

Appendix 6b. Habitat-level threats and actions

IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
1 - 4				Habitat loss (from various causes)	Encourage implementation of best management practices (BMPs) that minimize and reduce habitat fragmentation in land use plans, especially for large, contiguous forest blocks and old growth conditions that are connected by effective movement/dispersal corridors.	ALL	Forests, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands	Basic Mesic Forests, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest, Maritime Forest and Shrubland, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Upland Depression Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Forest	High
1	1 Development			Coastal development	Work with local and county planning departments to ensure that coastal, tourism-heavy communities plan for smart, long-term growth that will minimally impact coastal SGCN and habitats.	Southern, Eastern, Central	Bay/Ocean, Coastal Beaches/Dunes, (Sub)urban, Tidal Wetlands	Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland	Mid
1	1 Development			(Sub)urban sprawl	Incentivize multi-use and mixed-use development to reduce travel distances.	ALL	(Sub)urban		Low
1.1	1 Development	1.1 Housing & Urban Areas			Encourage policies and practices that focus on the renovation of existing housing rather than new development.	ALL	(Sub)urban		Low
1.1 / 1.2	1 Development	1.1 Housing & Urban Areas / 1.2 Commercial & Industrial Areas			Promote and support conservation landscaping techniques and projects in residential and commercial settings. Connect landowners to existing organizations (e.g., Chesapeake Bay Landscape Professionals) and provide new incentives.	ALL	(Sub)urban, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Streams/Rivers, Bay/Ocean, Artificial Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
1.2	1 Development	1.2 Commercial & Industrial Areas		Unproductive former industrial/commercial lands	Explore the possibility of turning currently unproductive lands (capped landfills, old golf courses, dredged material containment facilities, etc.) into productive grassland habitat.	ALL	Working Lands, (Sub)urban	Artificial Structure - Mine and Tunnel, Managed Grassland	Low

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1.3	1 Development	1.3 Tourism & Recreation Areas			Increase funding for additional staffing, public education efforts, and environmentally sensitive design with regards to recreational areas in or near important SGCN habitat.	ALL	CATCH-ALL		Low
1.3	1 Development	1.3 Tourism & Recreation Areas			Streamline process (e.g., waivers and permits) for public lands to implement "keep out zones" as needed to protect sensitive SGCN habitat.	ALL	CATCH-ALL		Low
1.3.1	1 Development	1.3 Tourism & Recreation Areas	1.3.1 Parks and sports fields		Work with municipal and county planning and zoning offices to ensure a balance of natural areas versus traditional recreational areas (e.g., sports fields).	ALL	CATCH-ALL	Urban and Suburban Environment	Low
1.3.1	1 Development	1.3 Tourism & Recreation Areas	1.3.1 Parks and sports fields		Discourage the use of artificial turf and promote/incentivize native turf grass alternatives.	ALL	CATCH-ALL	Urban and Suburban Environment	High
1.3.4	1 Development	1.3 Tourism & Recreation Areas	1.3.4 Recreational trails		Limit or more carefully place trails to protect forest interior dwelling species (FIDS) habitat and other sensitive areas.	ALL	Forests, Glades/Barrens/Cliffs, Floodplain Wetlands, Groundwater Wetlands, Streams/Rivers, Subterranean, Tidal Wetlands	Basic Mesic Forests, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest, Maritime Forest and Shrubland, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Upland Depression Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Forest, Serpentine Barren, Shale Barren, Acidic Glade and Barren, Basic Glade and Barren, Cliff, Talus, and Rock Outcrop	Low
2.1	2 Agriculture and Aquaculture	2.1 Annual & Perennial Non-Timber Crops			Work with the Maryland Department of Agriculture (MDA) and the University of Maryland Extension Office to diversify the agricultural landscape (in terms of scale, crops, etc.) by supporting "niche" crops, farmers markets, organic/regenerative farming practices, etc.	ALL	Working Lands	Managed Grassland	Mid

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2.1.1	2 Agriculture and Aquaculture	2.1 Annual & Perennial Non-Timber Crops	2.1.1 Annual cropping systems (field crops)	Increase in biofuel crop production leads to habitat loss and fragmentation	Encourage development of biofuel crops on existing farmland.	ALL	Working Lands	Managed Grassland	High
2.2	2 Agriculture and Aquaculture	2.2 Plantations		Historical and current forest monocultures (i.e., pine plantations)	Work with state land managers and partner organizations to revert pine plantations to natural forest types, where possible, especially organizations with an interest in sustainable forest management.	ALL	Forests, Working Lands	Managed Montane Conifer Forest, Managed Successional Forest	Mid
2.4	2 Agriculture and Aquaculture	2.4 Marine & Freshwater Aquaculture			Design and site aquaculture facilities in a manner that positively impacts estuarine and marine ecosystems.	Eastern, Southern	Bay/Ocean	Atlantic Ocean	Mid
3	3 Energy Production			Fossil fuels	Continue and increase efforts to establish in-state mitigation funds to offset damages caused by fossil fuel extraction and related operations.	ALL	CATCH-ALL		High
3	3 Energy Production			Fossil fuels	Explore the feasibility of increased nuclear power generation through means such as small modular reactors, expanded capacity at existing sites, etc. Work with entities such as the Power Plant Research Program (PPRP) and Public Service Commission (PSC) to do so.	ALL	CATCH-ALL		Low
3	3 Energy Production			Fossil fuels: methane gas	Increase efforts to monitor, map, and mitigate methane gas leaks from various sources.	ALL	CATCH-ALL		High
3.1.2	3 Energy Production	3.1 Oil & Gas Drilling	3.1.2 Offshore oil development		Site (potential) offshore oil and gas drilling in a manner that avoids or minimizes impacts on marine habitats and SGCN.	Eastern	Bay/Ocean	Atlantic Ocean	Low
3.1.4	3 Energy Production	3.1 Oil & Gas Drilling	3.1.4 Onshore natural gas development		Evaluate the threats---biological, chemical, and physical---posed by (potential) hydraulic fracturing to habitats and SGCN.	Western	Streams/Rivers, Floodplain Wetlands, Glades/Barrens/Cliffs, Forests, Groundwater Wetlands, Artificial Wetlands	Cliff, Talus, and Rock Outcrop, Cove Forest, Hemlock-Northern Hardwood Forest, Montane-Piedmont Floodplain, Montane-Piedmont Oak-Pine Forest, Montane-Piedmont Seepage Swamp, Piedmont Seepage Wetland, Montane Acidic Fen, Shale Barren	Low

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3.1.4	3 Energy Production	3.1 Oil & Gas Drilling	3.1.4 Onshore natural gas development		Site (potential) hydrofracturing development in a manner that avoids or minimizes impacts on SGCN and their habitats, including impacts of hydraulic fracturing-related groundwater extraction.	Western	Streams/Rivers, Floodplain Wetlands, Glades/Barrens/Cliffs, Forests, Groundwater Wetlands, Artificial Wetlands	Cliff, Talus, and Rock Outcrop, Cove Forest, Hemlock-Northern Hardwood Forest, Montane-Piedmont Floodplain, Montane-Piedmont Oak-Pine Forest, Montane-Piedmont Seepage Swamp, Piedmont Seepage Wetland, Montane Acidic Fen, Shale Barren	Low
3.2	3 Energy Production	3.2 Mining & Quarrying			Continue to carefully review new/updated mine plans, especially concerning potential impacts to sensitive habitat and SGCN.	Western	Working Lands, Subterranean		Low
3.3.2	3 Energy Production	3.3 Renewable Energy	3.3.2 Wind farms		Conduct research to determine the impacts of industrial wind development on SGCN and their habitats, both terrestrial and aquatic. Determine how to minimize and mitigate these impacts, as needed.	Western, Eastern	Forests, Bay/Ocean, Glades/Barrens/Cliffs	High Elevation Ridge Forest; Cliff, Talus, and Rock Outcrop; Atlantic Ocean	High
3.3.2	3 Energy Production	3.3 Renewable Energy	3.3.2 Wind farms		Site industrial wind development in a manner that avoids or minimizes impacts on SGCN and their habitats.	Western, Eastern	Forests, Glades/Barrens/Cliffs, Bay/Ocean	High Elevation Ridge Forest; Cliff, Talus, and Rock Outcrop; Atlantic Ocean	High
3.3.4	3 Energy Production	3.3 Renewable Energy	3.3.4 Solar farms		Continue to look into impacts of solar farms on various terrestrial and aquatic habitat types, including habitat fragmentation, groundwater recharge, runoff, and erosion. Potentially use findings to enact legislation that identifies "off-limit zones" for solar development.	ALL	Forests, Glades/Barrens/Cliffs, Floodplain Wetlands, Working Lands, Groundwater Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Managed Grassland	Mid
3.3.4	3 Energy Production	3.3 Renewable Energy	3.3.4 Solar farms		Encourage (or require) solar development in areas that are already developed, rooftops, brownfields, etc. in order to minimize forest and grassland loss.	ALL	Forests, Glades/Barrens/Cliffs, Floodplain Wetlands, Working Lands, Groundwater Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Managed Grassland	High

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3.3.4	3 Energy Production	3.3 Renewable Energy	3.3.4 Solar farms		Site and design solar projects in a way that minimizes impacts on (and potentially benefits) SGCN and their habitats. Distribute guidelines and enforce regulations at the state level.	ALL	Forests, Glades/Barrens/Cliffs, Floodplain Wetlands, Working Lands, Groundwater Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Managed Grassland	High
3.3.4	3 Energy Production	3.3 Renewable Energy	3.3.4 Solar farms		Consider incentive programs that could pay farmers to keep lands for agriculture rather than solar use. Alternatively, programs could incentivize particular kinds of solar farms that provide co-benefits to both humans and animals.	ALL	Working Lands	Managed Grassland	Mid
3.3.4	3 Energy Production	3.3 Renewable Energy	3.3.4 Solar farms		Implement demonstration projects on state-owned or state-partnered lands to showcase how solar arrays designed with a conservationist mindset can provide co-benefits to both humans and animals.	ALL	Working Lands, (Sub)urban	Managed Grassland	Mid
4.1	4 Transportation	4.1 Roads & Railroads			In order to minimize habitat fragmentation by transportation infrastructure, work with the Maryland Department of Transportation (MDOT) to improve transportation planning for new roads and encourage/facilitate additional opportunities for public transportation.	ALL	CATCH-ALL		Mid
4.1	4 Transportation	4.1 Roads & Railroads			Improve habitat connectivity in streams via blockage removal, culvert retrofit, and transportation BMPs.	ALL	Streams/Rivers, Floodplain Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain	High
4.1	4 Transportation	4.1 Roads & Railroads		Fish passage barriers	Require that barriers to fish passages be fixed within a certain time period once identified. Currently, there are fish passage barriers that have been unaddressed for decades on local and state roads.	ALL	Streams/Rivers, Floodplain Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain	Low

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4.2	4 Transportation	4.2 Utility & Service Lines		Conversion of land to facilitate new energy transmission infrastructure (gas lines, powerlines, etc.)	Adhere to existing legislation regarding the siting of such projects on state lands.	ALL	Forests, Floodplain Wetlands, Streams/Rivers, (Sub)urban		High
4.2	4 Transportation	4.2 Utility & Service Lines		Conversion of land to facilitate new energy transmission infrastructure (gas lines, powerlines, etc.)	Further educate conservation groups regarding habitat conservation/protection from such projects.	ALL	Forests, Floodplain Wetlands, Streams/Rivers, (Sub)urban		Mid
4.2.1	4 Transportation	4.2 Utility & Service Lines	4.2.1 Power and service lines	Powerline rights-of-way for data centers and other industry	Evaluate potential impacts of data center corridors and work with appropriate regulatory agencies to avoid impacts.	Central, Western, Southern	Forests, Floodplain Wetlands, Streams/Rivers, (Sub)urban		High
4.3.2	4 Transportation	4.3 Shipping Lanes	4.3.2 Dredging of shipping lanes		Identify areas for and increase targeted placement of dredge material for habitat restoration, especially for islands and marshes.	Southern, Eastern, Central	Tidal Wetlands, Bay/Ocean, Coastal Beaches/Dunes	Small Coastal Plain Islands Tidal Brackish Marsh and Shrubland Tidal Salt Marsh and Shrubland	High
4.3.2	4 Transportation	4.3 Shipping Lanes	4.3.2 Dredging of shipping lanes		Work with appropriate agencies (e.g., Army Corps of Engineers [ACOE]) to improve permitting process for habitat restoration using dredged material.	Southern, Eastern, Central	Tidal Wetlands, Bay/Ocean, Coastal Beaches/Dunes	Small Coastal Plain Islands Tidal Brackish Marsh and Shrubland Tidal Salt Marsh and Shrubland	High
4.3.2	4 Transportation	4.3 Shipping Lanes	4.3.2 Dredging of shipping lanes		Improve coordination between relevant agencies (ACOE, MD DNR, etc.) to ensure that dredging occurs during appropriate times of year, dredged material is given beneficial use (i.e., habitat restoration), and dredge placement projects are properly maintained.	Southern, Eastern, Central	Tidal Wetlands, Bay/Ocean, Coastal Beaches/Dunes	Small Coastal Plain Islands Tidal Brackish Marsh and Shrubland Tidal Salt Marsh and Shrubland	High
5.3	5 Bio Resource Use	5.3 Logging & Wood Harvesting			Continue to encourage sustainable forestry practices among private landowners and foresters through programs like American Tree Farm System (ATFS) and Sustainable Forestry Initiative (SFI).	ALL	Forests	Basic Mesic Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest	Low

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5.3	5 Bio Resource Use	5.3 Logging & Wood Harvesting			Support properties managed for forest growth at both ends of the age spectrum (i.e., old growth forest and early successional habitat).	ALL	Forests, Working Lands	Basic Mesic Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest	Mid
5.3	5 Bio Resource Use	5.3 Logging & Wood Harvesting			Protect remaining old growth forest (including adequate no-cut buffers) on public and private lands, and (where possible) expand these areas and promote the establishment of additional extensive tracts of old growth forest.	ALL	Forests	Basic Mesic Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest	High
5.3	5 Bio Resource Use	5.3 Logging & Wood Harvesting			Increase enforcement regarding riparian buffer removal or culling. Consider tactics such as increased fines and streamlined violation reporting.	ALL	Forests, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Working Lands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
5.3	5 Bio Resource Use	5.3 Logging & Wood Harvesting			Coordinate with local forestry boards, private foresters, state foresters, etc. to ensure that forest workplans for sensitive rock outcrops are compatible with SGCN and habitat needs.	Western	Forests, Glades/Barrens/Cliffs	Cliff, Talus, and Rock Outcrop, Shale Barrens, Serpentine Barren, Acidic Glade and Barren, Basic Glade and Barren	High
5.4.2	5 Bio Resource Use	5.4 Fishing & Harvesting Aquatic Resources	5.4.2 Commercial fishing		Work with counties, state agencies, etc. to better support "working waterfronts" (i.e., smaller scale fishing operations).	Central, Southern, Eastern	Bay/Ocean, Streams/Rivers, Floodplain Wetlands, Tidal Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Salt Marsh and Shrubland, Intertidal Mudflat and Sand Flat, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland	Mid
5.4.2	5 Bio Resource Use	5.4 Fishing & Harvesting Aquatic Resources	5.4.2 Commercial fishing		Minimize impacts of trawling or "conveyor belt" harvest boats on submerged aquatic vegetation (SAV) beds.	Southern, Eastern, Central	Bay/Ocean	Chesapeake Bay Coastal Bays	Low
6.1	6 Human Intrusions	6.1 Recreational Activities			Build a culture of stewardship among natural area user groups through tactics such as roundtable meetings, inclusion in field work days, educational signage and talks, encouraging use in less sensitive areas, etc.	ALL	CATCH-ALL		Mid

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6.1	6 Human Intrusions	6.1 Recreational Activities		Disturbance of sensitive beach and dune habitat	Create and implement a visitor use management plan for Assateague Island, as its beach and dune habitat is easily disturbed by hiking and off-road vehicle use.	Eastern	Coastal Beaches/Dunes, Forests	Maritime Forest and Shrubland, Maritime Dune and Grassland	Mid
6.1.1	6 Human Intrusions	6.1 Recreational Activities	6.1.1 Motor vehicles		Encourage and increase the number/quality of off-road vehicle trails in areas other than sensitive wetland habitats.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Low
6.1.3 / 6.1.7	6 Human Intrusions	6.1 Recreational Activities	6.1.3 Recreational use of cliffs and rock faces / 6.1.7 Caving		Better coordinate with the Office of Outdoor Recreation and climbing/spelunking groups to identify and increase understanding regarding sensitive areas where human disturbance is prohibited.	Western	Glades/Barrens/Cliffs, Subterranean	Cliff, Talus, and Rock Outcrop, Shale Barrens, Serpentine Barren, Acidic Glade and Barren, Basic Glade and Barren	High
6.3.3	6 Human Intrusions	6.3 Work & Other Activities	6.3.3 Vandalism		Decrease cave vandalism/breaking and entering through tactics such as emergency gating, cameras, increased signage, and improved response time. Explore options for funding these interventions.	Western	Subterranean	Cave and Karst	High
7.1.2	7 Natural System Modifications	7.1 Fire & Fire Suppression	7.1.2 Suppression in the fire regime		Work with new prescribed fire groups to restore and maintain habitat by re-establishing natural fire regimes (where feasible), particularly to control woody vegetation and canopy closure. Push for increased training and regulatory changes, as needed.	ALL	Forests, Working Lands, Glades/Barrens/Cliffs, Groundwater Wetlands	Coastal Plain Oak-Pine Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest, Serpentine Barren, Shale Barren, Acidic Glade and Barren, Basic Glade and Barren	Mid
7.1.2	7 Natural System Modifications	7.1 Fire & Fire Suppression	7.1.2 Suppression in the fire regime		Continue to improve land management for better oak regeneration, especially through prescribed burning.	ALL	Forests	Coastal Plain Oak-Pine Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest, Maritime Forest and Shrubland	Low
7.2	7 Natural System Modifications	7.2 Dams & Water Management / Use			Strengthen protections for wetlands against drainage, ditching, filling, water withdrawal, excessive raising of water levels, and other damaging practices that alter hydrology.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid

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7.2	7 Natural System Modifications	7.2 Dams & Water Management / Use			For habitats already affected by damaging, hydrology-altering practices, restore natural hydrology through structural interventions (e.g., plugging ditches).	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Streams/Rivers	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain	High
7.2	7 Natural System Modifications	7.2 Dams & Water Management / Use			Retrofit dams and other river blockages with functional fish ladders. Focus efforts on improved design and methods of excluding/sorting invasive species.	ALL	Streams/Rivers, Floodplain Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
7.2.6 / 7.2.7	7 Natural System Modifications	7.2 Dams & Water Management / Use	7.2.6 Withdrawal of surface water / 7.2.7 Withdrawal of groundwater	Groundwater use and surface water withdrawals can reduce surface water quantity and quality	Work with appropriate regulatory agencies to understand the impacts of water withdrawals (both ground and surface) on surface water quantity and quality; pursue measures to minimize these impacts.	Central, Western	Floodplain Wetlands, Groundwater Wetlands, Streams/Rivers, Subterranean	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
7.2.7	7 Natural System Modifications	7.2 Dams & Water Management / Use	7.2.7 Withdrawal of groundwater		Decrease groundwater extraction and aquifer depletion through tactics such as careful monitoring/metering, encouraging "precision agriculture" techniques that use less water, and updating withdrawal limits based on the most current research.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Streams/Rivers, Subterranean, Working Lands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
7.3	7 Natural System Modifications	7.3 Other Ecosystem Modifications			Reduce stream channelization, ditching, and impoundments, which reduce access to spawning areas and take away habitat.	ALL	Streams/Rivers, Tidal Wetlands, Floodplain Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Salt Marsh and Shrubland, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Freshwater Marsh and Shrubland, Tidal Salt Marsh and Shrubland	Mid
7.3	7 Natural System Modifications	7.3 Other Ecosystem Modifications		Inappropriate timing of mowing (public lands and large parcels)	Coordinate with utility companies and land managers to promote longer treatment intervals of vegetation in powerline rights-of-way and other grassy areas. Include an education component regarding the benefits of related practices such as the use of native plants, bird boxes, Integrated Pest Management (IPM), etc.	ALL	Working Lands, (Sub)urban	Roadside and Utility Right-of-Way, Managed Grassland	High

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7.3	7 Natural System Modifications	7.3 Other Ecosystem Modifications		Incompatible ordinances for mowing/vegetation height	Enact legislation and/or create incentives that require/encourage large landowners (farmers, municipalities, counties, etc.) to change the timing and frequency of mowing in order to balance maintenance needs with wildlife habitat.	ALL	Working Lands, (Sub)urban	Roadside and Utility Right-of-Way, Managed Grassland	Mid
7.3	7 Natural System Modifications	7.3 Other Ecosystem Modifications		Over-mowing and over-raking (residential areas)	Utilize existing (e.g., Wild Acres) and new educational materials/programs to emphasize the negative impacts of over-mowing and over-raking on the biodiversity of residential landscapes, including the benefits of traditional yard alternatives. Education will need to be done at both the municipal and landowner level in order to address legal barriers (e.g., grass height ordinances) and public perception.	ALL	Working Lands, (Sub)urban	Urban and Suburban Environment, Managed Grassland	High
7.3	7 Natural System Modifications	7.3 Other Ecosystem Modifications		Stream restoration practices	Increase (requirements for) collaboration on stream restoration projects; well-designed projects can restore natural hydrology and related biological uplift, but poorly designed stream restorations can reduce important forest habitat. Potentially develop incentives for biological integrity improvements as well as water quality credits.	ALL	Streams/Rivers, Floodplain Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
7.3	7 Natural System Modifications	7.3 Other Ecosystem Modifications		Stream restoration practices	Strengthen the requirements for and influence of pre-restoration assessments for stream restoration projects, especially in SGCN-critical habitat.	ALL	Streams/Rivers, Floodplain Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
7.3.1	7 Natural System Modifications	7.3 Other Ecosystem Modifications	7.3.1 Shoreline alteration		Work with the Maryland Department of the Environment (MDE) to review and strengthen living shoreline requirements and documentation (such as design manuals).	Central, Southern, Eastern	Bay/Ocean, Streams/Rivers, Coastal Beaches/Dunes, Tidal Wetlands, Forests	Montane-Piedmont Floodplain, Coastal Plain Floodplain	Low

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7.3.1	7 Natural System Modifications	7.3 Other Ecosystem Modifications	7.3.1 Shoreline alteration		Continue to update "living shoreline" guidelines, processes (especially for permitting), and educational materials. Create more incentives for private properties to adopt this approach.	Central, Southern, Eastern	Bay/Ocean, Streams/Rivers, Coastal Beaches/Dunes, Tidal Wetlands, Forests	Maritime Forest and Shrubland, Maritime Dune and Grassland, Tidal Salt Marsh and Shrubland, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland	Low
7.3.2	7 Natural System Modifications	7.3 Other Ecosystem Modifications	7.3.2 Vegetation succession		Restore high elevation, spruce-dominated forests, especially on ridgelines.	Western	Forests, Groundwater Wetlands	High Elevation Ridge Forest, Montane Acidic Fen	Low
7.3.2	7 Natural System Modifications	7.3 Other Ecosystem Modifications	7.3.2 Vegetation succession	Decline in early- and mid-successional forest	Actively manage for early- and mid-successional habitat in certain areas. Use herbicide in a targeted way to suppress development of taller trees until shrub lay develops.	ALL	Forests, Working Lands		Low
7.3.3	7 Natural System Modifications	7.3 Other Ecosystem Modifications	7.3.3 Natural erosion and sedimentation		Further research and promote natural, less traditional solutions to shoreline erosion and sedimentation such as leaving fallen trees, building up oyster reefs, restoring dunes, using "reef balls," etc.	Central, Southern, Eastern	Bay/Ocean, Streams/Rivers, Coastal Beaches/Dunes, Floodplain Wetlands, Tidal Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Coastal Beach	High
7.3.4	7 Natural System Modifications	7.3 Other Ecosystem Modifications	7.3.4 Beach development		Promote natural overwash processes in some areas by removing (man-made) impediments and limiting practices like beach nourishment.	Eastern	Coastal Beaches/Dunes, Forests	Maritime Forest and Shrubland, Maritime Dune and Grassland	Low
8	8 Invasive and Problematic Species				Increase education and outreach efforts regarding invasive species reporting, invasive plant removal, and tree disease/pest control. Consider tactics such as the promotion of community monitoring efforts (through iNaturalist, Maryland Biodiversity Project, etc.); increased signage on public lands; and other centralized reporting websites/apps.	ALL	Forests, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Working Lands, (Sub)urban	Basic Mesic Forest, Cove Forest, Oak-Hickory Forest, Shale Barren, Basic Glade and Barren, Montane-Piedmont Seepage Swamp, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Roadside and Utility Right-of-way, Artificial Impoundment and Artificial Wetland	Mid

Appendix 6b. Habitat-level threats and actions

IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
8	8 Invasive and Problematic Species			Tree diseases and pests	Continue to support research on location, spread, and potential control measures for tree diseases.	ALL	Forests, Floodplain Wetlands, Groundwater Wetlands, (Sub)urban	Basic Mesic Forest, Cove Forest, Oak-Hickory Forest, Shale Barren, Basic Glade and Barren, Montane-Piedmont Basic Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Montane-Piedmont Seepage Swamp	Mid
8.1	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals			Work with MDA to streamline the process for adding plants to the invasive list, which will in turn phase them out of the ecosystem more quickly.	ALL	Forests, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Working Lands, (Sub)urban	Basic Mesic Forest, Cove Forest, Oak-Hickory Forest, Montane-Piedmont Basic Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Montane-Piedmont Seepage Swamp	Mid
8.1	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals			Increase MD DNR's capacity for invasive species monitoring and management by funding data analysis efforts (animals), deepening involvement with preexisting removal efforts (plants), and encouraging staff to get certified in herbicide application (plants).	ALL	CATCH-ALL		High
8.1	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals			Better coordinate invasive species monitoring and management efforts through evidence-based, localized plans. Utilize existing partnerships (e.g., National Capital PRISM) and create new ones in order to share resources, prioritize areas/actions, have a stable volunteer base, and create lasting partnerships.	ALL	CATCH-ALL		Mid
8.1.1	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.1 Terrestrial animals	Hemlock wooly adelgid	Continue to research the effects of adelgid-related loss of eastern hemlock forest on species populations. Continue to implement treatment measures that minimize these effects.	Western, Central	Forests, Floodplain Wetlands, Groundwater Wetlands, Streams/Rivers	Cove Forest, Hemlock-Northern Hardwood Forest, Montane-Piedmont Seepage Swamp, Coldwater Stream	Mid
8.1.1	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.1 Terrestrial animals	Predation from domestic cats	Continue to educate the public on effects of free-ranging cats on wildlife. Research population management options other than trap-neuter-release programs.	ALL	CATCH-ALL	Urban and Suburban Environment	Mid

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants		Support the refining and implementation of state-level invasive species legislation.	ALL	CATCH-ALL		High
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants		Continue and increase targeted efforts regarding invasive species removal, especially on state lands.	ALL	CATCH-ALL		High
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants		Prioritize the planting of and education about native plants, especially on state-owned properties.	ALL	CATCH-ALL		High
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants		Increase native plant cover (grasses, shrubs, trees, etc.) by incentivizing nurseries to stock native plants; expand existing programs (such as MD DNR's native tree coupon) and create new ones, as needed.	ALL	Forests, (Sub)urban, Working Lands, Floodplain Wetlands, Groundwater Wetlands, Glades/Barrens/Cliffs	Basic Mesic Forest, Cove Forest, Oak-Hickory Forest, Shale Barren, Basic Glade and Barren, Montane-Piedmont Basic Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Montane-Piedmont Seepage Swamp	High
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants		Explore the feasibility of banning the sale of invasive plant species.	ALL	CATCH-ALL		High
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants		In order to slow the spread of invasive species, ensure that native plants are re-established soon after invasive plant removal efforts. Discourage tree harvesting in forests with no invasive plants as well.	ALL	Forests, Groundwater Wetlands, Floodplain Wetlands, Tidal Wetlands	Basic Mesic Forest, Cove Forest, Oak-Hickory Forest, Montane-Piedmont Basic Seepage Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Montane-Piedmont Seepage Swamp	Mid
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants		Control invasive plants and provide habitat for pollinators by creating and managing grassy habitat areas along roads, adjacent to cropland, in utility right-of-way areas, etc. with locally native seed mixes. Base future projects on successes along Route 1 corridor.	ALL	(Sub)urban, Working Lands	Roadside and Utility Right-of-way, Managed Grassland	Low

Appendix 6b. Habitat-level threats and actions

IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
8.1.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants	Common reed (<i>Phragmites</i>)	Improve coordination between relevant landowners and agencies in order to better manage common reed (<i>Phragmites</i>) (e.g., for Assateague, parties to better coordinate would be Assateague Island State Park and National Seashore).	Central, Southern, Eastern	Coastal Beaches/Dunes, Tidal Wetlands, Floodplain Wetlands, Artificial Wetlands, Working Lands, (Sub)urban, Groundwater Wetlands	Maritime Dune and Grassland, Maritime Swamp, Montane-Piedmont Floodplain, Tidal Freshwater Marsh and Shrubland, Piedmont Seepage Wetland, Artificial Impoundment and Artificial Wetland	Low
8.1.2 / 8.1.4	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.2 Terrestrial plants / 8.1.4 Aquatic plants		Create visitation management plans for public lands in order to reduce the spread of invasive plants (e.g., brush/shoe wash stations).	ALL	CATCH-ALL		Low
8.1.3	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.3 Aquatic animals		Continue to promote the use (i.e., consumption) of invasive species within seasonally appropriate times/places.	ALL	Streams/Rivers, Bay/Ocean, Artificial Wetlands, Groundwater Wetlands, Tidal Wetlands, Floodplain Wetlands	Maritime Dune and Grassland, Maritime Swamp, Montane-Piedmont Floodplain, Tidal Freshwater Marsh and Shrubland, Piedmont Seepage Wetland, Artificial Impoundment and Artificial Wetland	Low
8.1.3 / 8.1.4	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals	8.1.3 Aquatic animals / 8.1.4 Aquatic plants		Emphasize invasive species treatment at the watershed level rather than on a location-by-location basis.	ALL	Streams/Rivers, Bay/Ocean, Artificial Wetlands, Groundwater Wetlands, Tidal Wetlands, Floodplain Wetlands	Maritime Dune and Grassland, Maritime Swamp, Montane-Piedmont Floodplain, Tidal Freshwater Marsh and Shrubland, Piedmont Seepage Wetland, Artificial Impoundment and Artificial Wetland	Mid
8.1 / 8.2	8 Invasive and Problematic Species	8.1 Invasive Non-Native / Alien Plants & Animals / 8.2 Problematic Native Plants & Animals			Continue to manage all invasive non-native and problematic native plants and animals impacting key wildlife habitats.	ALL	CATCH-ALL		Low
8.2.2	8 Invasive and Problematic Species	8.2 Problematic Native Plants & Animals	8.2.2 Increased grazing by vertebrates	White-tailed deer	Continue to manage deer populations through education and outreach techniques, including: recruiting hunters; encouraging increased hunting throughout the season; increasing messaging on the importance of hunting, sharpshooter programs, and the like; and emphasizing the harvesting of does.	ALL	Forests, Glades/Barrens/Cliffs, Working Lands, (Sub)urban, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands		High

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
8.2.2	8 Invasive and Problematic Species	8.2 Problematic Native Plants & Animals	8.2.2 Increased grazing by vertebrates	White-tailed deer	Promote currently underutilized deer management techniques, including Deer Management Permits (DMPs) and Deer Cooperator Licenses and Permits (DCLs/DCPs, i.e., sharpshooter permits). Focus on more suburban areas as well as rural.	ALL	Forests, Glades/Barrens/Cliffs, Working Lands, (Sub)urban, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands		High
8.2.2	8 Invasive and Problematic Species	8.2 Problematic Native Plants & Animals	8.2.2 Increased grazing by vertebrates	White-tailed deer	Address hunter access challenges by incentivizing private landowners to partner with hunters, and/or have MD DNR act as go-between to better connect hunters to land.	ALL	Forests, Glades/Barrens/Cliffs, Working Lands, (Sub)urban, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands		High
8.2.2	8 Invasive and Problematic Species	8.2 Problematic Native Plants & Animals	8.2.2 Increased grazing by vertebrates	White-tailed deer	Research the feasibility of more widespread deer exclosure areas, both in terms of impact and potential funding.	ALL	Forests, Glades/Barrens/Cliffs, Working Lands, (Sub)urban, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands		High
8.2.2	8 Invasive and Problematic Species	8.2 Problematic Native Plants & Animals	8.2.2 Increased grazing by vertebrates	White-tailed deer	Continue to explore new deer management techniques, such as increased harvest-to-donation opportunities and expanded hunting seasons in targeted conservation areas.	ALL	Forests, Glades/Barrens/Cliffs, Working Lands, (Sub)urban, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands		High
8.2.2	8 Invasive and Problematic Species	8.2 Problematic Native Plants & Animals	8.2.2 Increased grazing by vertebrates	Feral horses (Assateague Island)	Re-establish and implement a vigorous vegetation monitoring plan in salt marshes (i.e., Assateague Island and surroundings) to ensure feral horses are not causing overgrazing.	Eastern	Coastal Beaches/Dunes, Tidal Wetlands, Forests	Coastal Beach, Maritime Forest and Shrubland, Maritime Dune and Grassland	Low
8.2.2	8 Invasive and Problematic Species	8.2 Problematic Native Plants & Animals	8.2.2 Increased grazing by vertebrates	Resident (Canada) geese	Increase efforts to control resident geese, which are negatively impacting marsh vegetation (e.g., along the Patuxent River).	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands	Artificial Impoundment and Artificial Wetland, Piedmont Seepage Wetland, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Brackish Marsh and Shrubland, Tidal Salt Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland	High
8.4	8 Invasive and Problematic Species	8.4 Pathogens		Unknown/unstudied diseases	Continue to support research to monitor wildlife health and identify emerging zoonotic diseases.	ALL	CATCH-ALL		High

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
9	9 Pollution				Better assess and manage instances of point source pollution such as landfills, combined sewer overflows, leaking sewers/septic, residual pharmaceuticals, etc..	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Bay/Ocean, (Sub)urban	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	High
9	9 Pollution				Conduct expansive studies or literature reviews to understand threats posed by contaminants of emerging concern (CECs) to aquatic SGCN. CECs include per- and polyfluoroalkyl substances (PFAS), 6PPD(-quinone), microplastics, endocrine-disrupting chemicals (EDCs), sludge/biosolids, etc.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Bay/Ocean	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
9	9 Pollution				Set temperature Total Maximum Daily Load (TMDL) for coldwater streams; require full infiltration and no discharge of untreated stormwater.	Central, Western	Streams/Rivers	Coldwater Stream	High
9	9 Pollution			PFAS	Work with MDE to further reduce the use of PFAS and other endocrine-disrupting chemicals.	ALL	CATCH-ALL		Low
9.1.1	9 Pollution	9.1 Domestic & Urban waste water	9.1.1 Domestic wastewater		Better engage with utility companies and owners of septic systems (especially in riparian zones) in order to identify solutions to failed/failing wastewater infrastructure. To ensure future failures do not occur, work with government entities and NGOs in order to brainstorm, create, and enforce higher standards for maintenance and inspection.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	High

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
9.1.1	9 Pollution	9.1 Domestic & Urban waste water	9.1.1 Domestic wastewater		Require small water treatment plants to follow the same regulations as larger plants. Improve funding for upgrades to these plants as needed.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff		Increase construction requirements for retention areas to better capture toxics in runoff, focusing on particularly sensitive areas.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	High
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff		Develop more incentives for green infrastructure projects, especially those related to stormwater management. Prioritize pervious surfaces and reduce impervious surfaces when possible.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	High
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff		Promote and support "Bay-wise" landscaping practices, particularly through demonstration projects (e.g., rain gardens, bioswales, etc.) in highly visible locations.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	High

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff		Phase out the "grandfathering" approach and other exceptions for stormwater and bioretention requirements.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff	Impacts from construction	Establish guidance and regulation to reduce the impact of stormwater both during and after construction for properties of all sizes.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff	6-PPD and 6-PPDQ	Test streams where brook trout currently/historically are/were present for the presence of 6PPD and 6PPD-Q.	Central, Western	Streams/Rivers	Coldwater Stream	Low
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff	Road salt	Assess impacts from road salt and develop abatement measures, including changes to MDE's chloride criteria. Assess and prioritize areas of greatest concern.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Bay/Ocean	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
9.1.2	9 Pollution	9.1 Domestic & Urban waste water	9.1.2 Runoff	Chemicals (polycyclic aromatic hydrocarbons [PAHs], metals) in road materials or that run off vehicles	Work with appropriate regulatory agencies to understand the potential magnitude and extent of road chemicals. Propose the use of alternative, aquatic species-friendly materials instead.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Bay/Ocean	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
9.2	9 Pollution	9.2 Industrial & Military Effluents		Toxic chemicals from factories, illegal dumping of chemicals, other industrial effluent, ship waste discharge	Continue to work to reduce dumping of toxic chemicals in the Atlantic Ocean through various means (e.g., educational, regulatory, etc.).	Eastern	Bay/Ocean	Atlantic Ocean	Low
9.2.1	9 Pollution	9.2 Industrial & Military Effluents	9.2.1 Oil spills		Maintain capacity for efficient oil spill response through increased trainings. Perform "mock spill" trainings with Occupational Safety and Health Administration (OSHA) education center.	Southern, Eastern, Central	Bay/Ocean, Streams/Rivers, Coastal Beaches/Dunes, Tidal Wetlands, Groundwater Wetlands, Floodplain Wetlands, Artificial Wetlands	Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Low
9.2.2	9 Pollution	9.2 Industrial & Military Effluents	9.2.2 Acid mine drainage		Continue to minimize acid mine drainage and mitigate damages resulting from such drainage.	Western	Groundwater Wetlands, Streams/Rivers, Artificial Wetlands, Floodplain Wetlands, Subterranean	Montane-Piedmont Floodplain, Montane-Piedmont Seepage Swamp, Montane Acidic Fen	Mid
9.3	9 Pollution	9.3 Agricultural & Forestry Effluents			Work with watershed groups, farmers, and large landowners to establish and maintain adequate forest buffers along rivers, streams, and wetlands (i.e., riparian buffers). Tactics could include additional incentives and/or education. Focus especially in agricultural areas.	ALL	Forests, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Working Lands	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	High
9.3	9 Pollution	9.3 Agricultural & Forestry Effluents			Increase effectiveness of existing and future riparian buffers by increasing funding for maintenance and keeping up-to-date maps of project locations.	ALL	Forests, Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers, Working Lands	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
9.3.1	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.1 Nutrient loads		Reduce sources of groundwater contamination by implementing BMPs for nutrients on agricultural lands (i.e., conservation agriculture techniques).	ALL	Working Lands, Subterranean, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
9.3.3	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides		Develop strict protocols for restricting the use of pesticides, such as for mosquito control, in SGCN habitats.	ALL	CATCH-ALL	Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Seepage Swamp, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Low
9.3.3	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides		Explore regulatory means to limit or end use of pesticides and herbicides for "cosmetic" purposes.	ALL	Working Lands, (Sub)urban	Urban and Suburban Environment	Mid
9.3.3	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides		Regulate pest control companies to only allow <i>Bacillus thuringiensis</i> (BT) treatments rather than broad spectrum pesticides.	ALL	CATCH-ALL	Urban and Suburban Environment	High
9.3.3	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides	Commercial/residential use	Initiate new marketing and public service campaigns to educate the public on the harmful effects of inappropriate or off-label use of herbicides and pesticides, particularly those which are commercially available. Promote IPM as an alternative.	ALL	CATCH-ALL	Urban and Suburban Environment Managed Grassland Working Lands	High
9.3.3	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides	Agricultural use	Further restrict neonicotinoid (neonic) use in agriculture. Consider imitating recent legislative changes in New York by banning the use of neonic-covered seeds for corn and soybeans.	ALL	Working Lands	Managed Grassland	Mid

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IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
9.3.3	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides	Agricultural use	Provide improved education to farmers on the appropriate uses of synthetic pesticides. Explore incentives to promote non-synthetic alternatives whenever and wherever possible.	ALL	Working Lands	Managed Grassland	Mid
9.3.3	9 Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides	Agricultural use	Work with MDA to ensure that native plant buffers are established in agricultural lands in order to increase natural pest control and ecosystem services.	ALL	Working Lands	Managed Grassland	Mid
9.4.1	9 Pollution	9.4 Garbage & Solid Waste	9.4.1 Garbage		Improve public education on litter management, particularly on state lands. Utilize plastic pollution reduction campaigns such as 'pack it out' stations with provided bags.	ALL	CATCH-ALL		High
9.4.1	9 Pollution	9.4 Garbage & Solid Waste	9.4.1 Garbage		Increase coordination and education efforts regarding beach trash (e.g., better coordinate clean-ups; push "carry in, carry out" messaging; etc.)	Southern, Eastern, Central	Coastal Beaches/Dunes, Forests	Coastal Beach, Maritime Dune and Grassland, Maritime Forest and Shrubland	Low
9.4.1	9 Pollution	9.4 Garbage & Solid Waste	9.4.1 Garbage		Build on existing work (e.g., MDE's Historic Landfill Initiative) to locate and remove legacy waste disposal sites.	ALL	CATCH-ALL		Low
9.4.4	9 Pollution	9.4 Garbage & Solid Waste	9.4.4 Drifting plastic and entanglement rubbish	Discarded fishing tackle	Reduce wildlife conflicts and aquatic pollution from discarded fishing tackle by further promoting ethical angling practices.	ALL	Streams/Rivers, Bay/Ocean, Artificial Wetlands, Floodplain Wetlands, Tidal Wetlands	Artificial Impoundment and Artificial Wetland, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland	Low
9.4.4	9 Pollution	9.4 Garbage & Solid Waste	9.4.4 Drifting plastic and entanglement rubbish	Plastics	Continue to work to reduce dumping of garbage (particularly plastics) in the Atlantic Ocean through various means (e.g., educational, regulatory).	Eastern	Bay/Ocean	Atlantic Ocean	Low
9.6.1	9 Pollution	9.6 Excess Energy	9.6.1 Light pollution		Create state-level mandates, set of regulations, or educational campaign (similar to Lights Out Baltimore) regarding light pollution, especially during peak bat and bird migration months. Implement these policies and programs at the local community level.	ALL	(Sub)urban	Artificial Structure - Buildings and Other Structures	High

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9.6.3	9 Pollution	9.6 Excess Energy	9.6.3 Noise pollution		Create and enforce noise pollution regulations at the local, county, and state levels.	ALL	(Sub)urban		Mid
11	11 Climate Change				Better coordinate efforts in monitoring how/which species are affected by climate change (both plants and animals) in order to track populations, monitor overall impact, and adapt land management practices appropriately.	ALL	CATCH-ALL	Hemlock-Northern Hardwood Forest, Montane Acidic Fen, Coastal Plain Seepage Acidic Fen, Tidal Salt Marsh and Shrubland, Coastal Plain Flatwood and Depression Swamp, Maritime Swamp, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Coastal Beach	Mid
11	11 Climate Change				Support ongoing surveillance and continued monitoring of aquatic habitats, particularly for climate change-related events (e.g., increased algal blooms).	ALL	Streams/Rivers, Bay/Ocean, Artificial Wetlands, Tidal Wetlands	Artificial Impoundment and Artificial Wetland, Atlantic Sea Level Fen, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland	Low
11	11 Climate Change				Prepare for new invasive species and pathogens that are likely to establish themselves in Maryland due to changing climatic conditions. Create new guidance and rely on existing documentation, including MD DNR's Climate-Ready Fisheries Planning Menu (2024).	ALL	CATCH-ALL		Mid
11	11 Climate Change				Work with local and county governments to develop more localized models and plans for climate resiliency. Include aspects of flood response, stormwater management, storm damage, and major heat events.	ALL	CATCH-ALL		Low
11	11 Climate Change				Encourage the use of electric vehicles and lawn care equipment. Emphasize the multiple negative impacts of fossil fuel-powered equipment, including climate change and noise pollution, and continue to discourage overall usage through "leave the leaves" campaigns and similar initiatives.	ALL	CATCH-ALL	Urban and Suburban Environment	Mid

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11.1	11 Climate Change	11.1 Habitat Shifting & Alteration		Sea-level rise	Prioritize the conservation and restoration of rapidly disappearing islands, which is a vital habitat type for colonial waterbirds, tiger beetles, diamond-backed terrapins, and more.	Southern, Eastern	Bay/Ocean	Small Coastal Plain Islands	High
11.1	11 Climate Change	11.1 Habitat Shifting & Alteration		Sea-level rise	Prioritize the purchasing of lands abandoned due to sea-level rise to potentially assist with marsh migration. Continue and increase Conservation Reserve Enhancement Program (CREP) on agricultural lands that are no longer viable due to saltwater intrusion.	Southern, Eastern, Central	Tidal Wetlands, Working Lands, Coastal Beaches/Dunes	Intertidal Mudflat and Sand Flat, Tidal Salt Marsh and Shrubland, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Coastal Beach	Mid
11.1	11 Climate Change	11.1 Habitat Shifting & Alteration		Sea-level rise: marsh inundation	Continue and increase "living shoreline" efforts to help slow marsh and maritime/coastal forest loss due to sea-level rise.	Central, Southern, Eastern	Bay/Ocean, Streams/Rivers, Coastal Beaches/Dunes, Tidal Wetlands, Forests	Tidal Forest, Intertidal Mudflat and Sand Flat, Tidal Salt Marsh and Shrubland, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Coastal Beach	Low
11.1	11 Climate Change	11.1 Habitat Shifting & Alteration		Sea-level rise: marsh inundation	Continue research, development, and implementation of new sea-level rise mitigation techniques, such as "shallow runnels" and thin-layering, in order to slow marsh loss.	Eastern	Tidal Wetlands, Bay/Ocean	Tidal Forest, Intertidal Mudflat and Sand Flat, Tidal Freshwater Marsh and Shrubland, Tidal Brackish Marsh and Shrubland, Tidal Salt Marsh and Shrubland, Small Coastal Plain Islands	High
11.1.1	11 Climate Change	11.1 Habitat Shifting & Alteration	11.1.1 Changes in vegetation communities	Loss of SAV (submerged aquatic vegetation) beds	Restore depleted SAV beds with heat-resistant strains that will prove more resilient against increased temperatures.	Central, Southern, Eastern	Streams/Rivers, Bay/Ocean	Chesapeake Bay Coastal Plain Rivers	Mid
11.2.1	11 Climate Change	11.2 Changes in Geochemical Regimes	11.2.1 Changes in pH of habitats	Ocean acidification	Continue to support research regarding the impacts of ocean acidification on marine life.	Southern, Eastern	Bay/Ocean	Atlantic Ocean Coastal Bays	Low
11.3	11 Climate Change	11.3 Changes in Temperature Regimes			Further research the feasibility of using tree species with more southern ranges (i.e., those that will do well in the face of rising temperatures) to replace/bolster struggling native populations. Ensure that only non-invasives and species with similar ecological functions are considered.	ALL	Forests, (Sub)urban, Groundwater Wetlands	High Elevation Ridge Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Montane Acidic Fen	Low

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11.4	11 Climate Change	11.4 Changes in Precipitation & Hydrological Regimes			Update both state- and county-level stormwater management regulations, as climate change has been overwhelming current regulations.	ALL	CATCH-ALL		High
11.4	11 Climate Change	11.4 Changes in Precipitation & Hydrological Regimes			Assist county planning departments in using recent sea-level rise models to improve zoning in floodplains.	Central, Southern, Eastern	Floodplain Wetlands, Tidal Wetlands	Montane-Piedmont Floodplain Coastal Plain Floodplain, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland	Mid
11.4.4	11 Climate Change	11.4. Changes in Precipitation and Hyrdologic Regimes	11.4.4 Increase of fluctuations in the precipitation regime	100- and 1000-year floods are becoming more frequent due to tropical storms and other heavy precipitation events	Conduct expansive studies or literature reviews to evaluate the potential effects of increased flooding on freshwater habitats and SGCN.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands, Artificial Wetlands, Streams/Rivers	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression, Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Salt Marsh and Shrubland, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
11.5.2	11 Climate Change	11.5 Storms & Severe Weather	11.5.2 Storm surges	Salt-wedge encroachment into freshwater due to storm surges	Conduct expansive studies on salt-wedge encroachment to evaluate long term effects on freshwater habitats and SGCN.	Eastern, Southern	Streams/Rivers, Bay/Ocean, Floodplain Wetlands	Chesapeake Bay, Coastal Plain Rivers, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Low
12.2	12 Other Options	12.2 Resource Needs		Lack of funding	Explore options for a permanent and significant source of funding for conservation work. Options to pursue include a portion of an existing state tax, a new state tax, a biodiversity license plate, charging for environmental review, or federal sources (e.g., Recovering America's Wildlife Act [RAWA]).	ALL	CATCH-ALL		High

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12.2	12 Other Options	12.2 Resource Needs	Management decision needs	Need for fish, wildlife and/or habitat planning	Include habitat protection and connectivity needs in local and county land zoning plans (e.g., comprehensive plans) through increased communication, outreach, and/or incentives to counties planning departments.	ALL	CATCH-ALL		Mid
12.2	12 Other Options	12.2 Resource Needs	Management decision needs	Need for fish, wildlife and/or habitat planning	Periodically re-evaluate state conservation status (i.e., S-ranks) for SGCN.	ALL	CATCH-ALL		High
12.2	12 Other Options	12.2 Resource Needs	Management decision needs	Need for fish, wildlife and/or habitat planning	Review beaver management and survey techniques currently employed by state and federal agencies to determine relevance and potential action items for inclusion into Maryland guidance.	ALL	Tidal Wetlands, Streams/Rivers, Working Lands, Artificial Wetlands, Floodplain Wetlands, Groundwater Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression, Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Salt Marsh and Shrubland, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Lack of initial baseline inventory	Identify "almost old growth" forests, especially those on state land, in order to establish sample research areas that won't be harvested.	ALL	Forests	Basic Mesic Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest	Mid
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Lack of initial baseline inventory	Implement regular species surveys in grassland and early successional habitat.	ALL	Working Lands		Mid
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Lack of initial baseline inventory	Improve on existing lists of vernal pools in Maryland in order to build a more complete inventory of this habitat type.	ALL	Groundwater Wetlands	Vernal Pool	Low
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Lack of initial baseline inventory	Generate geographical data (e.g., MERLIN Online) on grassland habitat distribution, which will make it easier to advocate for grassland habitats and species. Work with the public and land managers to identify these areas.	ALL	Working Lands		Low

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12.2	12 Other Options	12.2 Resource Needs	Outreach needs	Lack of initial baseline inventory	Identify areas and habitat where beaver presence is already or would be beneficial to SGCN, including freshwater mussels and odonates.	ALL	Tidal Wetlands, Streams/Rivers, Working Lands, Artificial Wetlands, Floodplain Wetlands, Groundwater Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression, Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Salt Marsh and Shrubland, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Low
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Lack of research and surveying efforts regarding urban habitats and wildlife	Expand upon existing efforts in Baltimore to survey and map important urban species and habitats on a statewide scale.	ALL	(Sub)urban	Urban and Suburban Environment	Mid
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Lack of up-to-date existing information	Identify and improve mapping of "rock habitat" (outcrops, talus, caves, etc.) in order to provide proper protections, especially on state lands.	Western	Glades/Barrens/Cliffs, Subterranean	Acidic Glade and Barren, Basic Glade and Barren, Cliff, Talus, Rock Outcrop	Low
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Lack of up-to-date existing information	Increase capacity for monitoring, surveying, and researching caves and cave-dwelling species by building staff technical expertise.	Western	Subterranean	Cave and Karst	Low
12.2	12 Other Options	12.2 Resource Needs	Resource information collection needs	Need to answer research question	Work with universities, non-governmental organizations (NGOs), etc. to better understand the drivers behind dwindling fish populations. Mine existing data and conduct new research as necessary.	ALL	Streams/Rivers, Bay/Ocean	Atlantic Ocean, Chesapeake Bay, Coastal Plain Rivers, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
12.3	12 Other Options	12.3 Education & Outreach	Education needs	K-12 education needs	Encourage more schools to adopt Maryland's (relatively) new environmental literacy standards.	ALL	CATCH-ALL		Mid

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12.3	12 Other Options	12.3 Education & Outreach	Education needs	Lack of appreciation for urban trees (forests, street trees, etc.)	Improve education/outreach to urban residents regarding the benefits of urban trees, which are often seen as a risk due to the possibility of property damage, higher insurance costs, etc. Emphasize benefits such as improved stormwater management, decreased temperatures, and property value enhancement.	ALL	Forests, (Sub)urban	Urban and Suburban Environment	Low
12.3	12 Other Options	12.3 Education & Outreach	Education needs	Lack of understanding and appreciation of rare, threatened, and endangered species	Continue existing and create new efforts for education/outreach regarding the importance of conserving the state's rare, threatened, and endangered species. Utilize specific stories and species in order to have a greater, more personal/emotional impact.	ALL	CATCH-ALL		Low
12.3	12 Other Options	12.3 Education & Outreach	Education needs	Lack of understanding of and appreciation for grassland habitats, as well as how to maintain them	Improve education/outreach to farmers and other largescale landowners regarding the benefits of grassland habitat. Emphasize best practices for this habitat type as well, such as regenerative farming practices and the proper management of grazed farmlands, through both existing programs and new incentives.	ALL	Working Lands	Managed Grasslands	Mid
12.3	12 Other Options	12.3 Education & Outreach	Education needs	Lack of understanding regarding Critical Area requirements	Better educate large landowners and realtors regarding Critical Area property restrictions/requirements, including restrictions on tree removal and requirements for stormwater management.	Central, Southern, Eastern	Forests, Floodplain Wetlands, Tidal Wetlands, Streams/Rivers, Bay/Ocean, Working Lands, (Sub)urban		Low
12.3	12 Other Options	12.3 Education & Outreach	Education needs	Lack of understanding regarding how wildlife conservation is funded	Increase education/outreach to the public regarding how wildlife conservation is funded, emphasizing that no general state tax dollars go towards this work.	ALL	CATCH-ALL		Mid

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12.3	12 Other Options	12.3 Education & Outreach	Education needs	Lack of understanding regarding prescribed burning and best practices.	Work with groups such as the Maryland Prescribed Fire Council to increase public education regarding the importance and benefits of targeted prescribed burning (both educational materials and more hands-on demonstrations). Continue dispelling common fears/myths, such as out-of-control forest fires.	ALL	Forests, Working Lands, Glades/Barrens/Cliffs	Coastal Plain Oak-Pine Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest, Maritime Forest and Shrubland, Shale Barrens, Acidic Glade and Barren, Cliff, Talus, and Rock Outcrop, Maritime Dune and Grassland	Mid
12.3	12 Other Options	12.3 Education & Outreach	Education needs	Need for improved knowledge of fish and wildlife and their habitats	Continue to explore opportunities to incorporate beaver-influenced habitat into public land management for habitat conservation and educational purposes.	ALL	Streams/Rivers, Artificial Wetlands, Floodplain Wetlands, Groundwater Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Coastal Plain Flatwood and Depression Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Low
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Provide more outreach and education on available technical assistance programs, easements, etc. There are already a variety of available programs (state government, county government, University of Maryland Extension, etc.), but many landowners do not know they exist.	ALL	CATCH-ALL		High
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Work with less "traditional" conservation partners such as scout groups, church groups, and civic centers to better distribute conservation-related messages and information.	ALL	CATCH-ALL		Mid
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Work more closely with smaller, community-based environmental NGOs to improve direct connections between people and nature (i.e., human-nature relationship building). Explore additional possibilities for funding these smaller-scale NGOs.	ALL	CATCH-ALL		Low

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12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Build public interest in natural area stewardship through additional community workdays, opportunities for student volunteer hours, and creatively funded positions (e.g., AmeriCorps). Invasive species removal projects and surveying efforts are good ways to reach the most people.	ALL	CATCH-ALL		High
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Reach more people with conservation messaging through less traditional online means (YouTube shorts, Reddit, podcasts, etc.).	ALL	CATCH-ALL		Low
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Improve the marketing of conservation plans to the general public in order to increase awareness and interest.	ALL	CATCH-ALL		Low
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		In certain outreach and education efforts, especially those to less receptive audiences, (continue to) center the economic valuation of Maryland's natural resources to make the case for investment in wildlife conservation.	ALL	CATCH-ALL		Low
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Increase efforts to influence legislators making infrastructure decisions that affect important habitat, especially in the realm of energy infrastructure.	ALL	CATCH-ALL		Mid
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Increase outreach to urban residents and improve access to nature through initiatives such as nature camps, firefly walks, and new urban natural areas.	ALL	(Sub)urban		Mid
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs		Research the feasibility of a state park (or similar) in Baltimore City in order to reach a new audience. Alternatively/additionally, improve non-car access to Patapsco State Park from Baltimore.	Central	(Sub)urban		Low

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12.2	12 Other Options	12.3 Education & Outreach	Outreach needs		Elevate the visibility of beaver co-existence strategies and resources within DNR communications in order to increase cultural tolerance of beaver influenced habitat.	ALL	Tidal Wetlands, Streams/Rivers, Working Lands, Artificial Wetlands, Floodplain Wetlands, Groundwater Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression, Swamp, Delmarva Bay, Maritime Swamp, Montane-Piedmont Floodplain, Coastal Plain Floodplain, Tidal Salt Marsh and Shrubland, Intertidal Mudflat and Sand Flat, Tidal Forest, Tidal Brackish Marsh and Shrubland, Tidal Freshwater Marsh and Shrubland, Artificial Impoundment and Artificial Wetland	Mid
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs	Disproportionately low outreach to non-English speakers	Increase existing efforts (e.g., funding, materials, staff capacity) for non-English language outreach and education. Until capacity is larger, focus on the translation of existing materials and providing a presence at public cultural events.	ALL	CATCH-ALL		Low
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs	Lack of focus on underrepresented communities	Make a concerted effort to include a more diverse group of participants in outreach efforts, volunteer opportunities, and other events by diversifying timing, availability, and length of engagement opportunities.	ALL	CATCH-ALL		Mid
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs	Lack of oversight for HOAs, corporate bodies, and other quasi-community groups	Increase outreach to homeowner associations (HOAs) and similar organizations in order to promote environmentally friendly land management practices for groups with large holdings. Consider setting up advisory committee(s) of HOA members, government representatives, and NGO staff.	ALL	CATCH-ALL		Low

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12.3	12 Other Options	12.3 Education & Outreach	Outreach needs	Lack of public trust in state management and expertise	Improve data sharing and transparency in targeted areas. Hold more meetings and roundtables with stakeholders as well as the general public in order to increase trust, transparency, and input in the decision-making process.	ALL	CATCH-ALL		Mid
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs	Lack of social science expertise	Better incorporate social sciences into outreach and education techniques in order to reach diverse sets of people and encourage behavior change.	ALL	CATCH-ALL		Mid
12.3	12 Other Options	12.3 Education & Outreach	Outreach needs	Lack of surveyors for aquatic surveys	Encourage and assist with the development of community science groups to participate in stream assessments, spawning surveys, etc.	ALL	Streams/Rivers, Bay/Ocean	Chesapeake Bay, Atlantic Ocean, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Low
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for agency organizational planning to meet goals and objectives	Consider adapting Maryland's 5 Million Trees initiative to include smaller plants (i.e., shrubs) in order to promote a wider variety of habitats.	ALL	Forests, Working Lands, (Sub)urban		Low
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Continue to participate in the Northeast Association of Fish and Wildlife Agencies (NEAFWA) Northeast Landscape Wildlife Conservation Committee and other landscape and watershed scale conservation partnerships, which provide Maryland with opportunities to implement coordinated conservation actions, reduce redundancy, save time and money, and combine resources to conserve landscapes and habitats for the benefit of people and the future of fish and wildlife.	ALL	CATCH-ALL		Low
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Expand upon existing work by Audubon Mid-Atlantic regarding saltmarsh conservation and restoration. Establish a coordinated effort that involves multiple partners, sites, and objectives.	Eastern	Tidal Wetlands	Tidal Brackish Marsh and Shrubland Tidal Salt Marsh and Shrubland	Mid

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12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Pursue opportunities for larger scale coordination and collaboration. Specific needs include species/habitat inventory, research (existing and future), invasive species management, and more.	ALL	CATCH-ALL		High
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Facilitate better coordination between state agencies, conservation organizations, and other nonprofit groups to reduce competition for funding sources and volunteers, and increase effectiveness.	ALL	CATCH-ALL		Mid
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Work with Forest Service, conservation partners, etc. to implement forest conservation on private lands, especially where adjacent to public land. Improve incentives to landowners.	ALL	Forests	Basic Mesic Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest	High
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Increase collaboration between foresters, wildlife conservationists, landowners, and others when creating forest stewardship plans. Potentially do this through a standing group that can establish considerations for wildlife, management techniques, educational materials, etc.	ALL	Forests	Basic Mesic Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest	High
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Foster increased collaboration between organizations and programs responsible for aquatic habitat/species management and conservation (DNR, MDE, NGOs, etc.). Utilize intentional and targeted landowner engagement to encourage cooperation across multiple properties.	ALL	Streams/Rivers, Bay/Ocean	Chesapeake Bay, Atlantic Ocean, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid
12.4	12 Other Options	12.4 Administrative Needs	Coordination/administration needs	Need for coordination for effective program/project management	Better identify, research, and manage fish-bird conflicts (e.g., menhaden and osprey population concerns) by increasing collaboration and communication among appropriate agencies and programs.	ALL	Streams/Rivers, Bay/Ocean	Chesapeake Bay, Atlantic Ocean, Montane-Piedmont Floodplain, Coastal Plain Floodplain	Mid

Appendix 6b. Habitat-level threats and actions

IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
12.5	12 Other Options	12.5 State Specific Issues		Lack of incentives for land conservation, particularly in urban areas	Work with local, state, and federal agencies to create and build upon existing conservation incentives for landowners, especially for wooded urban and suburban areas.	ALL	Forests, (Sub)urban	Urban and Suburban Environment	Mid
12.5	12 Other Options	12.5 State Specific Issues		Lack of smaller scale land easements	Explore ways to incentivize less wealthy landowners (i.e., lower- and middle-income landowners who typically do not benefit from easement tax incentives) to conserve land. Tactics could include the selling of tax credits, financial assistance to cover legal and surveying costs, etc.	ALL	CATCH-ALL		Low
12.5	12 Other Options	12.5 State Specific Issues		Need to meet land preservation goals	Continue to work towards land preservation goals set by the 2023 Maryland the Beautiful Act.	ALL	CATCH-ALL		Low
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Strengthen protections for vernal pools, springs, and other isolated wetlands. May want to establish a vernal pool (and related habitat) conservation workgroup across multiple fields of expertise in order to better identify, map, and create management actions for these habitats.	ALL	Groundwater Wetlands	Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Delmarva Bay, Maritime Swamp, Vernal Pool, Spring	High
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Increase efforts to protect caves and cave drainages through easements and property acquisition.	Western	Subterranean	Cave and Karst, Mine and Tunnel	High
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Increase efforts to protect floodplains and wetlands (especially tidal wetlands, which are threatened by sea-level rise) through easements and property acquisition.	ALL	Floodplain Wetlands, Groundwater Wetlands, Tidal Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Delmarva Bay, Maritime Swamp, Vernal Pool, Spring	High
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Increase efforts to protect grassland habitat through easements and property acquisition.	ALL	Working Lands	Managed Successional Forest, Managed Grasslands, Managed Montane Conifer Forest, Roadside and Utility Right-of-Way	High

Appendix 6b. Habitat-level threats and actions

IUCN Code	IUCN Level 1	IUCN Level 2	IUCN Level 3	Further Threat Description (if needed)	Conservation Action (WHAT)	Applicable regions	Applicable habitat groups	Priority KWHs	Priority Level
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Increase efforts to protect forested habitat through easements and property acquisition.	ALL	Forests	Basic Mesic Forest, Cove Forest, Hemlock-Northern Hardwood Forest, Coastal Plain Oak-Pine Forest, Oak-Hickory Forest, High Elevation Ridge Forest, Montane-Piedmont Oak-Pine Forest	High
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Increase enforcement of laws such as the Forest Conservation Act and Critical Area law in order to better protect forested habitats.	ALL	Forests		Low
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Expand bog protection overlay zone beyond Anne Arundel County. Potentially model a state-wide overlay zone after the County's program.	ALL	Floodplain Wetlands, Groundwater Wetlands	Montane-Piedmont Floodplain, Coastal Plain Floodplain, Montane-Piedmont Seepage Swamp, Montane Acidic Fen, Piedmont Seepage Wetland, Coastal Plain Seepage Acidic Fen, Coastal Plain Seepage Swamp, Piedmont Upland Depression Swamp, Coastal Plain Flatwood and Depression Swamp, Delmarva Bay	Mid
12.5	12 Other Options	12.5 State Specific Issues		Need for increased legal protection	Consider additional protections for SGCN that are not (yet) listed as Threatened or Endangered in Maryland.	ALL	CATCH-ALL		Low
12.5	12 Other Options	12.5 State Specific Issues		Need for updates to existing laws/regulations and enacting new laws/regulations	Provide a tax break for people who donate land easements across all Maryland counties, not just some of them.	ALL	CATCH-ALL		Low