Appendix F

Process for Developing the Species Approach

To evaluate which SGCN required conservation actions in addition to our habitat-based approach, we referred to the criteria used to identify Species in Greatest Conservation Need (chapter 2). We then reviewed species conservation needs that were gathered from (1) the 2013 revision of Minnesota's list of endangered, threatened, and special concern species, (2) the Species Technical Advisory Team (STAT) process, and (3) a 2014 multi-programmatic coordination meeting that identified top survey and data management needs.

1) Evaluation of issues and stressors

We evaluated the list of SGCN for which populations may be rare, have declined, or may decline within the next 10 years (Criterion 2). This criterion contained three subcategories: terrestrial and aquatic habitat concerns, specific threats, and life-history characteristics. Because habitat stressors are being addressed through the plan's habitat-based approach (Objective 1.1, 1.2 in chapter 4), we focused on the latter two subcategories of stressors and life-history traits impacting SGCN (Table 3.1 and 3.2). We then evaluated this group of 231 SGCN to determine if specific conservation actions and performance measures could be developed that meet the following three criteria: (1) specific conservation actions (other than survey, research, or monitoring) can be implemented to address the issues, (2) the conservation actions have a high likelihood of maintaining or increasing SGCN populations, and (3) we can monitor the effectiveness of the conservation actions on target populations. This resulted in a set of 10 species or groups of species for which conservation objectives are included in the Wildlife Action Plan (see Table 3.3; Objectives 1.1 and 2 in chapter 4).

Species or groups of species	Issues (stressors)
Hibernating bats (northern long-eared bat, little brown myotis, big brown bat, tri-colored bat)	White-nose syndrome
Freshwater mussels Four-toed salamander Blanding's turtle Wood turtle	Limited ability for populations to recover on own due to low dispersal ability or low reproductive rate
Gophersnake Plains hog-nosed snake Mudpuppy Hornyhead chub	Deliberate killing, overcollection, or unregulated take
Monarch butterfly	Insecticides, larval dependence on milkweed

2) Evaluation of stewardship species

During the process of developing the SGCN list, Species Technical Advisory Team members identified 23 species for which Minnesota has stewardship responsibility (see SGCN criteria 3 in chapter 2). We evaluated the list of stewardship species to determine if there were any species for which a habitat approach alone is not sufficient for maintaining or increasing populations, and if specific conservation actions (other than survey, research, or monitoring) were needed to maintain or increase populations in Minnesota. A species was removed from the list if it was already being covered by another plan objective (e.g., native pollinators, freshwater mussels). The result of this evaluation is a prioritized list of 2 stewardship species, golden-winged warbler and brook trout (southeastern Minnesota heritage strain), for which we identify conservation actions to maintain or increase populations. These 2 species were added to the set of 10 species or groups of species for which we are targeting factors or stressors impacting populations (see Table 3.3; Objectives 1.1 and 2 in chapter 4).

Stewardship species	Conservation actions needed
Golden-winged warbler	Incorporating forest cover type and age class diversity needs into best management practices
Brook trout, SE Minnesota heritage strain	Propagation and reintroduction to historical sites

3) Evaluation of species information needs

To identify priority species information needs, we compiled information contained in the Statement of Need and Reasonableness used in amending Minnesota's list of endangered, threatened, and special concern species in 2013 (DNR 2012). We also compiled notes from all Species Technical Advisory Team (STAT) meetings, all feedback received by nongame wildlife staff and other species experts on the STAT recommendations, and notes taken at a 2014 survey and data management coordination meeting. The three main information gaps identified were (1) species for which more information is needed to assess their state-listed status, (2) species for which data were insufficient to determine if the species met the SGCN criteria, and (3) species experiencing documented declines due to unknown causes. Details on each of these information needs are provided below.

a. Species for which more information is needed to assess their state-listed status

During the process of revising the Minnesota's list of endangered, threatened, and special concern species, status sheets were drafted for each species with a proposed change in state-listed status that served as the basis for listing. Twenty-nine of 117 species were identified as needing additional information to clarify their status. We removed species for which the information need would be addressed by our habitat-based approach, those where the information gap has since been filled, and those that are not currently feasible to pursue. We also requested feedback from DNR regional nongame wildlife biologists, who recommended adding boreal owl to this list. The result is 23 species for which data are needed to assess their state-listed status.

Taxon	Common name or subgroup	Scientific name	Information needs
Mammals	Richardson's ground squirrel	*Spermophilus richardsonii*	Assess distribution and abundance
Birds	boreal owl	*Aegolius funereus*	Assess distribution and abundance
Birds	Bell's vireo	*Vireo bellii*	Monitor occurrence at known nesting locations, assess distribution and abundance
Amphibians	spotted salamander	*Ambystoma maculatum*	Assess distribution, abundance, and ecology
Amphibians	Great Plains toad	*Anaxyrus cognatus*	Assess distribution and abundance
Amphibians	mudpuppy	*Necturus maculosus*	Assess distribution and abundance
Fish	redside dace	*Clinostomus elongates*	Research into life history and habitat (ecological) requirements
Fish	crystal darter	*Crystallaria asprella*	Development of effective survey methods; long-term monitoring and identification of habitat guilds to assess trends and guide management
Fish	bluntnose darter	*Etheostoma chlorosoma*	Assess distribution and abundance
Fish	warmouth	*Lepomis gulosus*	Targeted sampling using trapnets
Fish	pygmy whitefish	*Prosopium coulterii*	Research into life history/ecology; assess distribution and abundance
Snails	dull gloss	*Zonitoides limatulus*	Assess distribution and abundance
Butterflies & moths	abbreviated underwing	*Catocala abbreviatella*	Assess distribution and abundance, research into whether other Amorpha species besides leadplant are used as larval host plants
Butterflies & moths	Whitney's underwing	*Catocala whitneyi*	Assess distribution and abundance, research into whether other Amorpha species besides leadplant are used as larval host plants
Butterflies & moths	leadplant flower moth	*Schinia lucens*	Assess distribution and abundance
Caddisflies	species of northern caddisfly	*Anabolia ozburni*	Assess distribution and abundance, research into specific habitat needs
Caddisflies	species of saddle casemaker caddisfly	*Protoptila erotica*	Research into specific habitat needs
Caddisflies	species of long horned caddisfly	*Triaenodes flavescens*	Assess distribution and abundance, research into specific habitat needs
Jumping spiders	species of jumping spider	*Habronattus calcaratus maddisoni*	Assess distribution and abundance
Jumping spiders	species of jumping spider	*Habronattus viridipes*	Assess distribution and abundance
Jumping spiders	species of jumping spider	*Marpissa formosa*	Assess distribution and abundance
Leafhoppers	hill prairie shovelhead leafhopper	*Attenuipyga vanduzeei*	Assess distribution and abundance
Leafhoppers	caped leafhopper	*Macrosteles clavatus*	Assess distribution and abundance

The full list of species assessed including scores and ranking are available as an Excel spreadsheet (Table F1): http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/appendix-f-species-tables-for-species-approach-2015-09-16.xlsx

b. Species for which data were insufficient to determine if it met SGCN criteria

During the process of developing the SGCN list, Species Technical Advisory Team members identified a number of species for which there was insufficient information to determine whether they met criteria to be listed as a SGCN. During the next 10 years, we will address some of these information gaps so we can assess the species when the SGCN list is next updated.

Species Technical Advisory Team members were asked to assess these non-SGCN for which there is "insufficient information" in order to prioritize survey and research needs over the next 10 years. The four assessment categories were importance, feasibility, ability to assess conservation status, and overall priority rank. The first three categories were scored on a scale of 0 to 1 (0 = low, 0.5 = moderate, 1 = high). The overall priority was ranked from highest to lowest with a "1" representing the highest priority.

Results were compiled, and average scores for each species and category were tabulated. The list of species was then pared down by selecting the species with the highest scores based on the assessment categories and overall expert rankings as follows:

- average total score of 2.00 or higher (max = 3)
- average feasibility value of 0.625 or higher
- average conservation status value of 0.625 or higher
- average priority rank of 4 or less (within a given taxonomic group)

A few additional species were removed from the list if the information need was already being covered by another plan objective (e.g., native pollinators, freshwater mussels) or if it was unlikely that a conservation action could be developed. The result is 15 species for which data are needed to determine if the species meets criteria to be designated as a SGCN.

Taxon	Common name or subgroup	Scientific name	Description of need
Mammals	long-tailed weasel	*Mustela frenata*	Work with fur buyers to collect harvest information
Mammals	woodland jumping mouse	*Napaeozapus insignis*	Surveys to assess population status
Mammals	water shrew	*Sorex palustris*	Surveys on distribution and abundance; Research on habitat requirements/preferences
Birds	spotted sandpiper	*Actitis macularius*	Surveys to assess population status
Birds	brown creeper	*Certhia americana*	Surveys to assess population status
Birds	Lincoln's sparrow	*Melospiza lincolnii*	Surveys to assess population status
Birds	gray jay	*Perisoreus canadensis*	Surveys to assess population status
Amphibians	western tiger salamander	*Ambystoma mavortium*	Determine status and extent of species in Minnesota; need DNR sampling
Reptiles	Ouachita map turtle	*Graptemys ouachitensis*	Research on impacts of flooding, predators, and recreational activities on habitat availability and nestling recruitment.
Butterflies & moths		*Melaporphyria immortua*	Surveys to assess population status; research on habitat use and identify host plant
Butterflies & moths	blazing star stem borer	*Papaipema beeriana*	Targeted surveys and museum collection search to determine if species is present in Minnesota
Dragonflies & Damselflies	great spreadwing	*Archilestes grandis*	Surveys to assess population status
Dragonflies & damselflies	Cyrano darner	*Nasiaeschna pentacantha*	Surveys to assess population status
Dragonflies & damselflies	stygian shadowdragon	*Neurocordulia yamaskanensis*	Surveys to assess population status
Dragonflies & damselflies	larval dragonflies and damselflies		Identify larvae to species-level in MPCA macroinvertebrate reference collection

The full list of species assessed including scores and ranking are available as an Excel spreadsheet (Table F2): http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/appendix-f-species-tables-for-species-approach-2015-09-16.xlsx

c. Species whose populations are declining due to unknown causes

During the process of developing the SGCN list, Species Technical Advisory Team members identified a number of species for which populations are in decline due to unknown causes (see SGCN criteria 2A and 2C in Chapter 2). Species Technical Advisory Team members were asked to evaluate these species to identify the highest priority research needs for the next 10 years. The six assessment categories were: urgency, importance, feasibility, likelihood of obtaining actionable results, approach, and overall priority rank. The first four categories were scored on a scale of 0 to 1 (0 = low, 0.5 = moderate, 1 = high). To determine urgency, experts were asked to consider if the research need requires immediate attention; to determine importance, experts were asked to evaluate how vital the information is. For the approach, experts were asked to provide a written explanation for how they would design research that would help determine the cause of population decline for each species, including information to be measured, expertise needed, and so on. Lastly, the overall priority was ranked from highest to lowest with a "1" representing the highest priority.

Results were compiled, and average scores for each species and category were tabulated. The list of species was then pared down by selecting the species with the highest scores based on the assessment categories and overall expert rankings as follows:

- average total score greater than 2.00 (max = 4)
- average feasibility value greater than 0.5
- average actionable results value greater than 0.5
- average priority rank of 3 or less (within a given taxonomic group)

A few additional species were removed from the list if the approach was habitat based, was already being covered by another plan objective (e.g., native pollinators, freshwater mussels), or was unlikely to result in a conservation action. The result is 6 species for which research is needed to determine the cause(s) of population declines.

Taxon	Scientific name	Common name	Description of approach
Birds	*Contopus cooperi*	olive-sided flycatcher	investigate aerial insects and water quality; need migratory connectivity during non-breeding season
Birds	*Falco sparverius*	American kestrel	pesticides, competition from avian predators
Birds	*Megaceryle alcyon*	belted kingfisher	quality of riparian habitats/bank nesting, water turbidity, prey declines
Fishes	*Catostomus catostomus*	longnose sucker	surveys to compare catch per unit effort, stream spawning sites for substrate quality and reproduction, effect of harvest on populations
Fishes	*Lythrurus umbratilis*	redfin shiner	further work in SE Minnesota to determine what land use and landscape scales tell us about the changing fish communities; pair with suckermouth minnow
Fishes	*Phenacobius mirabilis*	suckermouth minnow	further work in SE Minnesota to determine what land use and landscape scales tell us about the changing fish communities; pair with redfin shiner

The full list of species assessed including scores and ranking are available as an Excel spreadsheet (Table F3): http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/appendix-f-species-tables-for-species-approach-2015-09-16.xlsx

References

Minnesota Department of Natural Resources. 2012. Statement of need and reasonableness in the matter of proposed amendment to and repeal of rules governing Minnesota's list of endangered, threatened, and special concern species in Minnesota Rules, Chapter 6134: *Endangered and Threatened Species*. Minnesota Department of Natural Resources, Division of Ecological and Water Resources. 337 pp.