable rooftops for nesting is likely to be an issue.** **Rank: 2.0**

Action 1 *Data Collection and Analysis; Research survey or monitoring habitat: Research alternative suitable nesting habitat options for the Nighthawk.* *Rank: 1.7*

Issue 4 **Resource management needs; Resource information collection needs: Lack of information about the reason for the decline of many Aerial Invertivores/Insectivores.** **Rank: 2.0**

Action 1 *Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.* *Rank: 1.5*

Action 2 *Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Assess threats to invertivores.* *Rank: 1.7*

Issue 5 **Transportation and service corridors; Roads and railroads: Use of transportation infrastructure for nesting** **Rank: 2.0**

Action 1 *Direct Management of Natural Resources; Fish and wildlife habitat structures; Nesting habitat improvements: Establish partnerships with municipalities and DeIDOT to create/protect and maintain structures suitable for cliff swallow breeding colonies.* *Rank: 2.0*

Issue 6 Resource management needs; Resource information collection needs: Need for better information of population status, trends and resource needs **Rank: 2.2**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats. **Rank: 2.2**

Ground-nesting Birds

Issue 1 Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: predation by pets and subsidized predators **Rank: 1.3**

Action 1 Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Work with conservation partners to control subsidized predators on public and NGO conservation lands by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals. **Rank: 1.5**

Action 2 Outreach; Partner stakeholder engagement; Non governmental organization: Work with retailers and NGOs to develop education and outreach for pet owners to minimize the impacts of pets on SGCN, such as "Cats Indoors." **Rank: 1.5**

Action 3 Education; Student training; Wildlife education: Develop education and outreach for the general public about the impacts of subsidized predators on SGCN. **Rank: 1.7**

Action 4 Law Enforcement; Law Enforcement; Law Enforcement: Strengthen enforcement of leash laws for dogs to protect SGCN. **Rank: 2.0**

Action 5 Coordination and Administration; Incentives: Provide incentives for landowners to control subsidized predators on private property by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals. **Rank: 3.0**

Land Birds

Issue 1 Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Need for better information on population status, trends, resource and habitat needs **Rank: 1.7**

Action 1 Technical Assistance; Environmental review; Review of proposed policies and plans: Incorporate landbird monitoring into existing waterfowl and shorebird monitoring programs. **Rank: 1.7**

Issue 2 Pollution; Air borne pollutants; Acid rain: contaminants (acid rain, pesticides) having lethal or sub-lethal effects **Rank: 1.8**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Age size and sex structure: Assess threats to birds from accumulation of contaminants. **Rank: 2.0**

Issue 3 Agriculture and aquaculture; Livestock farming and ranching; Scale unknown: livestock grazing causing riparian habitat degradation **Rank: 2.2**

Action 1 Direct Management of Natural Resources; Grazing/farm management: Institute habitat-conserving livestock grazing practices where grazing occurs. **Rank: 2.2**

Raptors - Hawks, Falcons, Eagles, Owls

Issue 1	Residential and commercial development; Housing and urban areas: residential development causing forest habitat conversion	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring utilization; Human dimensions: Assess threats to forest raptors, including human disturbance of nesting birds, habitat conversion and contaminants.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Research habitat requirements of forest raptors.</i>	<i>Rank: 2.0</i>
Issue 2	Transportation and service corridors; Utility and service lines: Communications towers and high-tension electric lines	Rank: 1.8
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Support research on improving the design of towers and lines to minimize impacts to SGCN</i>	<i>Rank: 1.2</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with utilities to develop standards for the placement of towers and lines to minimize impacts to SGCN nesting colonies, roosts, migration routes, movement corridors, and other critical areas</i>	<i>Rank: 1.2</i>
Issue 3	Resource management needs; Resource information collection needs: Lack of information regarding cause of injuries and deaths	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Gather data/information regarding injury and death and determine cause.</i>	<i>Rank: 1.5</i>
Issue 4	Biological resource use; Hunting and collecting terrestrial animals; Persecution/control: Misuse of rodenticides - Poisons	Rank: 1.8
<i>Action 1</i>	<i>Coordination and Administration: Work with pest control companies and Tri-state Bird Rescue to educate companies about this issue and alternatives.</i>	<i>Rank: 2.3</i>
<i>Action 2</i>	<i>Education; Student training: Educate the public about the proper use of rodenticides, how to avoid unintended "catches", or better alternatives.</i>	<i>Rank: 2.7</i>
Issue 5	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.7</i>
Issue 6	Invasive and other problematic species genes and diseases; Diseases of unknown cause: Infectious diseases	Rank: 2.0
<i>Action 1</i>	<i>Education; Educator/instructor training: Provide training for DFW staff in procedures for responding to disease outbreaks</i>	<i>Rank: 1.3</i>
<i>Action 2</i>	<i>Planning; Organizational strategic and CMS planning; Organizational strategic and operational planning: Establish an early detection and rapid response system to react to new invasions</i>	<i>Rank: 2.0</i>
Issue 7	Human intrusions and disturbance: Raptor injury and death	Rank: 2.2
<i>Action 1</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Gather data and resources to coordinate tristate bird rescue.</i>	<i>Rank: 1.3</i>

All Forest Birds

Issue 1	Residential and commercial development: Buildings	Rank: 1.7
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with architects, building owners and managers to develop design standards to minimize the impacts of window glass on SGCN, utilizing the resources of the Building and Birds Forum and others.</i>	<i>Rank: 1.8</i>
Issue 2	Transportation and service corridors; Utility and service lines: Communications towers and high-tension electric lines	Rank: 1.8
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Support research on improving the design of towers and lines to minimize impacts to SGCN</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with utilities to develop standards for the placement of towers and lines to minimize impacts to SGCN nesting colonies, roosts, migration routes, movement corridors, and other critical areas</i>	<i>Rank: 1.5</i>
Issue 3	Pollution; Excess energy; Light pollution: Buildings	Rank: 2.0
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities and building code officials to develop education and outreach for building owners and managers to minimize the impacts of building lights on SGCN, modeled after the "Lights Out", FLAP, WINGS or "Project Safe Flight" programs.</i>	<i>Rank: 1.5</i>

Forest Interior Birds

Issue 1	Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: excessive herbivory by deer causing forest habitat degradation	Rank: 1.5
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-biological: Increased control of deer population.</i>	<i>Rank: 1.7</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Wildlife damage management: Mitigate deer impacts on habitat of forest interior birds.</i>	<i>Rank: 1.7</i>
Issue 2	Biological resource use; Logging and wood harvesting: Habitat loss, fragmentation and degradation due to forestry operations and pesticide use	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Assess threats to forest interior birds, including habitat conversion and fragmentation, silvicultural practices, and sensitivity to pesticides currently used to control gypsy moths and other forest pests.</i>	<i>Rank: 1.8</i>
Issue 3	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Abundance determination: Implement a MAPS program for forest interior birds.</i>	<i>Rank: 1.8</i>
Issue 4	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.5</i>

<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Abundance determination: Research comparative occurrence and breeding success of forest interior birds among beaver wetlands, naturally occurring wetlands, and mitigated wetlands.</i>	<i>Rank: 2.0</i>
Issue 5	Residential and commercial development: residential and commercial development causing habitat fragmentation	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>
Issue 6	Biological resource use; Hunting and collecting terrestrial animals; Unintentional effects: Residential development	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Abundance determination: Research effects of game management practices on occurrence, breeding density, and nesting success of forest interior birds.</i>	<i>Rank: 2.0</i>
Issue 7	Biological resource use; Logging and wood harvesting: Negative impacts of forestry operations on forest interior birds, silviculture practices (clearcutting) incompatible with forest bird conservation	Rank: 2.0
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Incorporate forest interior bird conservation objectives into forest management through policy and planning.</i>	<i>Rank: 1.3</i>
<i>Action 2</i>	<i>Planning; Species and habitat management planning: Incorporate forest interior bird conservation objectives into forest management through policy and planning.</i>	<i>Rank: 1.5</i>

Forest Interior Wetlands Birds

Issue 1	Pollution; Agricultural and forestry effluents; Herbicides and pesticides: insect control with pesticides causing prey reduction	Rank: 1.7
<i>Action 1</i>	:	<i>Rank:</i>
Issue 2	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.7</i>
Issue 3	Natural system modifications; Dams and water management use; Abstraction of ground water (unknown use): groundwater withdrawals causing wetland habitat degradation	Rank: 2.0
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Develop a conservation plan for freshwater wetland birds, to include recovery goals, habitat development, and restoration consistent with North American Waterbird Conservation Plan.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites.</i>	<i>Rank: 2.0</i>

- Action 3 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Rank: 2.0*
Food habits: Research feeding habitats, home ranges and patch size requirements of freshwater wetland birds.
- Action 4 Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Rank: 2.0*
Research freshwater wetland bird habitat evaluation criteria based on review of literature and assessment of current distribution.
- Action 5 Direct Management of Natural Resources; Create new habitat or natural processes; Habitat Rank: 2.5*
conversion: Restore freshwater wetland bird habitats to provide adequate food supply and stopover habitat for migratory birds.
- Issue 4 Pollution; Agricultural and forestry effluents; Nutrient loads: nutrients and sediments Rank: 2.0**
from agricultural and residential runoff causing wetland habitat degradation due to community composition changes
- Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Rank: 2.0*
Reproduction: Research factors influencing nest success and productivity of freshwater wetland birds, including population dynamics and habitat selection.

Pine Specialist Birds

- Issue 1 Education Outreach needs; Outreach needs; Need to develop and/or maintain a broad Rank: 1.5**
base of support for agency goals and objectives: Residential and commercial development encroaching on habitat
- Action 1 Outreach; Partner stakeholder engagement; Non governmental organization: Establish Rank: 1.8*
partnerships with government agencies, conservation organizations, businesses and private landowners to protect, manage and restore extant and historical SGCN occurrences and key wildlife habitats.
- Issue 2 Resource management needs; Resource information collection needs: Need for better Rank: 2.0**
information on population status, trends, resource and habitat needs
- Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Rank: 2.0*
Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.

Grassland Birds

- Issue 1 Residential and commercial development: Buildings Rank: 1.3**
- Action 1 Outreach; Partner stakeholder engagement; Others: Work with architects, building owners Rank: 1.7*
and managers to develop design standards to minimize the impacts of window glass on SGCN, utilizing the resources of the Building and Birds Forum and others.
- Issue 2 Residential and commercial development; Housing and urban areas: residential Rank: 1.3**
development causing early successional habitat conversion
- Action 1 Direct Management of Natural Resources; Create new habitat or natural processes; Habitat Rank: 1.8*
conversion: Implement species and habitat management for grassland birds - e.g. planting of warm-season grasses, prescribed burns - on state lands (and Federal, NGO and private lands as appropriate), focusing on extant and historic occurrences; determine the efficacy of different management practices.

Issue 3	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: Loss of habitat	Rank: 1.5
<i>Action 1</i>	<i>Direct Management of Natural Resources; Planting seeding; Herbaceous vegetation: Increase the percentage of native grasses and forbs for grassland birds.</i>	<i>Rank: 2.0</i>
Issue 4	Transportation and service corridors; Utility and service lines: residential development causing early successional habitat conversion	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Research comparative quality of powerline right-of-way habitats and natural habitats for grassland birds.</i>	<i>Rank: 2.0</i>
Issue 5	Transportation and service corridors; Utility and service lines: Communications towers and high-tension electric lines	Rank: 1.7
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Support research on improving the design of towers and lines to minimize impacts to SGCN</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with utilities to develop standards for the placement of towers and lines to minimize impacts to SGCN nesting colonies, roosts, migration routes, movement corridors, and other critical areas</i>	<i>Rank: 1.5</i>
Issue 6	Natural system modifications; Other ecosystem modifications: early successional habitat degradation	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Assess threats to grassland birds including habitat loss/conversion, succession, edge effects and predation.</i>	<i>Rank: 2.0</i>
Issue 7	Natural system modifications; Fire and fire suppression; Suppression of fire frequency/intensity: fire suppression causing habitat degradation due to natural succession	Rank: 1.7
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Conservation area designation: Protect or restore natural barrens that support species in disturbed areas.</i>	<i>Rank: 2.7</i>
Issue 8	Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.7</i>
Issue 9	Resource management needs; Resource information collection needs: Need for information on habitat suitability	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Research the suitability of early successional habitats resulting from natural disturbances vs. forestry practices vs. power line rights-of-way, including breeding densities and nesting success.</i>	<i>Rank: 2.0</i>
Issue 10	Agriculture and aquaculture; Annual and perennial nontimber crops; Scale unknown: agriculture causing early successional habitat degradation	Rank: 2.0
<i>Action 1</i>	<i>Coordination and Administration; Incentives: Implement cost-share programs, tax reform, market mechanisms and other incentives to encourage SGCN and key habitat management and restoration on private lands.</i>	<i>Rank: 3.0</i>

Issue 11	Pollution; Excess energy; Light pollution: Buildings	Rank: 2.2
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities and building code officials to develop education and outreach for building owners and managers to minimize the impacts of building lights on SGCN, modeled after the "Lights Out", FLAP, WINGS or "Project Safe Flight" programs.</i>	<i>Rank: 1.5</i>

Shrubland Birds

Issue 1	Natural system modifications; Fire and fire suppression; Suppression of fire frequency/intensity: fire suppression causing habitat degradation due to natural succession	Rank: 1.2
<i>Action 1</i>	<i>Direct Management of Natural Resources; Fire management; Prescribed burning: Implement prescribed burns to restore early successional habitats.</i>	<i>Rank: 2.0</i>
Issue 2	Agriculture and aquaculture; Annual and perennial nontimber crops; Scale unknown: Lack of winter cover and access to quality brooding areas, primarily from removal of hedgerow and conversion of field edges.	Rank: 1.2
<i>Action 1</i>	<i>Direct Management of Natural Resources; Create new habitat or natural processes; Habitat conversion: Need to encourage hedgerow establishment and other winter cover for protection from predators and severe weather event. Also need to promote native ESH habitats with forbe component and high % of bare ground.</i>	<i>Rank: 2.3</i>
Issue 3	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: non-native grasses causing degradation of early successional habitats	Rank: 1.2
<i>Action 1</i>	<i>Direct Management of Natural Resources; Planting seeding; Herbaceous vegetation: Plant suitable cover types and enforce required management practices.</i>	<i>Rank: 2.0</i>
Issue 4	Biological resource use; Hunting and collecting terrestrial animals; Unintentional effects: Lead shot ingestion	Rank: 2.3
<i>Action 1</i>	<i>Planning; State Wildlife Action planning: Assess impacts to SGCN and use this assessment and longterm monitoring to guide adaptive management, education, outreach and enforcement efforts, as necessary</i>	<i>Rank: 2.2</i>

American Woodcock

Scolopax minor

Issue 1	Residential and commercial development; Housing and urban areas: Lack of forest management on public lands; Need to encourage 'Young Forest' habitats.	Rank: 1.2
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Abundance determination: Implement species and habitat management for woodcock on state lands (and Federal, NGO and private lands as appropriate), focusing on extant and historic occurrences; determine the efficacy of different management practices.</i>	<i>Rank: 2.3</i>
Issue 2	Residential and commercial development; Housing and urban areas: residential development causing early successional habitat conversion	Rank: 1.2
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Abundance determination: Implement species and habitat management for woodcock on state lands (and Federal, NGO and private lands as appropriate), focusing on extant and historic occurrences; determine the efficacy of different management practices.</i>	<i>Rank: 2.3</i>

- Issue 3** **Resource management needs; Resource information collection needs: Need for better information on population status, trends, resource and habitat needs** **Rank: 1.5**
- Action 1* *Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.* *Rank: 1.7*

Fish

All Fish

Issue 1	Resource management needs; Resource information collection needs: Lack of baseline data unavailable for native fish stocks	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Gather baseline data of native fish stocks</i>	<i>Rank: 2.0</i>
Issue 2	Education Outreach needs; Education needs; Need for improved knowledge of fish and wildlife and their habitats: Need better fish identification available for the public	Rank: 1.8
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Coordinate with fisheries division to include SGCN species in their new fish ID App (Bruce Cole).</i>	<i>Rank: 1.7</i>
Issue 3	Invasive and other problematic species genes and diseases; Problematic species diseases of unknown origin; Unspecified species: Assess the impacts fish stocking effects on native fish populations	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Determine the impacts of non-native species (eg. Trout) stocking on native species</i>	<i>Rank: 2.0</i>
Issue 4	Pollution; Domestic and urban waste water; Sewage: Negative impacts effluent pipes and dredging have on fish populations.	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis: Continue to research and monitor the effects effluent pipes and dredging have on fish populations.</i>	<i>Rank: 2.2</i>
<i>Action 2</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Coordinate with NOAA, DNREC, USACOE, USFWS, NMFS</i>	<i>Rank: 2.2</i>

Freshwater Fish

Issue 1	Transportation and service corridors; Roads and railroads: Impacts of inadequate culverts on migratory species	Rank:
<i>Action 1</i>	<i>Direct Management of Natural Resources; Dam and barrier removal: Insert and increase number of adequately sized culverts where appropriate.</i>	<i>Rank: 1.8</i>
Issue 2	Natural system modifications; Dams and water management use; Dams (size unknown): Impacts of dams on migratory species and overall habitat(s), including habitat conversion	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis: Complete pre and post removal analysis of fish and wildlife species.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Dam and barrier removal: Dam removal or enhancement where appropriate.</i>	<i>Rank: 1.8</i>
<i>Action 3</i>	<i>Planning: Integrate research findings into plans for waterway enhancements (including dam building, improvements, and removals).</i>	<i>Rank: 1.8</i>
<i>Action 4</i>	<i>Data Collection and Analysis: Complete cost/benefit analysis of dam removal. Consider the needs of other uses or values (historical, water supply, etc.). Investigate other options, such as fish passages.</i>	<i>Rank: 1.8</i>

Issue 3	Transportation and service corridors; Roads and railroads: Impacts of inadequate culverts on migratory species	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis: Complete pre and post repair/replace analysis of fish and wildlife species.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Data Collection and Analysis: Complete cost/benefit analysis of repairing/replacing inadequate culverts. Consider the needs of other uses or values (historical, water supply, etc.). Investigate other options to solve the issue.</i>	<i>Rank: 2.0</i>

Diadromous & Anadromous Fish

Issue 1	Transportation and service corridors; Roads and railroads: Impacts of inadequate culverts on migratory species	Rank:
<i>Action 1</i>	<i>Direct Management of Natural Resources; Dam and barrier removal: Insert and increase number of adequately sized culverts where appropriate.</i>	<i>Rank: 1.8</i>
Issue 2	Resource management needs: Need for better information on population status, trends and resource needs and management	Rank: 1.8
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Assess threats to critical areas for all life cycle stages of diadromous fish (i.e. Shortnose Sturgeon), and develop a management plan to protect and improve these habitats.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 2.0</i>
Issue 3	Natural system modifications; Dams and water management use; Dams (size unknown): Impacts of dams on migratory species and overall habitat(s), including habitat conversion	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis: Complete pre and post removal analysis of fish and wildlife species.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Dam and barrier removal: Dam removal or enhancement where appropriate.</i>	<i>Rank: 1.8</i>
<i>Action 3</i>	<i>Planning: Integrate research findings into plans for waterway enhancements (including dam building, improvements, and removals).</i>	<i>Rank: 1.8</i>
<i>Action 4</i>	<i>Data Collection and Analysis: Complete cost/benefit analysis of dam removal. Consider the needs of other uses or values (historical, water supply, etc.). Investigate other options, such as fish passages.</i>	<i>Rank: 1.8</i>
Issue 4	Transportation and service corridors; Roads and railroads: Impacts of inadequate culverts on migratory species	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis: Complete pre and post repair/replace analysis of fish and wildlife species.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Data Collection and Analysis: Complete cost/benefit analysis of repairing/replacing inadequate culverts. Consider the needs of other uses or values (historical, water supply, etc.). Investigate other options to solve the issue.</i>	<i>Rank: 2.0</i>

Marine Estuarine Fish

Issue 1	Biological resource use; Fishing and harvesting aquatic resources; Intentional use (large scale): Commercial fisheries over-harvesting	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis: Assess impact of commercial fisheries over-harvesting fish populations.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Education; Student training; Aquatic resource education: Promote a stewardship ethic among fishers to reduce mortality of estuarine and marine fish from commercial fisheries.</i>	<i>Rank: 2.0</i>
<i>Action 3</i>	<i>Law Enforcement: Regulation enforcement and monitoring.</i>	<i>Rank: 2.0</i>
Issue 2	Transportation and service corridors; Shipping lanes: Dredging timing sensitive to benthic feeders presence	Rank: 2.0
<i>Action 1</i>	<i>Planning; Species and habitat management planning: Consider estuarine and marine species and habitat impacts from dredging.</i>	<i>Rank: 2.0</i>
Issue 3	Natural system modifications; Other ecosystem modifications: Sand grain size for beach renourishment eliminating benthic inhabitants	Rank: 2.0
<i>Action 1</i>	<i>Planning: Sand grain - size requirement for beach nourishment</i>	<i>Rank: 2.2</i>

All Fish & Shark

Issue 1	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of coordination and sharing of information among regional, state and national data collectors for species that utilize habitats in a broad geographical range.	Rank: 1.2
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management: Complete a survey that will be summarized to (1) evaluate how well Delaware is meeting best management practices and standards; (2) identify Delaware's fish data management capacity and needs; and 3) identify bottlenecks to integrating data among states for regional and national scale analyses.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Database development and management; Database development: Partner with a centralized database (e.g. Avian Knowledge Network) that will enhance Delaware's ability to manage and conserve wide ranging species across broad and biologically meaningful geographic areas. The exchange and integration of data into a permanent centralized data management system is a priority action.</i>	<i>Rank: 1.8</i>
Issue 2	Transportation and service corridors; Shipping lanes: Negative impacts increased shipping and larger ships have on wildlife	Rank: 1.8
<i>Action 1</i>	<i>: Assess threats from ship traffic such as oils spills and other hazardous materials.</i>	<i>Rank: 2.2</i>
Issue 3	Pollution; Industrial and military effluents; Oil spills: Negative impacts increased shipping and larger ships have on wildlife	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Assess threats from ship traffic such as oils spills and other hazardous materials.</i>	<i>Rank: 2.2</i>
Issue 4	Pollution; Excess energy; Noise pollution: Increased shipping and larger ships - Effects of noise	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of underwater noise on wildlife.</i>	<i>Rank: 2.2</i>

Issue 5 Resource management needs; Resource information collection needs: Lack of information about effects of underwater noise **Rank: 2.0**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of underwater noise on native fish and sharks. **Rank: 2.2**

Issue 6 Human intrusions and disturbance; War, civil unrest, and military exercises: Negative impacts of underwater human activities (e.g., Naval activities/seismic testing) **Rank: 2.0**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Continue to research and monitor the impacts of naval activities and seismic testing. **Rank: 2.0**

Action 2 Coordination and Administration; Coordination Administration; Program/project administrative support: Coordinate with Navy/seismic testing through Fish and Wildlife Coordination Act (USFWS/NMFS), which requires federal agencies or federally funded activities to coordinate with USWFS and/or NMFS. **Rank: 2.0**

Issue 7 Pollution; Domestic and urban waste water; Sewage: Negative impacts of ocean outfall pipes (state waters) (i.e., lankton layer degraded by chlorine, medicinal content endocrine inhibitors and increasing cancer rates). **Rank: 2.0**

Action 1 : **Rank: 2.0**

Issue 8 Resource management needs; Resource information collection needs: Wind turbine development - lack of information about sounds from vibration at base, electromagnetic field disruptions, placement (migration paths, dredging). **Rank: 2.0**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of wind turbines on movement and populations. **Rank: 2.0**

All Shark

Issue 1 Biological resource use; Fishing and harvesting aquatic resources; Unintentional effects (large scale): Commercial fisheries bycatch **Rank: 2.0**

Action 1 Data Collection and Analysis: Develop fishing practices that reduce shark and ray bycatch and/or increase post-release survivorship. **Rank: 1.8**

Action 2 Planning; Species and habitat management planning; Species management planning: Impement and enforce fishing practices that reduce shark and ray bycatch and/or increase post-release survivorship. **Rank: 1.8**

Herpetofauna

All Reptiles and Amphibians

Issue 1	Transportation and service corridors; Roads and railroads: vehicle collisions	Rank: 1.2
<i>Action 1</i>	<i>Direct Management of Natural Resources; Fish and wildlife habitat structures; Wildlife escape structures: Work with the DE DOT to develop standards for directional fencing and underpasses for new or existing roads to protect SGCN.</i>	<i>Rank:</i>
Issue 2	Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Need for conservation plan(s) for all herpetofauna that are found to be rare (S1 especially).	Rank: 1.3
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Develop conservation plans for all rare herpetofauna consistent with the international Plan for Amphibian and Reptile Conservation.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Fish and wildlife habitat structures: Implement species and habitat management for all rare herpetofauna (ex. for the corn snake - e.g. prescribed burning, closing of roads, and construction of artificial hibernacula - on state lands (and Federal, NGO and private lands as appropriate), focusing on sites with extant or historic populations; determine the efficacy of different management practices.</i>	<i>Rank: 2.0</i>
Issue 3	Residential and commercial development; Housing and urban areas: residential development causing habitat conversion	Rank: 1.3
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Conservation area designation: Protect corridors and patches of suitable habitat for herps that enhance survival during migration and movement.</i>	<i>Rank: 1.7</i>
Issue 4	Transportation and service corridors; Roads and railroads: vehicle collisions	Rank: 1.3
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Gate non-essential roads, close roads temporarily during breeding migrations, reduce speed limits, add cautionary signage, use directional fencing and underpasses to protect herps.</i>	<i>Rank: 2.0</i>
Issue 5	Biological resource use; Hunting and collecting terrestrial animals; Persecution/control: nuisance control	Rank: 1.5
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions.</i>	<i>Rank: 2.0</i>
Issue 6	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: use of non-native plants for erosion control, silviculture, etc.	Rank: 1.5
<i>Action 1</i>	<i>Direct Management of Natural Resources; Planting seeding; Herbaceous vegetation: Control invasive plants that impact life history of herpetofauna.</i>	<i>Rank: 2.2</i>
Issue 7	Biological resource use; Hunting and collecting terrestrial animals; Intentional use: Inappropriate collection for the pet trade, bait, or for the international trade market (Many turtles are being shipped overseas for food markets.)	Rank: 1.7
<i>Action 1</i>	<i>Education; Student training; Wildlife education: Develop education and outreach for the public and the pet trade about impacts on SGCN</i>	<i>Rank: 1.8</i>

<i>Action 2</i>	<i>Technical Assistance; Environmental review; Review of proposed policies and plans: Evaluate the need for additional means of protecting SGCN from collecting, including voluntary guidelines and regulations, as necessary</i>	<i>Rank: 1.8</i>
Issue 8	Transportation and service corridors; Roads and railroads: Difficulty in crossing roads due to curbs	Rank: 1.8
<i>Action 1</i>	<i>Direct Management of Natural Resources; Fish and wildlife habitat structures; Wildlife escape structures: Work with the DE DOT to ensure that whenever curbs are being installed near wetlands they should be Deldot Type 2, Type 1-2, or Type 3-2 to specifically assist amphibians and turtles.</i>	<i>Rank: 1.5</i>
Issue 9	Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: Herpetofaunal diseases and parasites (i.e., Ranavirus, the chytrid fungus <i>Batrachochytrium dendrobatidis</i>, etc.)	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Do surveys to determine extent of diseases and impacts to species. Conduct or support reseach into solutions.</i>	<i>Rank: 2.2</i>
<i>Action 2</i>	<i>Education: Produce educational material regarding disinfection of boots/gear/clothing to minimize human-aided spread of diseases.</i>	<i>Rank: 2.2</i>
Issue 10	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases: Invasive species	Rank: 1.8
<i>Action 1</i>	<i>Education; Student training: Educate boaters, fishermen, recreational users of water areas to decontaminate their hip boots/waders to prevent the spread of diseases among reptiles and amphibians. Currently in Delaware the preferred decontamination protocol involves the spray application of a bleach solution.</i>	<i>Rank: 1.8</i>
Issue 11	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Named species: predation by cats	Rank: 1.8
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control feral cats and educate the public about the importance of keeping cats indoors.</i>	<i>Rank: 2.0</i>
Issue 12	Biological resource use; Hunting and collecting terrestrial animals; Intentional use: collection for pet trade	Rank: 2.0
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Halt illegal collection of herpetofauna using an interagency enforcement program. For turtles specifically, PIT-tag turtles at sites vulnerable to collection.</i>	<i>Rank: 2.0</i>
Issue 13	Biological resource use; Hunting and collecting terrestrial animals; Intentional use: collection for pet trade, bait and foreign food markets	Rank: 2.0
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Encourage enforcement agencies to patrol for possible violators of state and federal laws and local ordinances regarding herps.</i>	<i>Rank: 2.5</i>
Issue 14	Natural system modifications; Fire and fire suppression; Suppression of fire frequency/intensity: fire suppression causing habitat degradation due to natural succession	Rank: 2.0
<i>Action 1</i>	<i>Direct Management of Natural Resources; Fire management; Prescribed burning: Implement prescribed burns to restore early successional habitats.</i>	<i>Rank: 1.5</i>

Issue 15	Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: predation by subsidized predators - native species (raccoon, fox, skunk) and pets, whose populations have increased due to resources provided directly or indirectly by humans	Rank: 2.0
<i>Action 1</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Control subsidized predators of herps by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 2.7</i>
Issue 16	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: predation by subsidized predators - native species (raccoon, fox, skunk) and pets, whose populations have increased due to resources provided directly or indirectly by humans	Rank: 2.2
<i>Action 1</i>	<i>Coordination and Administration; Incentives: Provide incentives for landowners to control subsidized predators on private property by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Work with conservation partners to control subsidized predators on public and NGO conservation lands by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.</i>	<i>Rank: 1.8</i>
<i>Action 3</i>	<i>Outreach; Partner stakeholder engagement; Non governmental organization: Work with retailers and NGOs to develop education and outreach for pet owners to minimize the impacts of pets on SGCN, such as "Cats Indoors."</i>	<i>Rank: 1.8</i>
<i>Action 4</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Strengthen enforcement of leash laws for dogs to protect SGCN.</i>	<i>Rank: 2.5</i>
Issue 17	Pollution; Domestic and urban waste water; Run-off: contaminants from residential pesticides having lethal or sublethal effects	Rank: 2.5
<i>Action 1</i>	<i>Education; Student training: Know the effects of herbicides and pesticides on herps and follow the instructions on the container labels. Use plants that require minimal chemicals and seek ways to implement bio-control measures.</i>	<i>Rank: 2.5</i>

Wetland and Riparian Turtles

Issue 1	Natural system modifications; Dams and water management use; Abstraction of ground water (unknown use): groundwater withdrawals causing wetland habitat degradation	Rank:
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Determine recharge areas for groundwater-fed bog turtle habitat and conduct hydrological monitoring.</i>	<i>Rank: 1.5</i>
Issue 2	Resource management needs; Management decision needs; Need to provide technical assistance: Habitat and loss and fragmentation	Rank:
<i>Action 1</i>	<i>Species Reintroduction and Stocking; Native species restoration; Rehabilitation: Possibly reintroduce bog turtles into areas from which they have been extirpated or removed if determined advisable and only in situations where the surrounding area is protected from development.</i>	<i>Rank: 2.3</i>
Issue 3	Residential and commercial development: Loss and fragmentation of bog turtle habitat	Rank:
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement: Establish partnerships with government agencies, conservation organizations, businesses and private landowners to protect, manage and restore extant and historical SGCN occurrences and key wildlife habitats.</i>	<i>Rank: 1.7</i>

Issue 4	Resource management needs; Resource information collection needs: Need for better information on population status, trends, and resource needs	Rank:
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Genetics: Investigate the genetic variability of bog turtle throughout its range.</i>	<i>Rank:</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank:</i>
Issue 5	Residential and commercial development; Housing and urban areas: residential development causing non-forested wetland habitat degradation	Rank:
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Establish partnerships with private landowners having bog turtles on their land. Coordinate with land management agencies to implement management on state lands (and Federal, NGO and private lands as appropriate), focusing on sites with extant or historic populations.</i>	<i>Rank:</i>
Issue 6	Residential and commercial development: Encroachment on bog turtle habitat from residential and commercial development	Rank: 1.0
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Land acquisition: Protect bog turtle habitat through purchase and easements.</i>	<i>Rank: 2.2</i>
Issue 7	Residential and commercial development; Housing and urban areas: Habitat and loss and fragmentation	Rank: 1.0
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Conservation area designation: Protect bog turtle habitat through purchase and easements.</i>	<i>Rank: 1.7</i>
Issue 8	Resource management needs; Resource information collection needs: Need for better information on population status, trends and habitat resources and needs for bog turtles	Rank: 1.2
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.7</i>
Issue 9	Natural system modifications; Dams and water management use; Abstraction of surface water (agricultural use): flooding for farm ponds, reservoirs, and other impoundments causing wetland habitat degradation	Rank: 1.7
<i>Action 1</i>	<i>Direct Management of Natural Resources; Vegetation management: Manage and maintain bog turtle habitat to ensure suitability.</i>	<i>Rank: 2.2</i>
Issue 10	Resource management needs; Resource information collection needs: Need for better information of genetic viability of extant bog turtle population	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Genetics: Investigate the genetic variability of bog turtle throughout its range.</i>	<i>Rank: 1.8</i>

Bog Turtle

Glyptemys muhlenbergii

Issue 1	Agriculture and aquaculture: Habitat and loss and fragmentation	Rank: 1.0
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Private lands agreements: Protect bog turtle habitat through purchase and easements.</i>	<i>Rank: 1.8</i>

Issue 2	Biological resource use; Hunting and collecting terrestrial animals; Intentional use: Illegal collection	Rank: 1.2
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Enforce protection of extant bog turtle populations and their habitats using existing regulations.</i>	<i>Rank: 1.8</i>
Issue 3	Biological resource use; Hunting and collecting terrestrial animals; Intentional use: collection for pet trade	Rank: 1.3
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Genetics: Research genetics of bog turtle populations to identify genetic markers that can be used to determine the extent of gene flow between sites and identify the origin of confiscated turtles.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Enforce protection of extant bog turtle populations and their habitats using existing regulations.</i>	<i>Rank: 2.0</i>
<i>Action 3</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Share site information and expertise with state and federal law enforcement to increase surveillance of bog turtle sites vulnerable to collection.</i>	<i>Rank: 2.0</i>
Issue 4	Invasive and other problematic species genes and diseases; Invasive non native alien species diseases; Unspecified species: invasive plants causing wetland habitat degradation	Rank: 1.5
<i>Action 1</i>	<i>Technical Assistance; Environmental review; Review of proposed policies and plans: Develop management practices for SGCN, key habitats and abatement of threats on public and private lands; measure the effectiveness of different management practices and adapt as necessary.</i>	<i>Rank: 2.0</i>

River and Bay Turtles

Issue 1	Residential and commercial development; Housing and urban areas: residential development causing beach habitat conversion	Rank: 1.2
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Assess threats to terrapin and develop a conservation plan that focuses on protecting nesting areas.</i>	<i>Rank: 1.7</i>
Issue 2	Transportation and service corridors; Roads and railroads: vehicle collisions	Rank: 1.3
<i>Action 1</i>	<i>Outreach; Recruitment and retention activities; For wildlife watching: Implement a Master Naturalist/Citizen Scientist program of volunteer monitoring and wardening of SGCN and key habitats; recruit people to conduct surveys and protect sites, such as fencing high road-kill areas.</i>	<i>Rank: 1.8</i>
Issue 3	Biological resource use; Fishing and harvesting aquatic resources; Unintentional effects (large scale): commercial fisheries bycatch	Rank: 1.5
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Research/consider requiring TEDs for commercial crabbers and/or conduct survey to see if they are already using them.</i>	<i>Rank: 1.8</i>

Issue 4	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of coordination and sharing of information among regional, state and national data collectors for species that utilize habitats in a broad geographical range.	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management; Database development: Partner with a centralized database (e.g. Avian Knowledge Network) that will enhance Delaware's ability to manage and conserve wide ranging species across broad and biologically meaningful geographic areas. The exchange and integration of data into a permanent centralized data management system is a priority action.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Database development and management: Complete a survey that will be summarized to (1) evaluate how well Delaware is meeting best management practices and standards; (2) identify Delaware's herpetology data management capacity and needs; and 3) identify bottlenecks to integrating data among states for regional and national scale analyses.</i>	<i>Rank: 2.5</i>
Issue 5	Resource management needs; Resource information collection needs: Need for better information on population status, trends and resource needs	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 2.3</i>

Sea Turtles

Issue 1	Resource management needs; Resource information collection needs: Need to develop and support partnerships to enhance data collection efforts	Rank:
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Participate in the National Marine Fisheries Program's sea turtle tagging network by tagging turtles captured in trawl surveys or trap nets or caught in commercial pound nets; outfit a portion of these turtles with sonic transmitters to monitor movements.</i>	<i>Rank: 2.0</i>
Issue 2	Transportation and service corridors; Shipping lanes: Increased shipping and larger ships - increased risk of collisions	Rank: 1.2
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Assess threats to sea turtles such as ship strikes.</i>	<i>Rank: 1.5</i>
Issue 3	Biological resource use; Fishing and harvesting aquatic resources: commercial fishing gear entanglement	Rank: 1.3
<i>Action 1</i>	<i>Direct Management of Natural Resources: Participate in Take Reduction Teams. Fisheries person already on some of these teams but should also have a non-game biologist included.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Direct Management of Natural Resources: Support the rescue of stranded whales and turtles by the Marine Mammal Stranding Center. Participate in the mid-Atlantic disentanglement team's work to free whales and turtles from fishing gear and debris.</i>	<i>Rank: 1.5</i>
Issue 4	Pollution; Industrial and military effluents; Oil spills: Increased shipping and larger ships - potential for oil spills and other hazardous materials	Rank: 1.3
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Assess threats to sea turtles from ship traffic such as oils spills and other hazardous materials.</i>	<i>Rank: 1.2</i>

Issue 5	Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Need for up to date management plan that addresses current issues	Rank: 1.3
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Develop a sea turtle management plan that determines critical areas, assesses threats such as boat strikes and commercial fishing gear entanglement, and recommends management such as no wake zones, critical habitat designations, and commercial fishing gear modifications.</i>	<i>Rank: 1.2</i>
Issue 6	Resource management needs; Management decision needs; Need to provide technical assistance: Need to develop and support partnerships to enhance data collection efforts	Rank: 1.3
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Non governmental organization: Improve partnerships with internal groups conducting strandings and establish partnerships with groups such as the Marine Mammal Stranding Center to support necropsies in order to determine major food sources and cause of death.</i>	<i>Rank: 1.3</i>
Issue 7	Resource management needs; Resource information collection needs: Need for better information on population status, trends, and resource needs	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Determine abundance and distribution of loggerhead turtle and other sea turtles in Delaware Bay.</i>	<i>Rank: 1.8</i>
Issue 8	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of coordination and sharing of information among regional, state and national data collectors for species that utilize habitats in a broad geographical range.	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management: Complete a survey that will be summarized to (1) evaluate how well Delaware is meeting best management practices and standards; (2) identify Delaware's herpetology data management capacity and needs; and 3) identify bottlenecks to integrating data among states for regional and national scale analyses.</i>	<i>Rank: 1.0</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Database development and management; Database development: Partner with a centralized database (e.g. Avian Knowledge Network) that will enhance Delaware's ability to manage and conserve wide ranging species across broad and biologically meaningful geographic areas. The exchange and integration of data into a permanent centralized data management system is a priority action.</i>	<i>Rank: 1.0</i>
Issue 9	Pollution; Domestic and urban waste water; Sewage: Ocean outfall pipes (state waters) - medicinal content endocrine inhibitors, cancer rate increasing and plankton layer degraded by chlorine	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis: Investigate potential impacts to sea turtles</i>	<i>Rank: 1.7</i>
Issue 10	Pollution; Domestic and urban waste water; Sewage: Rehoboth Beach Project - negative impacts of effluent pipes and dredging	Rank: 1.7
<i>Action 1</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Coordinate with NOAA, DNREC, USACOE, USFWS, NMFS</i>	<i>Rank: 1.2</i>

Issue 11 Human intrusions and disturbance: Underwater human activities that cause noise interference with wildlife communication and/or navigation **Rank: 1.7**

Action 1 Coordination and Administration; Coordination Administration; Program/project administrative support: Coordinate with Navy/seismic testing through Fish and Wildlife Coordination Act (USFWS/NMFS), which requires federal agencies or federally funded activities to coordinate with USFWS and/or NMFS. Coordination should include some monitoring for actual impacts to species during underwater activities. **Rank: 1.7**

Action 2 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research impacts of naval activities and seismic testing **Rank: 1.7**

Issue 12 Resource management needs; Resource information collection needs: Wind turbine development - lack of information about sounds from vibration at base, electromagnetic field disruptions, placement (migration paths, dredging). **Rank: 1.8**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of wind turbines on movement and populations. **Rank: 2.0**

Issue 13 Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Various difficulties for sea turtles nesting on Delaware beaches **Rank: 2.2**

Action 1 Planning; Species and habitat management planning; Species management planning: Develop an action plan for when sea turtles nest on Delaware Beaches **Rank: 1.5**

Issue 14 Pollution; Excess energy; Noise pollution: Underwater noise (all sources) **Rank: 2.2**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of underwater noise on sea turtles. **Rank: 1.3**

Sand Specialist Reptiles

Issue 1 Resource management needs; Resource information collection needs: Need for better information on population status, trends and resource needs **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats. **Rank: 1.5**

Issue 2 Biological resource use; Hunting and collecting terrestrial animals; Intentional use: collection for pet trade **Rank: 2.2**

Action 1 Law Enforcement; Law Enforcement; Law Enforcement: Develop a law enforcement plan to protect corn snake breeding occurrences from disturbance and curtail illegal collection, including an [operation game thief= type program to reward people who provide information that assists with apprehending snake collectors. **Rank: 2.2**

Other Reptiles

Issue 1 Biological resource use; Hunting and collecting terrestrial animals; Persecution/control: Nuisance wildlife management impacts on snakes **Rank: 1.5**

Action 1 Education; Student training; Wildlife education: Develop education and outreach for the public about impacts on SGCN **Rank: 1.5**

Groundwater Lotic Amphibians

- Issue 1** **Resource management needs; Resource information collection needs: Need for better information on population status, trends and resource needs** **Rank: 1.3**
- Action 1* *Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.* *Rank: 2.0*
- Issue 2** **Resource management needs; Resource information collection needs: Need for better information on population status, trends and resource needs** **Rank: 1.7**
- Action 1* *Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Determine recharge areas for groundwater-fed breeding pools of longtail salamander and conduct hydrological monitoring.* *Rank: 1.7*
- Action 2* *Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.* *Rank: 2.0*

Ephemeral Wetland Obligate Amphibians

- Issue 1** **Residential and commercial development; Housing and urban areas: residential development causing conversion of forests containing vernal pools** **Rank: 1.0**
- Action 1* *Planning; Species and habitat management planning; Species management planning: Assess threats to tiger salamander populations and critical areas, and develop a plan to mitigate threats and link breeding sites via corridors.* *Rank: 1.5*
- Action 2* *Planning; State Wildlife Action planning: Implement management for SGCN and key habitats on state lands (and Federal, NGO and private lands if appropriate) in order to protect extant occurrences and restore historic occurrences, and to establish new occurrences where feasible.* *Rank: 2.2*
- Issue 2** **Resource management needs; Resource information collection needs: Need for better information on population status, trends and habitat resources and needs** **Rank: 1.7**
- Action 1* *Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.* *Rank: 1.7*

Invertebrates

All Invertebrates

Issue 1	Administrative needs; Coordination Administration needs; Need for coordination for effective program/project management: Lack of coordination with institutional collections	Rank: 1.3
<i>Action 1</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Improve coordination with major collections, especially U of Delaware, DMNH, Philadelphia Academy of Sciences, AMNH, and Smithsonian, including joint projects</i>	<i>Rank: 1.7</i>
Issue 2	Administrative needs; Coordination Administration needs; Need for coordination for effective program/project management: Lack of coordination with Maryland DNR on invert conservation and Delmarva survey efforts	Rank: 1.3
<i>Action 1</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Work closely with MD DNR staf on Delmarva-wide invertebrate survey and management projects</i>	<i>Rank: 1.7</i>
Issue 3	Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of museum specimen data integrated into conservation planning and state databases	Rank: 1.3
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management; Information systems operations and maintenance: Survey major museum collections and the literature for Delaware specimens and compile data in a database of specimens, rather than occurrences. This data can then be used to update Biotics occurrences</i>	<i>Rank: 1.8</i>
Issue 4	Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of specific management planning	Rank: 1.3
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Habitat management planning: Create management plans for various ecological groups of inverts / habitat types to assist land managers and partners</i>	<i>Rank: 1.8</i>
Issue 5	Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of updated S-ranks and EO data	Rank: 1.3
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management; Information systems operations and maintenance: Update all S-Ranks for invertebrates and add all currently available data to Biotics database as well as a specimen database</i>	<i>Rank: 1.2</i>
Issue 6	Administrative needs; Coordination Administration needs; Need for coordination for effective program/project management: Lack of coordination among Delaware experts	Rank: 1.7
<i>Action 1</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Formalize invertebrate advisory group</i>	<i>Rank: 1.0</i>
Issue 7	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of coordination and sharing of information among regional, state and national data collectors for species that utilize habitats in a broad geographical range.	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management; Database development: Partner with a centralized database (e.g. Avian Knowledge Network) that will enhance Delaware's ability to manage and conserve wide ranging species across broad and biologically meaningful geographic areas. The exchange and integration of data into a permanent centralized data management system is a priority action.</i>	<i>Rank: 1.7</i>

Action 2 **Data Collection and Analysis; Database development and management: Complete a survey that will be summarized to (1) evaluate how well Delaware is meeting best management practices and standards; (2) identify Delaware's invertebrate data management capacity and needs; and 3) identify bottlenecks to integrating data among states for regional and national scale analyses.** **Rank: 1.8**

Issue 8 **Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of invertebrate inventory / monitoring of priority habitats for rare inverts** **Rank: 1.7**

Action 1 **Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Conduct invertebrate inventories of the following priority habitats: piedmont seepage wetlands, coastal plain ponds, xeric sand ridges, Atlantic white cedar wetlands, and interdunal swales** **Rank: 2.2**

Issue 9 **Resource management needs; Resource information collection needs: Need for accurate identification of invertebrates** **Rank: 1.7**

Action 1 **Education; Educator/instructor training: Partner with University of Delaware Dept. of Entomology so that students and classes can help identify insects** **Rank: 1.8**

Tiger Beetles

Issue 1 **Climate change and severe weather; Storms and flooding: Loss of foredune habitat due** **Rank: 1.2**

Action 1 **Planning; Land use planning: Identify beach and dune system inland migration areas and conduct land use planning to allow for habitat movement** **Rank: 2.2**

Issue 2 **Natural system modifications; Fire and fire suppression; Trend unknown: Fire-dependent habitat modification** **Rank: 1.3**

Action 1 **Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Monitor tiger beetles in burned and unburned sites, and/or compare pre and post treatment** **Rank: 2.3**

Issue 3 **Human intrusions and disturbance; Recreational activities: Increase in permitted vehicular traffic on beaches** **Rank: 1.3**

Action 1 **Planning; Land use planning: Explore alternative revenue streams to minimize increasing resource impacts of surf vehicle permits** **Rank: 1.8**

Issue 4 **Resource management needs; Resource information collection needs; Lack of up-to-date existing information:** **Rank: 1.5**

Action 1 **Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences** **Rank: 1.5**

Action 2 **Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends.** **Rank: 1.8**

Action 3 **Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Monitor status and trends of the extent and condition of key habitats** **Rank: 2.3**

Issue 5 **Natural system modifications; Other ecosystem modifications: Beach replenishment** **Rank: 1.7**

Action 1 **Planning; Land use planning: Evaluate all beach replenishment projects for effects on potential tiger beetle habitat** **Rank: 2.5**

Issue 6	Natural system modifications; Other ecosystem modifications: Loss of forest gaps	Rank: 1.7
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Produce and distribute a guide to forest management for tiger beetles</i>	<i>Rank: 1.3</i>
Issue 7	Climate change and severe weather; Sea level rise: Loss of foredune habitat due	Rank: 1.8
<i>Action 1</i>	<i>Planning; Land use planning: Identify beach and dune system inland migration areas and conduct land use planning to allow for habitat movement</i>	<i>Rank: 2.2</i>
Issue 8	Human intrusions and disturbance; Recreational activities: ORV and foot traffic in dune systems	Rank: 2.0
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Protect interdunal wetlands and dunes from disturbance</i>	<i>Rank: 2.0</i>
Issue 9	Residential and commercial development; Housing and urban areas: residential development causing beach habitat conversion	Rank: 2.0
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Develop a management plan for beach-dwelling tiger beetles that landowners and land managers can follow if beetles are found on their property.</i>	<i>Rank: 2.0</i>

Virginia Big-headed Tiger Beetle

Tetracha virginica

Issue 1	Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Population status unknown	Rank: 1.3
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Conduct light-trapping surveys for this species in potential habitat</i>	<i>Rank: 2.0</i>

Other Beetles

Issue 1	Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Lack of baseline inventory data	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Complete baseline inventory of Delaware forest-associated beetles, with focal taxa Carabidae, Cerambycidae, Lucanidae, as these groups are well known and often affected by forest quality and fragmentation</i>	<i>Rank: 2.3</i>

American Burying Beetle

Nicrophorus americanus

Issue 1	Resource management needs; Resource information collection needs; Lack of up-to-date existing information:	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Conduct presence/absence surveys in potential habitat, giving priority to sites with historic occurrences.</i>	<i>Rank: 1.7</i>

Seth Forest Water Scavenger Beetle

Hydrochus spangleri

Issue 1	Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of species-specific planning for globally imperiled species	Rank: 1.3
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Complete species-specific management plan</i>	<i>Rank: 1.2</i>

Freshwater Beetles

- Issue 1** Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Lack of baseline inventory data **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Complete baseline inventory of Delaware water beetles and their habitat associations **Rank: 2.3**

Fireflies

- Issue 1** Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Lack of complete baseline inventory **Rank: 1.3**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Complete a baseline inventory of Delaware Laympyridae **Rank: 1.7**

Bethany Beach Firefly

Photuris bethaniensis

- Issue 1** Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of species-specific planning for globally imperiled species **Rank: 1.3**
- Action 1* Planning; Species and habitat management planning; Species management planning: Complete species-specific management plan **Rank: 1.2**
- Issue 2** Climate change and severe weather; Sea level rise: loss of interdunal swales due to sea level rise **Rank: 1.8**
- Action 1* Planning; Land use planning: Identify beach and dune system inland migration areas and conduct land use planning to allow for habitat movement **Rank: 2.2**
- Issue 3** Human intrusions and disturbance; Recreational activities: ORV and foot traffic in dune systems **Rank: 2.0**
- Action 1* Law Enforcement; Law Enforcement; Law Enforcement: Protect interdunal wetlands and dunes from disturbance **Rank: 2.0**
- Issue 4** Residential and commercial development; Housing and urban areas: residential development causing beach habitat conversion **Rank: 2.0**
- Action 1* Planning; Species and habitat management planning; Species management planning: Develop a management plan for beach-dwelling tiger beetles that landowners and land managers can follow if beetles are found on their property. **Rank: 2.0**

A Firefly

Photuris mysticalampas

- Issue 1** Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Population status unknown **Rank: 1.3**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Inventory for additional occurrences **Rank: 1.5**
- Issue 1** Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of taxa- or guild-specific habitat restoration guidelines **Rank: 1.5**
- Action 1* Planning; Species and habitat management planning; Habitat management planning: Design site-specific planting guidelines for early successional habitat restoration on state lands to ensure maximum benefit for lepidoptera **Rank: 1.7**

- Issue 2** Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of taxa- or guild-specific habitat restoration guidelines **Rank: 1.7**
- Action 1* Planning; Species and habitat management planning; Habitat management planning: Design site-specific planting guidelines for early successional habitat restoration on state lands to ensure maximum benefit for lepidoptera **Rank: 1.7**

All Butterflies and Skippers

- Issue 1** Resource management needs; Management decision needs; Need to provide technical assistance: Lack of technical assistance to land managers for habitat management of rare invertebrates **Rank: 1.8**
- Action 1* Planning; Species and habitat management planning; Species management planning: Provide relevant EO data, habitat needs, and dispersal information to partners and land managers to facilitate conservation of metapopulations **Rank: 1.8**
- Issue 2** Resource management needs; Management decision needs; Need to provide technical assistance: Lack of technical guidance on habitat creation for other DNREC Programs **Rank: 2.0**
- Action 1* Technical Assistance; Technical assistance; Technical assistance: Provide habitat management planning guidance and technical assistance within DNREC, e.g. to the HSCA Advisory Committee, stormwater program, etc **Rank: 2.2**

Non-tidal Forested Wetland Butterflies

- Issue 1** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences of state endangered and highly G-ranked species to determine population status and trends. **Rank: 1.7**

Frosted Elfin

Callophrys irus

- Issue 1** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences of state endangered and highly G-ranked species to determine population status and trends. **Rank: 1.7**
- Issue 2** Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of species specific planning **Rank: 2.3**
- Action 1* Planning; Species and habitat management planning; Species management planning: Develop management plans for frosted elfin and work with land managers to incorporate these plans on public and private lands where this species occurs. **Rank: 1.8**

Bronze Copper

Lycaena hyllus

- Issue 1** Agriculture and aquaculture: ditching & draining for agriculture causing wetland habitat degradation **Rank: 1.2**
- Action 1* Data Collection and Analysis: Determine critical areas for bronze copper. **Rank: 1.8**

Issue 2 Agriculture and aquaculture: ditching & draining for agriculture causing wetland habitat degradation **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring Fish and wildlife populations: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats. **Rank: 1.8**

Black Dash

Euphyes conspicua

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences of state endangered and highly G-ranked species to determine population status and trends. **Rank: 1.7**

Baltimore Checkerspot

Euphydryas phaeton

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences of state endangered and highly G-ranked species to determine population status and trends. **Rank: 1.7**

Issue 2 Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of regional species management cooperation **Rank: 1.5**

Action 1 Planning; Species and habitat management planning; Species management planning: Collaborate with MDDNR on Baltimore Checkerspot recovery team efforts **Rank: 1.7**

Monarch

Danaus plexippus

Issue 1 Agriculture and aquaculture; Annual and perennial nontimber crops: Decline of *Asclepias* sp. **Rank: 1.3**

Action 1 Direct Management of Natural Resources; Planting seeding; Herbaceous vegetation: Plant *Asclepias* sp., especially *A. syriaca* at all suitable early successional state wildlife areas **Rank: 1.2**

Mulberry Wing

Poanes massasoit massasoit

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences of state endangered and highly G-ranked species to determine population status and trends. **Rank: 1.7**

Myrina Fritillary

Boloria selene myrina

Issue 1 Natural system modifications; Other ecosystem modifications: wetland habitat degradation due to natural succession **Rank: 1.3**

Action 1 Direct Management of Natural Resources; Vegetation management: Implement species and habitat management for s-b fritillary - e.g. retarding succession in wetlands - on state lands (and Federal, NGO and private lands as appropriate), focusing on extant and historic occurrences; determine the efficacy of different management practices. **Rank: 2.7**

Issue 2 Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: **Rank: 1.7**

Action 1 Planning; Species and habitat management planning; Species management planning: **Rank: 2.3**
Develop models for designating s-b fritillary critical areas based on species occurrence.

Issue 3 Resource management needs; Resource information collection needs: **Rank: 2.0**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; **Rank: 2.2**
Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.

Rare Skipper

Problema bulenta

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; **Rank: 1.7**
Population assessment: Monitor extant SGCN occurrences of state endangered and highly G-ranked species to determine population status and trends.

Issue 2 Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of species specific planning **Rank: 2.3**

Action 1 Planning; Species and habitat management planning; Species management planning: **Rank: 1.8**
Develop management plans for frosted elfin and work with land managers to incorporate these plans on public and private lands where this species occurs.

Chermock's Mulberry Wing

Poanes massasoit chermocki

Issue 1 Agriculture and aquaculture: ditching & draining for agriculture causing wetland habitat degradation **Rank: 1.2**

Action 1 Data Collection and Analysis: Determine critical areas. **Rank: 1.5**

Issue 2 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**

Action 1 : Monitor extant SGCN occurrences of state endangered and highly G-ranked species to determine population status and trends. **Rank:**

Checkered White

Pontia protodice

Issue 1 Resource management needs; Resource information collection needs: **Rank: 1.8**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; **Rank: 1.8**
Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.

Estuarine / Marine Invertebrates

Issue 1 Transportation and service corridors; Shipping lanes: Dredging-timing sensitive to benthic feeders presence **Rank: 1.5**

Action 1 Coordination and Administration; Coordination Administration: Consider estuarine and marine species and habitat impacts from dredging. **Rank: 1.5**

Issue 2 **Pollution; Domestic and urban waste water; Sewage: Rehoboth Beach Project - negative impacts of effluent pipes and dredging** **Rank: 2.0**

Action 1 *Coordination and Administration; Coordination Administration; Program/project administrative support: Coordinate with NOAA, DNREC, USACOE, USFWS, NMFS* *Rank: 1.5*

Issue 3 **Natural system modifications; Other ecosystem modifications: Sand grain size used for beach nourishment eliminating intertidal inhabitants.** **Rank: 2.0**

Action 1 *Coordination and Administration; Coordination Administration: Sand grain - size requirement for beach nourishment* *Rank: 1.8*

Horseshoe Crab

Limulus polyphemus

Issue 1 **Climate change and severe weather; Habitat shifting and alteration: natural beach dynamics causing loss of spawning habitat** **Rank: 1.0**

Action 1 *Data Collection and Analysis: Research the potential benefit of jetties for protecting spawning beaches from wave action.* *Rank: 2.0*

Issue 2 **Climate change and severe weather: sea level rise** **Rank: 1.0**

Action 1 *Direct Management of Natural Resources: Restore or improve spawning habitat with beach replenishment, provided measures are implemented to minimize adverse project-related impacts on horseshoe crabs and other resources.* *Rank: 1.8*

Issue 3 **Natural system modifications; Dams and water management use: Rip-rap, intended to stabilize the shoreline, has created a barrier for spawning horseshoe crabs (i.e., along Port Mahon Road)** **Rank: 1.2**

Action 1 *Direct Management of Natural Resources; Hazard or infrastructure removal; Shoreline armoring removal: Rehabilitate a portion of hardened shorelines to balance the needs of wildlife resources and infrastructure protection* *Rank: 1.8*

Issue 4 **Resource management needs; Resource information collection needs: Need for better public involvement and increased resource information gathering** **Rank: 1.5**

Action 1 *Outreach; Partner stakeholder engagement; Others: Develop a Citizen scientist program to assist with horseshoe crab monitoring* *Rank: 2.2*

Issue 5 **Biological resource use; Fishing and harvesting aquatic resources: commercial fisheries over-harvesting** **Rank: 1.7**

Action 1 *Technical Assistance; Environmental review; Review of proposed policies and plans: Review current harvest restrictions and ensure they are adequate* *Rank: 1.8*

Action 2 *Law Enforcement; Law Enforcement; Law Enforcement: Ensure enforcement of regulations is adequate* *Rank: 2.0*

Action 3 *Law Enforcement; Law Enforcement; Law Enforcement: Manage populations through appropriate coastwide measures to provide the necessary quantities of adults and eggs for fish and wildlife resources.* *Rank: 2.0*

Action 4 *Law Enforcement; Law Enforcement; Law Enforcement: Regulate horseshoe crab harvest by restricting the harvest method; limiting daily possession, catch, and/or landings; limiting harvest seasons; limiting the location of harvest; or limiting the number of harvesters.* *Rank: 2.0*

American Oyster

Crassostrea virginica

- Issue 1** Invasive and other problematic species genes and diseases; Diseases of unknown cause: Infectious diseases **Rank: 1.2**
- Action 1* Education; Educator/instructor training: Provide training for DFW staff in procedures for responding to disease outbreaks **Rank: 2.0**

Freshwater Mussels

- Issue 1** Natural system modifications; Dams and water management use: Cumulative impact of dams **Rank: 1.2**
- Action 1* Species Reintroduction and Stocking; Native species restoration; Translocation: Reintroduce native freshwater mussel species by translocation of existing stock where appropriate **Rank: 1.7**
- Issue 2** Pollution: Cumulative impact of pollution **Rank: 1.5**
- Action 1* Species Reintroduction and Stocking; Native species restoration; Translocation: Reintroduce native freshwater mussel species by translocation of existing stock where appropriate **Rank: 1.7**
- Issue 3** Natural system modifications; Dams and water management use: Dams limit dispersal and recolonization of historically occupied stream reaches **Rank: 1.5**
- Action 1* Direct Management of Natural Resources; Dam and barrier removal; Dam removal: Remove dams impeding recolonization of historically occupied or otherwise suitable stream reaches, except in areas where such removal may result in destruction of sensitive downstream populations via mobilization of sediments, pollutants, etc. **Rank: 2.0**
- Issue 4** Climate change and severe weather; Storms and flooding: Increased flood frequency **Rank: 1.7**
- Action 1* Species Reintroduction and Stocking; Native species restoration; Translocation: Reintroduce native freshwater mussel species by translocation of existing stock where appropriate **Rank: 1.7**
- Issue 5** Climate change and severe weather; Sea level rise: Saltwater intrusion from sea level rise **Rank: 1.7**
- Action 1* Species Reintroduction and Stocking; Native species restoration; Translocation: Reintroduce native freshwater mussel species by translocation of existing stock where appropriate **Rank: 1.7**
- Issue 6** Resource management needs; Resource information collection needs: Lack of current population information on freshwater mussels **Rank: 1.8**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Survey existing populations and EOs **Rank: 2.0**

Freshwater Aquatic Insects

- Issue 1** Resource management needs; Resource information collection needs: Lack of information on macroinvertebrates, specifically mayflies as indicators of rare habitats. **Rank: 1.3**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Gather baseline information on macroinvertebrates. **Rank: 1.7**
- Issue 2** Resource management needs; Resource information collection needs: **Rank: 1.7**
- Action 1* Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Assess water quality of headwaters and seeps **Rank: 1.7**

Issue 3	Resource management needs; Resource information collection needs: Lack of baseline inventory for Tipulidae	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Conduct baseline inventory for Tipulidae in collaboration with Chen Young or John Gelhaus</i>	<i>Rank: 1.8</i>
Issue 4	Resource management needs; Resource information collection needs: Lack of current species occurrence data on freshwater invertebrates	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Survey headwater streams and seepage swamps for freshwater aquatic invertebrates</i>	<i>Rank: 1.3</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Identify high quality streams for targeted inventory effort</i>	<i>Rank: 1.5</i>
Issue 5	Resource management needs; Resource information collection needs: Lack of information on groundwater invertebrates	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Survey hypotelminorheic seepage areas statewide for groundwater-associated invertebrates, using methodology of recent Maryland study (Culver et al 2012)</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Survey Hockessin karst system for groundwater-associated invertebrates</i>	<i>Rank: 1.7</i>
Issue 6	Invasive and other problematic species genes and diseases; Problematic species diseases of unknown origin; Unspecified species: Fish stocking effects on invertebrates	Rank: 2.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Determine effects of fish stocking on native invertebrate populations</i>	<i>Rank: 1.5</i>

Forest Tree Canopy feeding Moths

Issue 1	Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: White-tailed Deer (<i>Odocoileus virginianus</i>) overbrowsing reducing tree diversity and limiting canopy tree regeneration	Rank: 1.2
<i>Action 1</i>	<i>: Reduce white-tailed deer populations to ecologically sustainable levels that will minimize impacts on plant biodiversity (at least <25 deer / sq mile)</i>	<i>Rank: 2.0</i>
Issue 2	Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences</i>	<i>Rank: 1.7</i>

Forest Understory feeding Moths

Issue 1	Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: White-tailed Deer (<i>Odocoileus virginianus</i>) overbrowsing reducing shrub and forb diversity and abundance thus eliminating hostplant resources and lepidoptera metapopulations	Rank: 1.2
<i>Action 1</i>	<i>: Reduce white-tailed deer populations to ecologically sustainable levels that will minimize impacts on plant biodiversity (at least <25 deer / sq mile)</i>	<i>Rank: 2.0</i>

- Issue 2** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Freshwater Wetland Forb feeding Moths

- Issue 1** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Meadow Forb feeding Moths

- Issue 1** Invasive and other problematic species genes and diseases; Problematic native species diseases; Named species: White-tailed Deer (*Odocoileus virginianus*) overbrowsing reducing shrub and forb diversity and abundance thus eliminating hostplant resources and lepidoptera metapopulations **Rank: 1.2**
- Action 1* : Reduce white-tailed deer populations to ecologically sustainable levels that will minimize impacts on plant biodiversity (at least <25 deer / sq mile) **Rank: 2.0**
- Issue 2** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**
- Issue 3** Resource management needs; Management decision needs; Need to provide technical assistance: Lack of technical guidance for land managers **Rank: 1.7**
- Action 1* : Create meadow restoration and creation technical guidance for use by state and private land managers that specifically references SGCN lepidoptera and native bee habitat and resource needs **Rank: 1.3**

Other Moths

- Issue 1** Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of genus-specific planning **Rank: 1.5**
- Action 1* Planning; Species and habitat management planning; Species management planning: Complete a management plan for genus *Papaipema* **Rank: 1.7**
- Issue 2** Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Lack of complete baseline inventory **Rank: 1.7**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Complete baseline inventory of moth genera *Catocala* and *Zale* begun by K. Heckscher **Rank: 1.7**

All Odonates

- Issue 1** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: State Biotics database needs updating with more current information from taxa experts **Rank: 1.7**
- Action 1* Data Collection and Analysis; Database development and management; Information systems operations and maintenance: Update Biotics Eos to reflect available information **Rank: 1.2**
- Issue 2** Invasive and other problematic species genes and diseases; Problematic species diseases of unknown origin; Unspecified species: Fish stocking effects on invertebrates **Rank: 2.8**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Determine effects of fish stocking on native invertebrate populations **Rank: 1.5**

Low Gradient Small Sream and Seep Odonates

- Issue 1** Residential and commercial development; Commercial and industrial areas: Commercial development impacts to small, non-jurisdictional seep and stream habitats **Rank: 1.3**
- Action 1* Coordination and Administration: Support state-level efforts to improve isolated wetland protection **Rank: 1.8**
- Issue 2** Residential and commercial development; Housing and urban areas: Residential development impacts to small, non-jurisdictional seep and stream habitats **Rank: 1.3**
- Action 1* Coordination and Administration: Support state-level efforts to improve county land use practices **Rank: 1.8**

Burgundy Bluet

Enallagma dubium

- Issue 1** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Pale Bluet

Enallagma pallidum

- Issue 1** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Banner Clubtail

Gomphus apomyius

- Issue 1** Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Midland Clubtail***Gomphus fraternus***

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Sable Clubtail***Gomphus rogersi***

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Taper-tailed Darner***Gomphaeschna antilope***

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Brown Spiketail***Cordulegaster bilineata***

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Selys' Sundragon***Helocordulia selysii***

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Elfin Skimmer***Nannothemis bella***

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Treetop Emerald

Somatochlora provocans

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Laura's Clubtail

Stylurus laurae

Issue 1 Resource management needs; Resource information collection needs; Lack of up-to-date existing information: Lack of recent monitoring of element occurrences for Endangered odonates **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor existing element occurrences **Rank: 1.7**

Pollinators

Issue 1 : contaminants from residential pesticides having lethal effects **Rank:**

Action 1 : Educate homeowners about Integrated Pest Management, plant diversity in the home landscape, and pollinators **Rank:**

Issue 2 Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Lack of baseline inventory data for solitary bees and wasps **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Conduct baseline inventory of solitary bees and wasps, including existing data compilation, museum specimens, and targeted field inventory **Rank: 1.5**

Issue 3 Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Lack of baseline inventory of *Bombus* sp. **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Conduct baseline inventory of bumblebees, including existing data compilation, museum specimens, and targeted field inventory **Rank: 1.5**

Issue 4 Resource management needs; Resource information collection needs; Lack of initial baseline inventory: Lack of baseline inventory of hoverflies (Diptera: Syrphidae), which are frequently important pollinators **Rank: 1.3**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: Conduct baseline inventory of syrphid flies, including existing data compilation, museum specimens, and targeted field inventory **Rank: 1.8**

Issue 5 Resource management needs; Resource information collection needs: Lack of baseline inventory of land snails and their habitat associations **Rank: 1.5**

Action 1 Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Baseline inventory: **Rank: 2.0**

Issue 6 Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Lack of management planning for *Bombus* **Rank: 1.5**

Action 1 Planning; Species and habitat management planning; Species management planning: Complete management plan for *Bombus* sp. In Delaware **Rank: 1.3**

Issue 7	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of technical guidance for land managers	Rank: 1.5
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Habitat management planning: Create habitat restoration and creation technical guidance for use by state and private land managers that specifically references SGCN lepidoptera and native bee habitat and resource needs</i>	<i>Rank: 1.3</i>
Issue 8	Residential and commercial development; Housing and urban areas: Residential insecticide and herbicide use having direct and indirect effects on pollinators	Rank: 1.5
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Educate homeowners about Integrated Pest Management, plant diversity in the home landscape, and pollinators</i>	<i>Rank: 2.2</i>
Issue 9	Agriculture and aquaculture; Annual and perennial nontimber crops: Incompatible agricultural practices reducing available early successional habitat	Rank: 1.7
<i>Action 1</i>	<i>Technical Assistance; Technical assistance: Create technical guidance and practice standards for pollinator habitat creation for use in Delaware Landowner Incentive Program and/or adopt existing Delaware NRCS Conservation Cover 327 Pollinator Practices</i>	<i>Rank: 1.7</i>
<i>Action 2</i>	<i>Coordination and Administration; Incentives: Increase cost-share and rental payments for the Delaware Landowner Incentive Program Upland Early Successional Habitat Enhancement Practice</i>	<i>Rank: 2.5</i>
Issue 10	Invasive and other problematic species and genes: invasive plants causing habitat degradation	Rank: 1.7
<i>Action 1</i>	<i>Direct Management of Natural Resources; Planting seeding; Herbaceous vegetation: Restore degraded habitat by planting a diversity and abundance of nectar and pollen laden native plants.</i>	<i>Rank: 2.2</i>
Issue 11	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of technical guidance for land managers	Rank: 1.7
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Habitat management planning: Create habitat restoration and creation technical guidance for use by state and private land managers that specifically references SGCN lepidoptera and native bee habitat and resource needs</i>	<i>Rank: 1.3</i>
Issue 12	Pollution; Agricultural and forestry effluents; Herbicides and pesticides: Negative effects of neonicotinoids on pollinators	Rank: 1.8
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Target lawn care industries, golf courses, farmers and agriculture to reduce use of pesticide and fertilizer and promote green solutions.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Target retail businesses to reduce selling of harmful pesticides (i.e., Home Depot signed agreement to not sell certain ones).</i>	<i>Rank: 2.0</i>
Issue 13	Pollution; Excess energy; Light pollution: Outdoor lighting	Rank: 2.3
<i>Action 1</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities to develop education and outreach for homeowners, business owners and municipalities to promote reduced use of outdoor lighting</i>	<i>Rank:</i>
<i>Action 2</i>	<i>Outreach; Partner stakeholder engagement; Others: Work with electric utilities and building code and public safety officials to develop design standards for outdoor lighting that minimizes stray light</i>	<i>Rank: 1.7</i>

Action 3 Outreach; Partner stakeholder engagement; Others: Work with electric utilities to develop education and outreach for homeowners, business owners and municipalities to promote reduced use of outdoor lighting Rank: 1.7

Monarch

Danaus plexippus

Issue 1 Residential and commercial development: Monarch Butterfly (*Danaus plexippus*) population decline Rank: 1.7

Action 1 Land and Water Rights Acquisition and Protection: Follow Federal guidelines to address pollinator conservation; Address the decline in Milkweed, breeding habitat, etc. Rank: 1.5

Issue 2 Agriculture and aquaculture: Monarch Butterfly (*Danaus plexippus*) population decline Rank: 1.8

Action 1 Planning: Follow Federal guidelines to address pollinator conservation; Address the decline in Milkweed, breeding habitat, etc. Rank: 1.5

Mammals

Delmarva Fox Squirrel

Sciurus niger cinereus

Issue 1	Residential and commercial development; Housing and urban areas: residential development causing forest habitat conversion	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Baseline inventory: Determine habitat availability and use for fox squirrel. Use established GIS component to go onsite and evaluate locations.</i>	<i>Rank: 1.5</i>
Issue 2	Residential and commercial development; Housing and urban areas: residential development causing forest habitat conversion	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Population assessment: Monitor extant SGCN occurrences to determine population status and trends. Conduct surveys for additional occurrences in potential habitats, giving priority to sites with historic occurrences. Monitor status and trends of the extent and condition of key habitats.</i>	<i>Rank: 1.6</i>
<i>Action 2</i>	<i>Species Reintroduction and Stocking; Native species restoration; Translocation: Translocate fox squirrels into suitable habitats to maintain population viability.</i>	<i>Rank: 2.0</i>
<i>Action 3</i>	<i>Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about SGCN biology, key habitat ecology, threats and conservation actions.</i>	<i>Rank: 2.4</i>
<i>Action 4</i>	<i>Land and Water Rights Acquisition and Protection; Private lands agreements: Pursue non-regulatory land protection alternatives, e.g. easements, for fox squirrel.</i>	<i>Rank: 2.4</i>
Issue 3	Agriculture and aquaculture; Annual and perennial nontimber crops; Scale unknown: agriculture causing forest habitat conversion	Rank: 2.3
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat: Monitor extent of forest removed for agriculture that falls within DFS travel corridors or occupied habitat.</i>	<i>Rank: 2.3</i>
Issue 4	Biological resource use; Hunting and collecting terrestrial animals; Unintentional effects: illegal hunting or hunter confusion with gray squirrel	Rank: 2.3
<i>Action 1</i>	<i>Education: Develop education and outreach strategies that provide information to hunters about DFS in order to minimize the possibility of an accidental killing.</i>	<i>Rank: 2.3</i>
Issue 5	Residential and commercial development; Housing and urban areas: residential development causing forest habitat conversion	Rank: 2.5
<i>Action 1</i>	<i>Law Enforcement; Law Enforcement; Law Enforcement: Enforce compliance with existing Federal laws regarding fox squirrel.</i>	<i>Rank: 2.5</i>

Marine Mammals

Issue 1	Pollution; Excess energy; Noise pollution: Increased shipping and larger ships - effects of noise	Rank: 1.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of underwater noise on marine mammals.</i>	<i>Rank: 1.0</i>

Issue 2	Biological resource use; Fishing and harvesting aquatic resources; Unintentional effects (large scale): commercial fishing gear entanglement	Rank: 1.5
<i>Action 1</i>	<i>Direct Management of Natural Resources; Hazard or infrastructure removal: Support the rescue of stranded whales by the Marine Mammal Stranding Center. Participate in the mid-Atlantic disentanglement team's work to free whales and other marine mammals from fishing gear and debris. Participate in Take Reduction Teams. Fisheries person already on some of these teams, but there should also be a non-game biologist included.</i>	<i>Rank: 1.5</i>
Issue 3	Pollution; Industrial and military effluents; Oil spills: Increased shipping and larger ships - potential for oil spills and other hazardous materials	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Assess threats to marine mammals from ship traffic such as oils spills and other hazardous materials.</i>	<i>Rank: 1.5</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Have a plan in place to rescue/rehab oiled/contaminated marine mammals.</i>	<i>Rank: 1.5</i>
Issue 4	Resource management needs; Resource information collection needs: Lack of information about effects of underwater noise	Rank: 1.5
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of underwater noise on marine mammals.</i>	<i>Rank: 1.5</i>
Issue 5	Transportation and service corridors; Shipping lanes: Increased shipping and larger ships - increased risk of collisions	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Assess threats to marine mammals such as ship strikes.</i>	<i>Rank: 1.7</i>
Issue 6	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of coordination and sharing of information among regional, state and national data collectors for species that utilize habitats in a broad geographical range.	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management: Complete a survey that will be summarized to (1) evaluate how well Delaware is meeting best management practices and standards; (2) identify Delaware's marine mammal data management capacity and needs; and 3) identify bottlenecks to integrating data among states for regional and national scale analyses.</i>	<i>Rank: 1.7</i>
Issue 7	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of staff for the purpose of coordination and sharing of information among regional, state and national data collectors for species that utilize habitats in a broad geographical range.	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management: Ensure that there is staff dedicated to transferring data to the centralized database with NMFS/NOAA.</i>	<i>Rank: 1.7</i>
Issue 8	Resource management needs; Management decision needs; Lack of fish, wildlife and/or habitat planning: Need to coordinate recovery planning of whale populations with other agencies	Rank: 1.7
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Work with the National Marine Fisheries Service to implement whale recovery plans as needed. Develop a state whale conservation plan.</i>	<i>Rank: 1.7</i>

Issue 9	Resource management needs; Resource information collection needs: Wind turbine development - lack of information about sounds from vibration at base, electromagnetic field disruptions, placement (migration paths, dredging).	Rank: 1.7
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of wind turbines on movement and populations.</i>	<i>Rank: 1.7</i>
Issue 10	Pollution; Domestic and urban waste water; Sewage: Ocean outfall pipes (state waters) - medicinal content endocrine inhibitors, cancer rate increasing	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis: Research potential impacts of sewage in DE Waters on marine mammals (and sea turtles)</i>	<i>Rank: 1.8</i>
Issue 11	Pollution; Domestic and urban waste water; Sewage: Ocean outfall pipes (state waters) - plankton layer degraded by chlorine and other sewage-related inputs	Rank: 1.8
<i>Action 1</i>	<i>Data Collection and Analysis: Conduct literature search and laboratory research on the effects of sewage on plankton</i>	<i>Rank: 1.8</i>
Issue 12	Pollution; Domestic and urban waste water; Sewage: Rehoboth Beach Project - negative impacts of effluent pipes, dredging, and other potential effluent disposal projects	Rank: 1.8
<i>Action 1</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Coordinate with NOAA, DNREC, USACOE, USFWS, NMFS</i>	<i>Rank: 1.8</i>
Issue 13	Biological resource use; Fishing and harvesting aquatic resources; Unintentional effects (large scale): commercial fishing gear entanglement	Rank: 1.8
<i>Action 1</i>	<i>Planning; Species and habitat management planning; Species management planning: Develop a state management plan for whales and other marine mammals that protects critical migration routes, and participate in whale (and other marine mammal) recovery team work.</i>	<i>Rank: 1.8</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Research whale (and other marine mammal) interactions with commercial fishing gear.</i>	<i>Rank: 1.8</i>
Issue 14	Transportation and service corridors; Shipping lanes: Ship strikes	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations; Movement: Assess threats to whales and other marine mammals from impacts such as ship strikes</i>	<i>Rank:</i>
Issue 15	Human intrusions and disturbance; War, civil unrest, and military exercises: Underwater human activities - Naval activities/seismic testing	Rank: 2.0
<i>Action 1</i>	<i>Coordination and Administration; Coordination Administration; Program/project administrative support: Coordinate with Navy/seismic testing through Fish and Wildlife Coordination Act (USFWS/NMFS), which requires federal agencies or federally funded activities to coordinate with USWFS and/or NMFS.</i>	<i>Rank: 2.0</i>

Bobcat

Lynx rufus

Issue 1	Biological resource use; Hunting and collecting terrestrial animals: Severe decline in population due to cumulative effects of over-hunting.	Rank: 1.8
<i>Action 1</i>	<i>Species Reintroduction and Stocking:</i>	<i>Rank: 1.8</i>

All Small Mammals

- Issue 1** **Resource management needs; Resource information collection needs: Lack of information about status of these species (moles, shrews, rodents and weasels are lacking data)** **Rank: 1.5**
- Action 1* *Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Conduct surveys to determine the status of small mammals in Delaware* *Rank: 1.5*

All Bats

- Issue 1** **Invasive and other problematic species genes and diseases; Invasive non native alien species diseases: Predation by domestic pets and subsidized predators** **Rank: 1.3**
- Action 1* *Direct Management of Natural Resources; Invasive species control: Control feral cats and keep house cats indoors to protect bats.* *Rank: 1.3*
- Action 2* *Education; Student training; Wildlife education: Develop education and outreach for the general public about the impacts of subsidized predators on SGCN.* *Rank: 1.3*
- Action 3* *Land and Water Rights Acquisition and Protection; Land acquisition: Preserve bat roost sites within forest cut blocks. Increase the ratio of edge to open areas to provide higher quality roosting areas and foraging habitats.* *Rank: 1.3*
- Action 4* *Coordination and Administration; Incentives: Provide incentives for landowners to control subsidized predators on private property by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.* *Rank: 1.3*
- Action 5* *Direct Management of Natural Resources; Invasive species control; Animal-mechanical: Work with conservation partners to control subsidized predators on public and NGO conservation lands by reducing subsidies (refuges, food sources), erecting exclosures, or by removal of individuals.* *Rank: 1.3*
- Action 6* *Outreach; Partner stakeholder engagement; Non governmental organization: Work with retailers and NGOs to develop education and outreach for pet owners to minimize the impacts of pets on SGCN, such as "Cats Indoors."* *Rank: 1.3*
- Issue 2** **Biological resource use; Hunting and collecting terrestrial animals; Persecution/control: Nuisance wildlife management impacts on bats** **Rank: 1.5**
- Action 1* *Education; Educator/instructor training: Enhance training for pest control companies to minimize impacts on SGCN and increase educational opportunities for NAWCO.* *Rank: 1.5*
- Issue 3** **Biological resource use; Hunting and collecting terrestrial animals; Persecution/control: nuisance control** **Rank: 1.7**
- Action 1* *Education; Student training; Wildlife education: Implement outreach and education programs - on-site programs and exhibits; print and video materials; web-based products - about timing for exclusions and importance of bats in ecosystem.* *Rank: 1.7*
- Issue 4** **Energy production and mining; Renewable energy: Wind facilities collisions** **Rank: 1.7**
- Action 1* *Technical Assistance; Technical assistance; Technical assistance: Support research for improving the design of wind facilities to minimize impacts to SGCN.* *Rank: 1.7*
- Action 2* *Outreach; Partner stakeholder engagement; Others: Work with energy companies to develop standards for the placement of wind energy towers to avoid SGCN nesting colonies, roosts, migration routes, movement corridors and other critical areas.* *Rank: 1.7*

Issue 5	Biological resource use; Logging and wood harvesting: Accidental removal of bat roost trees in forest blocks.	Rank: 2.0
<i>Action 1</i>	<i>Land and Water Rights Acquisition and Protection; Land acquisition: Protect bat roost trees within forest blocks. Increase the ratio of edge to open areas to provide higher quality roosting areas and foraging habitats.</i>	<i>Rank: 2.0</i>
Issue 6	Agriculture and aquaculture; Annual and perennial nontimber crops; Scale unknown: contaminants from agricultural runoff having lethal or sub-lethal effects	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research impacts of pesticides (for gypsy moths and other forest pests) on forest bats.</i>	<i>Rank: 2.0</i>
Issue 7	Resource management needs; Management decision needs; Need to provide technical assistance: Lack of coordination and sharing of information among regional, state and national data collectors for species that utilize habitats in a broad geographical range.	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Database development and management: Complete a survey that will be summarized to identify Delaware's bat data management capacity and needs and identify bottlenecks to integrating data among states for regional and national scale analyses.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Database development and management; Database development: Continue to partner with a centralized database (e.g., NABat) that will enhance Delaware's ability to manage and conserve wide ranging species across broad and biologically meaningful geographic areas. The exchange and integration of data into a permanent centralized data management system is a priority action.</i>	<i>Rank: 2.0</i>
Issue 8	Biological resource use; Logging and wood harvesting; Intentional use (large scale): Loss of habitat due to forestry operations	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research best management practices for forest bats and the effects of silvicultural practices on forest bat habitat.</i>	<i>Rank: 2.0</i>
<i>Action 2</i>	<i>Data Collection and Analysis; Research survey or monitoring habitat; Monitoring: Review and possibly implement BMPS as they are developed by National Forest Service and USFWS/state teams, particularly concerning silvicultural practices.</i>	<i>Rank: 2.0</i>
Issue 9	Pollution; Agricultural and forestry effluents; Herbicides and pesticides: Pesticides for invasive species having negative impacts on cave bats	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research impacts of pesticides (for gypsy moths and other forest pests) on cave bats.</i>	<i>Rank: 2.0</i>
Issue 10	Resource management needs; Resource information collection needs: Wind turbine development - lack of information about sounds from vibration at base, electromagnetic field disruptions, placement (migration paths, dredging).	Rank: 2.0
<i>Action 1</i>	<i>Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research effects of wind turbines on movement and populations.</i>	<i>Rank: 2.0</i>
Issue 11	Transportation and service corridors; Utility and service lines: Communication towers and high-tension electric lines	Rank: 2.5
<i>Action 1</i>	<i>Technical Assistance; Technical assistance; Technical assistance: Support research for improving the design of towers and lines to minimize impacts to SGCN.</i>	<i>Rank: 2.5</i>

Tree Bats

- Issue 1** Biological resource use; Logging and wood harvesting; Intentional use (large scale): silviculture practices (clearcutting) incompatible with forest bat conservation **Rank: 1.7**
- Action 1* Direct Management of Natural Resources; Create new habitat or natural processes; Habitat conversion: Preserve bat roost sites within forest cut blocks. **Rank: 1.7**
- Issue 2** Natural system modifications; Fire and fire suppression; Increase in fire frequency/intensity: prescribed burns in upland forests causing bat roosting and foraging habitat degradation **Rank: 2.5**
- Action 1* Data Collection and Analysis; Research survey or monitoring fish and wildlife populations: Research impacts of the intensity and timing of prescribed burns on forest bats. **Rank: 2.5**

Cave Bats

- Issue 1** Invasive and other problematic species genes and diseases; Problematic species diseases of unknown origin; Named species: White nose syndrome in bats **Rank: 1.3**
- Action 1* Direct Management of Natural Resources; Wildlife disease management: Continue efforts to reduce impacts of WNS in DE hibernacula - both to DE bats and to decrease the chances of spread of WNS to other locations. **Rank: 1.3**