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ELEMENT 3: PROBLEMS AFFECTING SGCN AND THEIR HABITATS

Abstract

Maine's Wildlife Action Plan focuses much attention on the habitats used by Species of Greatest Conservation Need (SGCN). The Plan uses a coarse filter – fine filter approach to conservation to ensure, where possible, that individual conservation initiatives benefit multiple species, while also acknowledging that some species require individualized attention. We assigned stressors to both habitats and to SGCN, in order to clearly identify the issues that should be addressed at each level in the conservation hierarchy. As with most other states in the Northeast, we identified stressors using the International Union for the Conservation of Nature (IUCN) Threat Classification Scheme. While the IUCN system is useful for categorizing stressors to SGCN and their habitats, we found that the system lacks the resolution to clearly identify the specific issues that should be considered for conservation attention. Therefore, when assigning stressors we chose to adopt the primary and secondary IUCN categories, but replaced the tertiary category with a detailed narrative that fully describes the issue and its impact on the species or habitat being considered. In addition, we adapted Table 7 (*Threat characteristics and categorical ratings)* from The Northeast Lexicon to identify characteristics for each stressor assignment.

We assigned stressors to Priority 1 and 2 SGCN, and assigned 'Severity' and 'Actionabilty' characteristics for each Stressor – SGCN interaction. The concepts of Likelihood, Certainty and Spatial Extent were considered implicitly, and only those Stressors that were determined to have a moderate or high impact for each of these characteristics were assigned. In addition, only those stressors with moderate or high severity were assigned to SGCN. In addition, we developed a simple matrix to prioritize SGCN stressors, using the combination of the Impact scores for 'Severity' and 'Actionability.' We identified stressors for terrestrial and freshwater aquatic habitats using Anderson at al. (2013) as our primary source of reference material. Because no single comprehensive source is available that describes that state of marine habitats along Maine's coast, we used a wide variety of scientific publications to compile information on stressors. We assumed that the habitat systems within each terrestrial and marine macrogroup all faced similar conservation problems; therefore we assigned stressors to each macrogroup, but did not identify stressors separately for each habitat system, with the exception of freshwater aquatic habitats (River and Streams, and Lakes and Ponds) were we identified stressors separately for each of systems Unlike our approach for SGCN, we assigned all 7 stressor characteristics for each habitat – stressor combination.

We assigned 38 unique stressors to 190 Priority 1 and 2 SGCN species, for a total of 1,108 SGCN – stressor combinations. Habitat Shifting or Alteration, Lack of Knowledge, and Fishing

and Harvesting of Aquatic Resources were identified as stressors for the largest number of total SGCN. Lack of Knowledge, Agricultural and Forestry Effluents, and Fishing and Harvesting of Aquatic Resources were identified as medium-high or high priority stressors for the largest number of SGCN. We assigned 31 unique stressors to 34 habitats macrogroups, for a total of 342 habitat – stressor combinations. Invasive Non-native/Alien Species/Diseases, Roads and Railroads, and Housing and Urban Areas were assigned to the largest number of habitats.

Differences from Maine's 2005 Comprehensive Wildlife Conservation Strategy are discussed.

INTRODUCTION

In previous chapters, we summarized what we know about the abundance and distribution of Maine's fauna, described how we selected Species of Greatest Conservation Need (SGCN), and described how we identified and characterized Maine's key habitats. In this chapter, we outline how we integrated this information with information on problems facing SGCN and their habitats.

The problems that impact SGCN are often multi-faceted, with a variety of ultimate and proximate causes that lead to negative impacts on a species' habitat, behavior, or health. In some cases, issues that have negative impacts for some species, such as a particular type of agriculture, may be highly beneficial to other species. Therefore, the factors that impact SGCN must be considered thoughtfully, with recognition that measures designed to resolve problems faced by one species may have negative implications for others. This is especially important in Maine, where much of the state is privately owned and managed for the production of forestry or agricultural products; invariably these activities are less impactful on SGCN than alternate land uses, such as commercial development. Nonetheless, identifying problems for SGCN and their habitats is a fundamental step towards developing meaningful Conservation Actions that will have the greatest benefit for the full suite of SGCN that are present in Maine.

Differences from Maine's 2005 Comprehensive Wildlife Conservation Strategy

In 2005, MDIFW used a variety of international, national, regional, and state plans and initiatives to compile information on the problems impacting SGCN and their habitats. Efforts were focused on Priority 1 and Priority 2 species, with some attention also given to Priority 3 species in certain taxanomic groups. The plan identified the major known threats to each SGCN, with recognition that additional threats existed that were poorly understood or were of relatively low priority. The information was descriptive, and did not follow a standardized approach for threat categorization or nomenclature.

In this plan, we made several revisions to our approach for identifying problems for SGCN and their habitats, including:

- Replaced the term 'threat' with 'stressor' to acknowledge that factors that are a problem for some SGCN may be beneficial for others, and that the term 'threat' has a negative connotation.
- In addition to identifying stressors for habitats, we identified stressors for Priority 1 and Priority 2 SGCN, but not Priority 3 species.

- Utilized the International Union for the Conservation of Nature (IUCN) Threat Classification Scheme to categorize stressors.
- Used an adapted version of Table 7 (*Threat characteristics and categorical ratings)* from The Northeast Lexicon to identify characteristics for each stressor assignment.
- Categorized SGCN stressors as either Low, Medium, Medium-High, or High priority for Action.

Assigning Stressors – General Considerations

Although Maine's Wildlife Action Plan is ultimately intended to benefit SGCN, our plan focuses much attention on that habitats used by these species. This coarse filter – fine filter approach to conservation ensures that, where possible, individual conservation initiatives benefit multiple species, while also acknowledging that some species require individualized attention. In keeping with this approach, we assigned stressors to both habitats and to SGCN, in order to clearly identify the issues that should be addressed at each level in the conservation hierarchy. We assumed that the stressors identified for habitats would apply to the SGCN that used those habitats, reducing or eliminating the need to assign these same stressors to individual SGCN. To advance our goal of developing a highly prioritized, streamlined Action Plan, we used a strategic approach to identify stressors to SGCN that included assignment of only those stressors that are currently having, or in the near future are likely to have, a significant impact on high priority SGCN (see section 5.1.4 for further detail).

To identify stressors specific to SGCN species and their habitats, we consulted international, national, regional, and state plans and initiatives, including Maine's 2005 Comprehensive Wildlife Conservation Strategy. We also consulted recent scientific literature, particularly for marine species, which were not fully included in Maine's 2005 Plan. Our knowledge base of threats was also supplemented from our comprehensive species planning process. As part of the planning process, we develop species assessments for individual species or groups of species, which require the author (species expert) to identify known threats to the species and their habitats. Other species experts review these assessments and provide additional input, and the species public working group further identifies threats to the species and its habitats as they develop species management goals and objectives. We also relied on species experts within MDIFW and DMR, who through years of experience and accumulated knowledge, have become very familiar with the threats facing the species they work with. Finally, Conservation Partners were given the opportunity to critique these tables and provide further input, which several chose to do. For more detailed information on sources we consulted, please refer to the *Literature Cited and References* section of this document.

Although we sought to identify the major, known threats to each SGCN and habitat, we know that there may be threats that we did not list. Also, our knowledge of some species is very limited, and consequently we may not clearly understand the threats they face.

Stressor Classification and Characteristics

As with most other states in the Northeast, we identified stressors using the International Union for the Conservation of Nature (IUCN) Threat Classification Scheme (http://www.iucnredlist.org/technical-documents/classification-schemes/threats-classification-scheme). This classification scheme was developed to provide conservationists with a universal menu of terminology to describe the "proximate human activities or processes that have impacted, are impacting, or may impact the status of the taxon being assessed" (IUCN 2015).

The IUCN classification scheme is hierarchical, and includes 11 primary (Level 1) threat categories, 44 secondary (Level 2) categories, and 76 tertiary (Level 3) categories. The categories are customizable, and may be expanded at each level in the hierarchy if doing so is necessary to adequately describe the impact being assessed. Although some categories are not applicable to Maine (e.g. earthquakes, volcanoes), an initial assessment of the IUCN hierarchy determined most factors that negatively impact SGCN in our state were included in the classification system. Table 3.1 contains a list of the IUCN Level 2 threat categories that were determined to impact SGCN and their habitats in Maine, a brief description of those stressores, and where applicable, examples of positive impacts that the stressor may have for wildlife.

While the IUCN system is useful for categorizing stressors to SGCN and their habitats, and will ultimately allow multi-state summaries of these factors across the Northeast region, we found that the system lacks the resolution to clearly identify the specific issues that should be considered for conservation attention. Therefore, when assigning stressors we chose to adopt the primary and secondary IUCN categories (e.g. the first and second levels of the hierarchy), but replaced the tertiary category with a detailed narrative that fully describes the issue and its impact on the species or habitat being considered. This approach provided more detailed information on the stressor than the IUCN system allows, which we ultimately found important when considering whether stressors should be addressed with conservation actions.

In addition to identifying stressors using a modified version of the IUCN system, we adapted Table 7 (*Threat characteristics and categorical ratings)* from The Northeast Lexicon to identify characteristics for each stressor assignment (The Northeast Lexicon 2013). This table presents six Threat Characteristics that can be used to help describe the specific nature of a particular stressor: Severity, Reversibility, Immediacy, Spatial Extent, Certainty, and Likelihood. Each characteristic can be identified as having a low, moderate, or high level of impact (Table 3.2). We added an additional characteristic – Actionability – in order to more explicitly indicate the relative ease with which the impact of the stressor could be addressed through prevention, restoration, or mitigation. We determined that a stressor is Actionable if either the stressor itself, or the impact of the stressor, can be reversed, prevented, or mitigated in some way. Conceptually, Actionability is similar to, but distinct from the concept of 'Reversibility'. While 'Reversibility' considers only whether the impact of the stressor can be reversed once it occurs, 'Actionability' incorporates the idea that preventing or mitigating the impact of a stressor can be just as effective, and in some cases more desireable, than reversing the impact once it has already occurred.

Table 3.1. Nomenclature, Descriptions, and Examples of Positive Impacts on Wildlife for IUCN Threat Categories assigned to SGCN and Habitats in Maine.

IUCN Threat Category	Description	Example of Positive Impact on Wildlife
Residential and Commercial Development		
Housing and Urban Areas	Human cities, towns, and settlements including non-housing development typically integrated with housing	Some species are adept at utilizing human-food sources and habitats provided in residential areas
Commercial and Industrial Areas	Factories and other commercial centres	Large commercial buildings may provide nesting habitat for some species (e.g. Peregrine Falcons)
Tourism and Recreational Areas	Tourism and recreation sites with a substantial footprint	These areas often enhance the public's perceptions of wildlife and the outdoors, which is important to building support for conservation
Agriculture and Aquaculture		
Annual and Perennial Non-timber crops	Crops planted for food, fodder, fibre, fuel, or other uses	Provides forage for a wide variety of wildlife species
Livestock Farming and Ranching	Domestic terrestrial animals raised in one location on farmed or non-local resources (farming); also domestic or semi-domesticated animals allowed to roam in the wild and supported by natural habitats (ranching)	Maintains grassland habitat required by many wildlife species
Marine and Freshwater Aquaculture	Aquatic animals raised in one location on farmed or non-local resources; also hatchery fish allowed to roam in the wild	Reduces reliance on wild-caught fish for human consumption
Energy Production and Mining		
Oil and Gas Drilling	Exploring for, developing, and producing petroleum and other liquid hydrocarbons	
Mining and Quarrying	Exploring for, developing, and producing minerals and rocks	

Renewable Energy	Exploring, developing, and producing renewable energy	Reduces reliance on non-renewable energy sources
Transportation and Service Corridors		
Roads and Railroads	Surface transport on roadways and dedicated tracks	
Utility and Service Lines	Transport of energy & resources	Provides early successional habitat important for some wildlife (e.g. New England Cottontail)
Shipping Lanes	Transport on and in freshwater and ocean waterways	
Biological Resource Use		
Hunting and Collecting Terrestrial Animals	Killing or trapping terrestrial wild animals or animal products for commercial, recreation, subsistence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch	Important wildlife management tool to help prevent overabundant wildlife populations
Gathering Terrestrial Plants	Harvesting plants, fungi, and other non-timber/non-animal products for commercial, recreation, subsistence, research or cultural purposes, or for control reasons	Can increase society's connection with wildlife, often leading to increased support for conservation
Logging and Wood Harvesting	Harvesting trees and other woody vegetation for timber, fibre, or fuel	Provides wildlife habitat for many species by altering forest structure and composition
Fishing and Harvesting of Aquatic Resources	Harvesting aquatic wild animals or plants for commercial, recreation, subsistence, research, or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch	Can increase society's connection with wildlife, often leading to increased support for conservation
Human Intrusions and Disturbance		
Recreational Activities	People spending time in nature or traveling in vehicles outside of established transport corridors, usually for recreational reasons	Improves society's connection with wildlife, often leading to increased support for conservation

War, Civil Unrest and Military Exercises	Actions by formal or paramilitary forces without a permanent footprint	
Work and Other Activities	People spending time in or traveling in natural environments for reasons other than recreation or military activities	
Natural Systems Modifications		
Fire and Fire Suppression	Suppression or increase in fire frequency and/or intensity outside of its natural range of variation	Fire (both natural and prescribed) can enhance some wildlife habitats and is required for regeneration in some forest types
Dams and Water Management/Use	Changing water flow patterns from their natural range of variation either deliberately or as a result of other activities	
Other Ecosystem Modifications	Other actions that convert or degrade habitat in service of "managing" natural systems to improve human welfare	
Invasive and Other Problematic Species, Genes and Diseases		
Invasive Non-native/Alien Species/Diseases	Harmful plants, animals, pathogens and other microbes not originally found within the ecosystem(s) in question and directly or indirectly introduced and spread into it by human activities	
Problematic Native Species/Diseases	Harmful plants, animals, or pathogens and other microbes that are originally found within the ecosystem(s) in question, but have become "out-of-balance" or "released" directly or indirectly due to human activities	
Problematic Species/Diseases of Unknown Origin	Harmful plants, animals, or pathogens and other microbes of unknown origin.	
Viral/Prion-induced Diseases	Viruses are small infectious agents that replicate only inside the living cells of an organism. Prions are infectious agents composed of protein in a misfolded form.	

Pollution		
Domestic and Urban Waste Water	Water-borne sewage and non-point runoff from housing and urban areas that include nutrients, toxic chemicals and/or sediments	
Industrial and Military Effluents	Water-borne pollutants from industrial and military sources including mining, energy production, and other resource extraction industries that include nutrients, toxic chemicals and/or sediments	
Agricultural and Forestry Effluents	Water-borne pollutants from agricultural, silivicultural, and aquaculture systems that include nutrients, toxic chemicals and/or sediments including the effects of these pollutants on the site where they are applied	
Garbage and Solid Waste	Rubbish and other solid materials including those that entangle wildlife	
Air-Bourne Pollutants	Atmospheric pollutants from point and nonpoint sources	
Excess Energy	Inputs of heat, sound, or light that disturb wildlife or ecosystems	
Climate Change and Severe Weather		
Habitat Shifting or Alteration	Major changes in habitat composition and location	Changing habitat composition will benefit species that utilize the new habitat type
Droughts	Periods in which rainfall falls below the normal range of variation	
Temperature Extremes	Periods in which temperatures exceed or go below the normal range of variation	
Storms and Flooding	Extreme precipitation and/or wind events	Wind events can result in the creation of early successional habitats, benefiting some wildlife species

Table 3.2. Characteristics and rankings used to summarize stressors assigned to SGCN and Habitats. Adapted from the Northeast Lexicon (2013).

Stressor Characteristic	Low Impact	Moderate Impact	High Impact
Severity	**Slight Severity**: Degree of ecological change is minor	**Moderate Severity:** Degree of ecological change is substantial	**Severe:** Degree of ecological change is major
Actionability (Consider the likelihood of implementing Conservation Actions to begin reducing the impact of the Stressor within the next 10 years)	**Actionable with Difficulty:** Impacts of a Stressor can only be minimally reversed, prevented, or mitigated, and cost or logistics make solutions difficult to implement	**Moderately Actionable:** Impacts of a Stressor can be reversed, prevented, or mitigated, however solutions are only partially effective or may be difficult to implement	**Highly Actionable:** Impacts of the Stressor can be reversed, prevented, or mitigated with proven strategies, at relatively low costs and with few logistical difficulties
Reversibility (Consider the likelihood of reversing the impacts within 10 years)	**Reversible:** Effects of the threat can be reversed by proven actions	**Reversible with difficulty:** effects of the threat may be reversed but costs or logistics make action impractical	**Irreversible:** Effects of the threat are irreversible
Immediacy (This characteristic assesses the time scale over which impacts of the threat will be observable)	**Long-term:** Effects of the threat are expected in 10-100 years given known ecosystem interactions or compounding threats	**Near-term:** Effects of the threat are expected within the next 1-10 years	**Immediate:** Effects of the threat are immediately observable (current or existing)
Spatial Extent (Consider the impact of threat within 10 years)	**Localized:** (<10%) A small portion of the habitat or population is negatively impacted by the threat.	**Dispersed or Patchy:** (10-50%)	**Pervasive:** (>50%) A large portion of the habitat or population is negatively impacted by the threat.
Certainty (This characteristic is used to assess the certainty surrounding the threat and its impacts)	**Low Certainty:** threat is poorly understood, data are insufficient, or the response to threat is poorly understood	**Moderate Certainty:** some information describing the threat and ecological responses to it is available, but many questions remain	**High Certainty:** Sufficient information about the threat and ecological responses to it is available
Likelihood (Consider impact of the threat within 10 years.)	**Unlikely:** Effects of the threat are unlikely to occur (less than 30% chance)	**Likely:** effects of threat are likely to occur (30-99% chance)	**Occurring:** effects of the threat are already observable (100% chance)

Assigning and Prioritizing Stressors for SGCN

We assigned stressors to Priority 1 and Priority 2 SGCN, and assigned 'Severity' and 'Actionabilty' characteristics for each of Stressor – SGCN interaction (Table 5.2). The concepts of Likelihood, Certainty and Spatial Extent were considered implicitly, and only those Stressors that were determined to have a moderate or high impact for each of these characteristics were assigned. In addition, only those stressors with moderate or high severity were assigned to SGCN. Using this approach, those stressors with low importance for a particular species were excluded from further consideration, in recognition that these low-priority issues were not likely to be considered for conservation action if they only impacted a single SGCN or were not impacting a habitat itself.

In addition, we developed a simple matrix to prioritize SGCN stressors, using the combination of the Impact scores for 'Severity' and 'Actionability' (Figure 3.1). These priority levels were considered during the assignment of Conservation Actions (see Element 4).

Figure 3.1. SGCN Stressor Priority Level based on Severity and Reversibility.

		Severity	
		Moderate	**Severe**
Actionability	**Highly Actionable**	Medium - High	High
	Moderately Actionable	Medium	Medium - High
	Actionable with Difficulty	Low	Low

Assigning Stressors for Habitats

We identified stressors for terrestrial and freshwater aquatic habitats using Anderson at al. (2013) as our primary source of reference material. Because no single comprehensive source is available that describes that state of marine habitats along Maine's coast, we used a wide variety of scientific publications, which are listed in the Literature Cited, to compile information on stressors. We assumed that the habitat systems within each terrestrial and marine macrogroup all faced similar conservation problems; therefore we assigned stressors to each macrogroup, but did not identify stressors separately for each habitat system. However, because we determined that the macrogroups for freshwater aquatic habitats (River and Streams, and Lakes and Ponds) were too coarse for assigning stressors in a meaningful way,

we identified stressors separately for each of these systems. Unlike our approach for SGCN, we assigned all 7 stressor characteristics (Table 3.2) for each habitat – stressor combination. Although we acknowledge that there may be stressors that we did not list, we attempted to assign all known stressors for each habitat, regardless of severity or impact level for other characteristics. Our stressor assignments for habitats were intended to be comprehensive, in recognition that over the long term, relatively minor problems within a habitat could have important implications for large numbers of SGCN. In addition, this approach increased the likelihood that a problem would be identified for potential conservation attention if it impacted a species' habitat, even if it was not assigned for an SGCN because it was of slight severity.

STRESSORS TO SGCN

We assigned 38 unique stressors to 190 Priority 1 and Priority 2 SGCN species, for a total of 1,108 SGCN – stressor combinations. Because of the complexity of species-specific stressors and the sheer volume of information, we do not attempt to summarize and discuss all stressors, but instead refer the reader to reports for individual species. However, for ease of reference, we developed Table 3.3, which is includes a list of the Secondary (Level 2) IUCN threat categories and the number of Priority 1 and 2 SGCN, as well as the number of Habitat Macrogroups, that were associated with each category. Complete stressor reports can be downloaded by clicking on the hyperlinks embedded within the table.

Habitat Shifting or Alteration, Lack of Knowledge, and Fishing and Harvesting of Aquatic Resources were identified as stressors for the largest number of total SGCN, affecting 109, 109, and 69 species, respectively (Table 3.3). Each of these stressors impacted more than one-third of all Priority 1 and Priority 2 SGCN, indicating that they are wide-spread, pervasive issues that occur across taxanomic groups. However, a simple evalution of the numbers of species impacted by each stressor does not necessarily translate into priority for conservation attention. In fact, our assessment indicated that a relatively small number of SGCN stressors were both highly severe and highly actionable, resulting in a high priority ranking (Fig. 3.2). Only 30% of SGCN stressors were classified as either high or medium-high priority for action, indicating that they were both severe enough to warrant immediate attention, and that solutions are available to mitigate, reverse, or prevent the impact of the stressor. In fact, of the 38 unique stressors that were assigned to SGCN, only 27 were determined to be of medium-high or high priority for one or more species.

Lack of Knowledge, Agricultural and Forestry Effluents, and Fishing and Harvesting of Aquatic Resources were identified as medium-high or high priority stressors for the largest number of SGCN (Table 3.4). Interestingly, Habitat Shifting or Alteration, which was found to impact a large number of SGCN, was identified as a priority stressor for only one SGCN. In most cases, impacts from Habitat Shifting or Alteration were related to changes in habitat that will occur as a result of predicted levels of climate change. Common examples include the direct impacts of increasing seawater temperatures on coastal species, effects of shifts in forest composition on terrestrial species, and loss of saltmarsh habitat due to sea level rise. Although these effects are diverse and statewide in scope, most are not highly actionable at the level of individual

SGCN within the scope of an individual state's Wildlife Action Plan, or are not predicted to have severe impacts on those species. However, we fully recognize the long-term implications of climate change for SGCN in Maine, and address these issues more fully at the coarse-filter (habitat) scale. We also refer readers to Whitman et al. (2013) for more information on the potential impacts of climate change on SGCN and their habitats in Maine.

Table 3.3. IUCN Threat Category and the Number of Priority 1 SGCN, Priority 1 SGCN, and Habitat Macrogroups associated with each category. Complete stressor reports can be downloaded by clicking on the hyperlinks embedded within the table.

Threat Category	Priority 1 SGCN	Priority 2 SGCN	Total SGCN	Habitat Macrogroups
Housing and Urban Areas.pdf	27	34	61	20
Commercial and Industrial Areas .pdf	20	17	37	19
Tourism and Recreational Areas.pdf	5	0	5	6
Annual and Perennial Non-timber crops.pdf	9	18	27	7
Livestock Farming and Ranching.pdf	3	3	6	0
Marine and Freshwater Aquaculture.pdf	1	0	1	6
Oil and Gas Drilling.pdf	9	12	17	5
Mining and Quarrying.pdf	8	10	18	0
Renewable Energy.pdf	13	16	29	7
Roads and Railroads.pdf	16	24	40	10
Utility and Service Lines.pdf	5	3	8	19
Shipping Lanes.pdf	4	4	8	16
Hunting and Collecting Terrestrial Animals.pdf	4	4	8	11
Gathering Terrestrial Plants.pdf	0	0	0	0
Logging and Wood Harvesting.pdf	12	16	28	0
Fishing and Harvesting of Aquatic Resources.pdf	21	48	69	1
Recreational Activities.pdf	22	28	50	9
War, Civil Unrest and Military Exercises.pdf	2	4	6	11
Work and Other Activities.pdf	1	1	2	18
Fire and Fire Suppression.pdf	3	16	19	0
Dams and Water Management-Use.pdf	19	15	34	0
Other Ecosystem Modifications.pdf	5	5	10	5

Invasive Non-native-Alien Species-Diseases.pdf	25	39	64	8
Problematic Native Species-Diseases.pdf	8	15	23	0
Problematic Species-Diseases of Unknown Origin.pdf	1	2	3	29
Viral-Prion-induced Diseases.pdf	0	2	2	9
Diseases of Unknown Cause.pdf	0	1	1	0
Domestic and Urban Waste Water.pdf	12	24	36	1
Industrial and Military Effluents.pdf	23	40	63	2
Agricultural and Forestry Effluents.pdf	14	53	67	0
Garbage and Solid Waste.pdf	5	7	12	19
Air-Bourne Pollutants.pdf	4	2	6	18
Excess Energy.pdf	3	7	10	17
Habitat Shifting or Alteration.pdf	33	76	109	7
Droughts.pdf	6	2	8	3
Temperature Extremes.pdf	20	45	65	0
Storms and Flooding.pdf	15	13	28	0
Other Threat.pdf	0	6	8	0
Lack of knowledge.pdf	31	78	109	0

Unlike Climate Change, Lack of Knowledge is often highly actionable at the level of individual SGCN, and in many cases is one of the most severe stressors impacting species in Maine. In particular, Maine's invertebrate and marine fauna are generally poorly studied, and little information exists to describe distribution, trends in abundance, or limiting factors. Gathering basic ecological information on these species will be fundamental to advancing their conservation over the next 10 years.

The types of Agricultural and Forestry Effluents that impact SGCN in Maine are diverse, and include pesticides, excessive nutrients, sedimentation, and the release of heavy metals. Many insect SGCN can be negatively impacted by the application of pesticides intended to control other species. Although these effects can be severe, they are often highly actionable through slight modifications to pesticide application methods, changes in the types of pesticides used, or in some cases, use of alternate pest control methods. Freshwater Aquatic and Marine habitats, and their associated SGCN, are often sensitive to declines in water quality, which can be caused by both point-source and non point-sources. Excessive nutrients and sedimentation from agricultural activites (both crop and livestock operations) and aquaculture facilities can cause elevated algae growth and lead to reduced levels of dissolved oxygen. Slight changes to

farming practices are often sufficient to reduce nutrient and sediment migration to aquatic habitats, and many programs currently exist to assist agricultural producers with these efforts.

Fishing and Harvesting of Aquatic Resources was identified as a medium-high or high priority stressor for 39 SGCN. In most cases, these impacts were related to overfishing of commercial species or accidental by-catch of non-target species. Often, these are historic impacts that have largely been addressed through changes in regulations or fishing practices, however stocks of some species are slow to recover. Commercial fishing is a staple industry in Maine, and addressing past and current impacts will require close collaboration between government agencies and the commercial fishing industry

Figure 3.2. Number of SGCN stressor assignments categorized as low, medium, medium-high, and high priority.

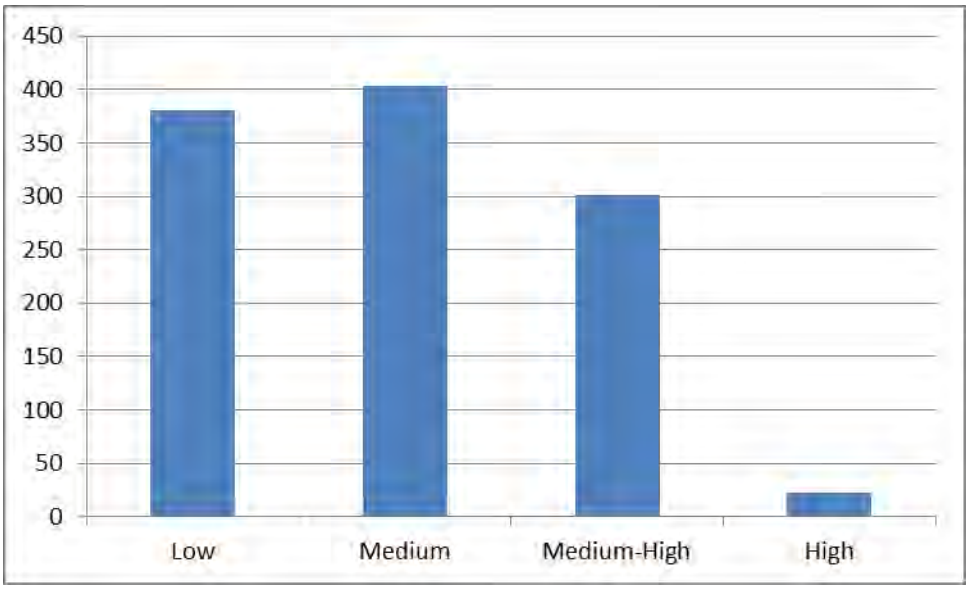

Table 3.4. Secondary IUCN Threat Categories and the number of Priority 1 and Priority 2 SGCN assigned to each category where the stressor was ranked as either high or medium-high priority for action.

IUCN Threat Category	Number of SGCN Assignments
Agricultural and Forestry Effluents	46
Commercial and Industrial Areas	3
Dams and Water Management/Use	11
Diseases of Unknown Cause	1
Domestic and Urban Waste Water	19
Fire and Fire Suppression	13

Fishing and Harvesting of Aquatic Resources	39
Habitat Shifting or Alteration	1
Housing and Urban Areas	25
Hunting and Collecting Terrestrial Animals	1
Industrial and Military Effluents	18
Invasive Non-native/Alien Species/Diseases	2
Lack of knowledge	73
Livestock Farming and Ranching	1
Logging and Wood Harvesting	8
Marine and Freshwater Aquaculture	1
Mining and Quarrying	1
Other Ecosystem Modifications	4
Other Threat	1
Problematic Native Species/Diseases	7
Recreational Activities	20
Renewable Energy	11
Roads and Railroads	12
Storms and Flooding	5
Tourism and Recreational Areas	1
Utility and Service Lines	1
Viral/Prion-induced Diseases	1

STRESSORS TO HABITATS

We assigned 31 unique stressors to 34 habitats macrogroups, for a total of 342 habitat – stressor combinations. Similar to SGCN, we do not attempt to summarize and discuss all stressors, but instead refer the reader to reports for individual habitats, and to Table 3.3 which includes links to summary reports for each stressor.

Invasive Non-native/Alien Species/Diseases, Roads and Railroads, and Housing and Urban Areas were assigned to the largest number of habitats. Although all of these issues occur statewide and have the potential to impact virtually every habitat in Maine, their impacts on SGCN differ markedly.

Impacts from Invasive Non-native/Alien Species/Diseases are most commonly related to invasive plant and animal species that degrade habitats or directly displace native species through competition or predation. These issues tend to be more prevalent in southern Maine, where higher human populations and a moderate climate facilitate expansion of non-native

species. In the marine environment, green crabs are a prevalent invasive species with deleterious impacts on a varity of habitats and SGCN. In some cases, non-native diseases, such as white-nosed syndrome in bats, have also had devastating impacts on SGCN. Impacts from this stressor can be severe, and in many cases it is extremely difficult to reverse the spread of invasive species or diseases; prevention is often the only feasible solution.

In contrast, Roads and Railroads tend to impact habitats through fragmentation, especially for aquatic species, and by alterting hydrology. Improperly installed culverts can prevent or reduce passage by many SGCN, reducing connectivity between habitat patches. Both roads and railroads can also impede water flowage in seepage forests, tidal marshes, mudflats, and floodplains, reducing the function of these habitats. Construction of new roads and railroads is not prevalent in most of Maine, so addressing impacts from this stressor typically involves partial reconstruction of existing infrastructure through installation of improved culverts and bridges.

Development of Housing and Urban Areas is most prevalent in southern Maine, where most of Maine's human population lives, and where populations are expected to increase over the next two decades (Maine Office of Policy and Management 2015). Conversion of forest or agricultural land to residential areas results causes a net loss of habitat for most species, although some SGCN are capable of adapting to development. In many cases, secondary impacts from development, such as increases in pollution, off-leash pets, traffic volumes, and even foot traffic, can have greater impacts on SGCN that the development itself. Outside of southern Maine, human populations are predicted to stabilize or decline over the next 20 years, so future impacts from housing development are likely to be localized and should have relatively minor impacts on SGCN.

KEY TO ACRONYMS

IUCN	International Union for the Conservation of Nature
SGCN	Species of Greatest Clonservation Need

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