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Wildlife and Fisheries Habitat Management Notes

Management Indicator Species for the National Forest Lands in Alaska

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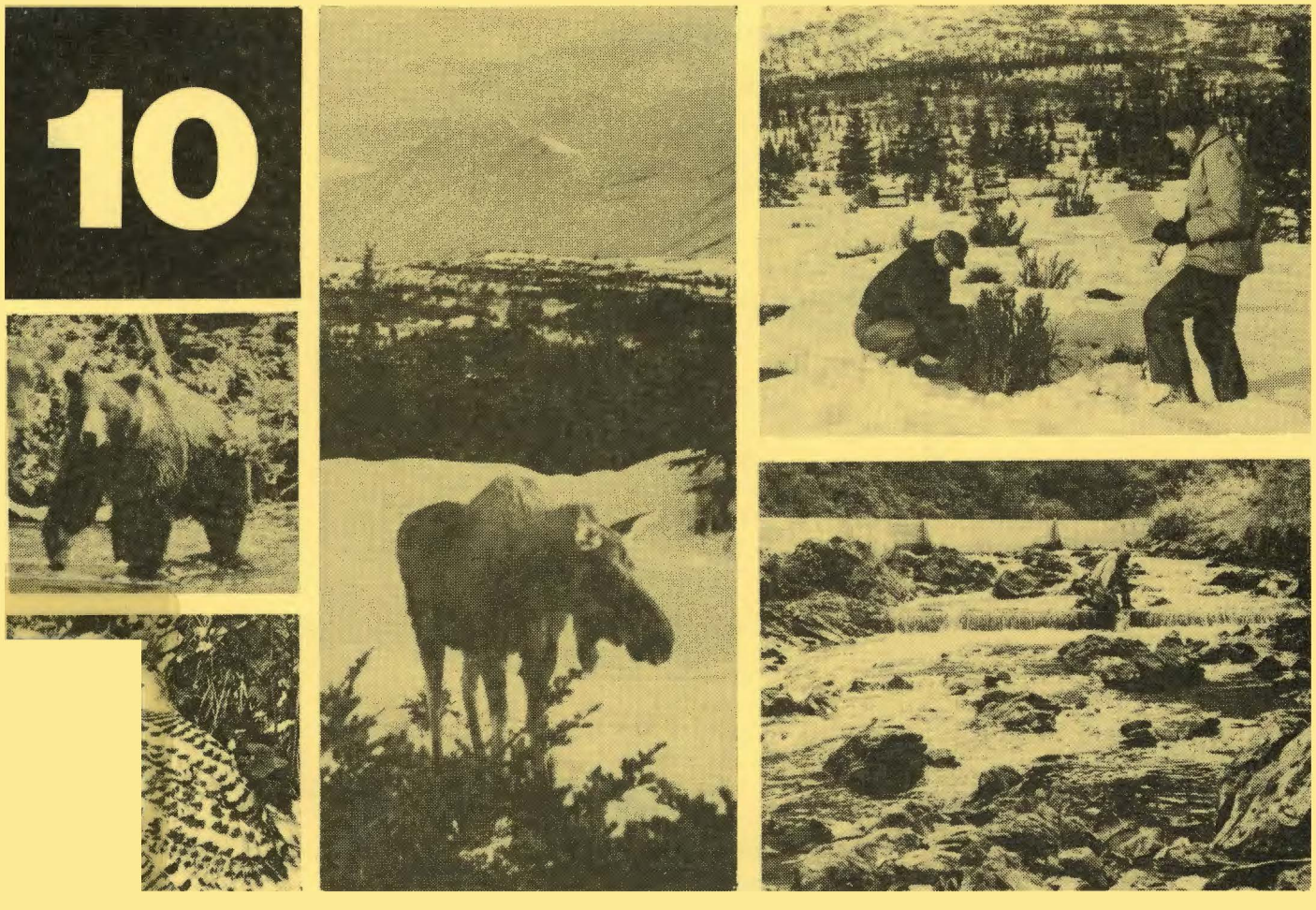

Abstract

This paper describes a cooperative effort of the USDA Forest Service, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and National Marine Fisheries Service to identify Management Indicator Species (MIS) for the National Forest Lands in Alaska. National and Regional direction on MIS was developed into a five-step screening process to evaluate 451 species of wildlife, fish, and shellfish of the Alaska Region. Species recommended as MIS included 26 for the Alaska Region, 30 for the Chugach National Forest, and 29 for the Tongass National Forest. Recommendations were developed for applying MIS in project implementation. Results of the MIS evaluations will be provided to interdisciplinary planning teams to guide their selections of MIS for use in Regional, Forest, and project level planning.

Acknowledgements

The identification of MIS for the Alaska Region was accomplished through interagency cooperation. The Forest Service acknowledges the contributions of the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service to this important effort.

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Introduction

Management indicator species (MIS) are vertebrate or invertebrate species whose population changes are believed to indicate the effects of land management activities (USDA Forest Service 1982). The MIS concept was developed in response to Forest planning requirements contained in the National Forest Management Act of 1976 (16 USC 1600). MIS are a planning tool to promote more effective management of wildlife and fish habitats on National Forest lands. Through this concept, the total number of species that occurs within a planning area is reduced to a manageable set of species that collectively represents the complex of habitats, species, and associated management concerns. MIS are used to meet the requirements of the National Forest Management Act for maintenance of population viability and biological diversity and to establish management goals for species in public demand (USDA Forest Service 1982).

MIS in National Forest Planning

Application of the MIS concept offers land managers more opportunity to integrate wildlife and fish resources into National Forest management than has previously been available. Planning and management efforts may be focused on a few species that are linked to identified planning issues, without neglecting any of the whole assemblage of species that depend on National Forest habitats. Information about MIS is applied in Forest planning through application of habitat suitability and capability models. These models are developed for each MIS to measure change in habitat condition and project species responses to changing habitat quality. The goal is rapid and consistent evaluation of wildlife and fish resources throughout the planning process.

MIS also provide a means to establish population objectives that are responsive to public demand for fish and wildlife resources. A key requirement of the National Forest Management Act regulations is that "Population trends of the management indicator species will be monitored . . . " (USDA Forest Service 1982:43048). Monitoring is a means of quality control to test whether projected responses of MIS are accurate, and to measure attainment of wildlife and fish objectives.

A hierarchy of MIS is used by the Forest Service to represent wildlife and fish resources at the different levels of National Forest planning (FSH 2609.12). The Regional list of MIS contains species used as indicators at the national level (Resources Planning Act, or RPA), plus additional species that represent issues and goals of Regional significance. Forest lists include appropriate species from the Regional list, plus additional species needed to represent wildlife and fish at the Forest level of planning. The Forest MIS that occur within a specific area of the Forest may be used, along with selected local species, in development of projects that will affect that area. These species are used to meet wildlife and fish needs in treatment design and layout, timing of activities, monitoring, and other aspects of project planning.

MIS for the Alaska Region

The lands and waters of the Alaska Region support a diversity of habitats and associated wildlife, fish, and shellfish that require effective representation at all levels of forest planning. In 1985, the Forest Service, in cooperation with the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and National Marine Fisheries Service, developed and implemented a process to identify species having the greatest potential to serve as MIS for the Alaska Region. The process consisted of the following components:

1. Drafting of a Regional handbook chapter that supplements national direction on MIS and meets the special needs of the Alaska Region.

2. Development of Regional matrices containing information on habitat associations, distributions, abundance, population status, and management concerns for all wildlife, fish, and shellfish known to occur in the Alaska Region.

3. Refinement of the Regional matrices at the Forest/Area level using information compiled by the Forest Service, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and National Marine Fisheries Service.

4. Systematic evaluation of species by an interagency MIS task group, and identification of MIS proposed for use in Regional, Forest, and project planning.

Results of these evaluations, and the listings of recommended MIS, will be provided to interdisciplinary planning teams to guide their selections of MIS for use in individual Forest and project plans. MIS selections will be final when these plans are approved through the process prescribed by the National Forest Management Act and its associated regulations (36 CFR 219).

This document is a product of the Alaska Region's MIS identification process, and is intended to serve three purposes. First, it provides a record of the procedures and results of the process used to identify MIS for the Alaska Region. Second, the document provides information on the species of wildlife, fish, and shellfish recommended for use as MIS in Regional and Forest level planning. Considerable information on all wildlife and fish of the Alaska Region was compiled in preparation for, during, and subsequent to the identification of MIS. The third purpose of this document is to summarize portions of that information for use by managers. Additional information resources are available on request from the Alaska Region, Wildlife and Fisheries Management Program, Juneau, Alaska.

Methods

Information Sources

Two types of species matrices were developed to organize and display information pertinent to identification of MIS. A species-habitat matrix was developed from data contained in the Alaska Region Wildlife Habitat Relationships (WHR) data base (USDA Forest Service 1984) and information contributed by the cooperating agencies. Habitat categories and definitions used in the matrix (Table 1) were adopted from several sources including Taylor (1979), Viereck and Dyrness (1980), and USDA Forest Service (1984). The categories were of necessity broad, as their primary purpose was to organize all species for further evaluation rather than to describe the specific habitat requirements of any one species. Information contained in the species-habitat matrix was reviewed by biologists of the cooperating agencies and used as a reference throughout the MIS identification process.

A species-status matrix was developed to display information on population status, abundance, distribution, and additional management considerations pertinent to identification of MIS. Information sources for the matrix included the Alaska Region WHR data base (USDA Forest Service 1984) and various records maintained by the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and the National Marine Fisheries Service. Additional reference materials for the species evaluations included the U.S. Fish and Wildlife Service listings of national and regional species of special emphasis; and supplemental information on selected species compiled by the Alaska Department of Fish and Game.

Species Evaluation Procedures

The MIS task group of wildlife and fish biologists from cooperating agencies (Appendix A) met 3-5 December 1985 to accomplish the following objectives:

1. Evaluate all species and habitats known to occur in the Alaska Region using national and Regional direction on MIS.

2. Develop lists of proposed MIS for the Chugach National Forest, the Tongass National Forest, and the Alaska Region.

3. Identify additional populations of local significance to management, and formulate recommendations for their consideration as MIS in project-level planning.

The MIS task group was divided into three workgroups to conduct evaluations for the following species groups: (1) birds; (2) mammals; and (3) reptiles and amphibians, fishes, and shellfishes. The workgroups used a stepwise screening procedure (Fig. 1) to evaluate species' eligibility for consideration as MIS. Every vertebrate and shellfish species known to occur in the Alaska Region was processed through this procedure, and either dropped from further consideration for MIS or carried to the next step of the evaluation. The following sections describe the steps of the evaluation procedure.

RPA indicators. In the first step of the evaluation, species of the Alaska Region that are proposed MIS at the national (Resources Planning Act) level were identified. All such species are to be included in proposed Regional and Forest listings of MIS, as provided for in national and Regional direction on MIS.

Categories of potential MIS. The second step of the evaluation was a determination of whether the species belonged to one or more category of potential MIS. MIS categories and definitions (Table 2) were taken from national direction on MIS and supplemented by additional elements, such as insular (island) populations, to meet situations encountered in the Alaska Region. Species that could not be placed in one or more category were dropped from further consideration.

Diversity and productivity issues. In the third step, remaining species were evaluated to determine whether they are representative of a significant diversity or productivity issue at the local, Forest, or Regional level. This step in the process usually involved considerable discussion of the issues associated with the species and the level (local, Forest-wide, or Region-wide) of concern. Species that were not determined to represent a significant diversity or productivity issue were dropped from further consideration.

Table 1. Categories of habitat used to describe the habitat orientations of wildlife, fish, and shellfish of the Alaska Region.

Habitat Category	Description
Terrestrial Plant Communities	
Spruce/hemlock forest	Closed or open forests dominated by Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*), or a mixture of the two species.
True fir forest	Closed conifer forests of silver fir (*Abies amabilis*) or subalpine fir (*A. lasiocarpa*). These forests occur with limited distribution on the Tongass National Forest.
Shore pine	Open conifer forests of shore pine with western hemlock, western redcedar (*Thuja plicata*), or Alaska Cedar (*Chamaecyparis nootkatensis*).
Interior spruce forest	Open or closed forests dominated by black spruce (*Picea mariana*), white spruce (*P. glauca*) or a mixture of the two species. These forests occur on the Chugach National Forest.
Deciduous forest or shrub	Forest or tall shrub community dominated by red alder (*Alnus rubra*), willow (*Salix* spp.), cottonwood (*Populus trichocarpa*), or other deciduous species.
Deciduous/conifer forest	Forest containing a mixture of conifer trees and deciduous trees or tall shrubs.
Alpine/tundra	Includes alpine and all other categories of tundra occurring in the Alaska Region.
Grass/sedge meadow	Meadows, coastal grassflats above high tide, and all other upland habitats dominated by grasses and/or sedges.
Muskeg	Wet, boggy areas dominated by sphagnum mosses and ericaceous or other low woody vegetation.
Aquatic Habitats	
Estuarine	Fiord and tidal mixed estuaries and associated mudflat habitats
Marsh	Freshwater and saltwater marshes including tidal marshes; dominated by grasses and sedges.
Riverine	Freshwater rivers and streams.
Lacustrine	Freshwater lakes and ponds.
Intertidal	Beaches and mudflats influenced by the tide.
Forest Successional Stages	
New opening	Stand created by logging, blowdown, or other disturbance within the past 5 years. Most shrub and herbaceous cover is residual from the original stand.
Seedling/sapling	Regenerating stand created by logging, blowdown, or other disturbance. Regeneration consists of tree seedlings (DBH < 1.0 inches [2.5 cm]) or saplings (DBH 1.0 to 4.9 inches [2.5 to 12.5 cm]). Shrubs and herbaceous vegetation are abundant. Approximate stand age is 5 to 25 years.

Table 1, continued. Categories of habitat used to describe the habitat orientations of wildlife, fish, and shellfish of the Alaska Region.

Habitat Category	Description
Pole timber	Even-age stand of pole-size trees (DBH 5.0 to 10.9 inches (12.7 to 27.7 cm). Canopy is closed or nearly closed and understory herbs are declining or absent.
Young sawtimber	Even-age stand of trees over 11 inches (28 cm) DBH. Canopy may be closed or partially opened through natural processes or thinning. Understory shrubs and herbaceous plants may be rare to moderately abundant.
Old growth	Uneven-age stand with dominant trees 18 inches (46 cm) DBH and having old-growth characteristics including natural canopy openings, well-developed understory of shrubs and forbs, standing snags, and down and rotting wood.

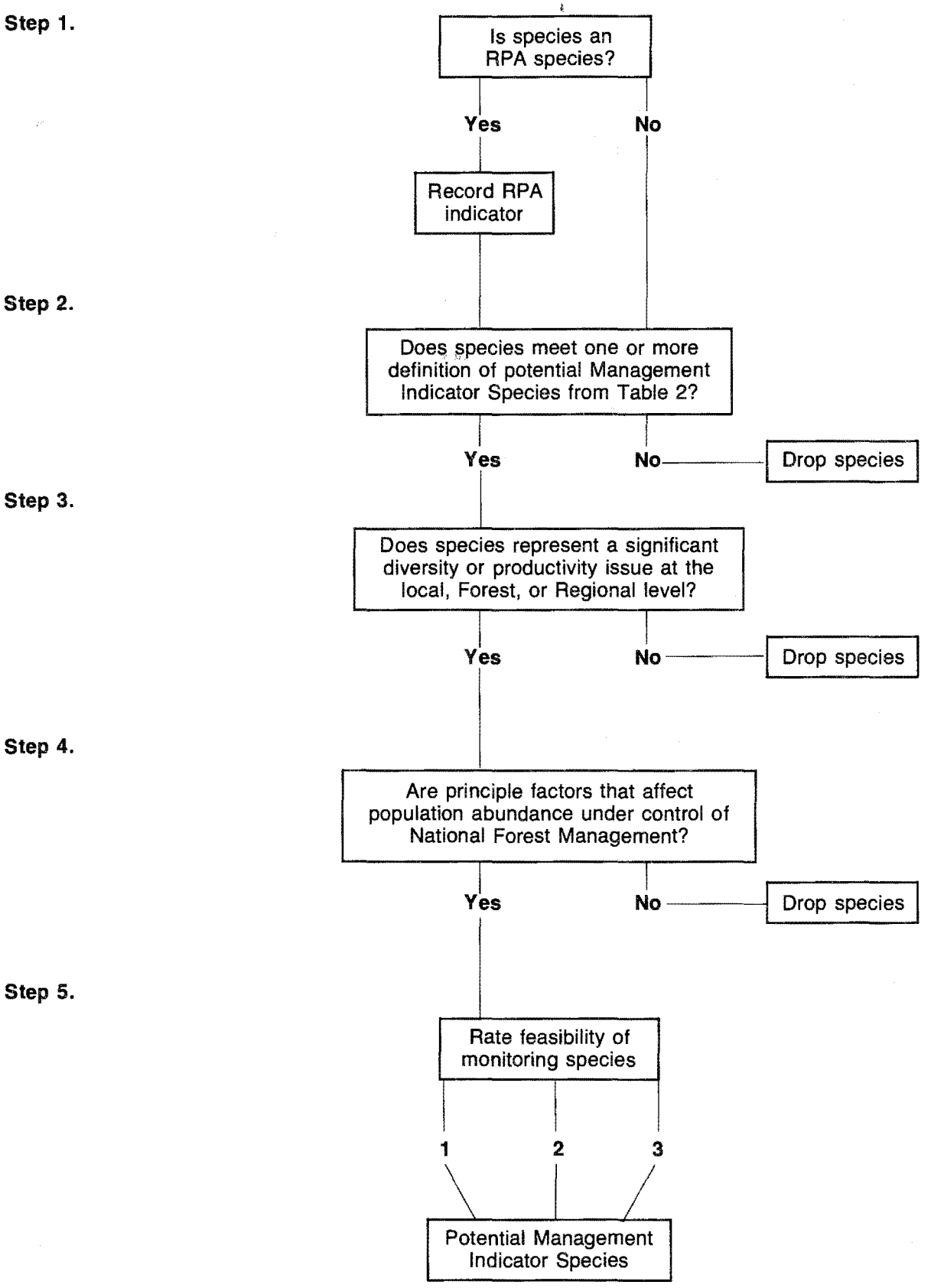

Fig. 1. Evaluation procedure used in the identification of Management Indicator Species for the Alaska Region.

Table 2. Categories and definitions of potential Management Indicator Species for the Alaska Region.

Category	Definition
Endangered species	A plant or animal species listed as endangered on State and Federal lists; i.e., that is in danger of extinction throughout all or a significant portion of its range (FSM 2670).
Threatened species	A plant or animal species listed as threatened on State and Federal lists; i.e., that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (FSM 2670).
Sensitive species	A species for which population viability is a concern as evidenced by (a) significant current or predicted downward trends in population numbers or density; or (b) significant current or predicted downward trends in habitat capability that would further reduce a species' existing distribution (FSM 2670.5).
Rare species	A species for which population viability is a concern because the species exists at extremely low numbers over the Forest or is highly restricted in its distribution within the Forest.
Insular species	A species that occurs as one or more small, reproductively isolated populations on an island or group of islands.
Keystone species	A species whose presence and effect in an ecosystem are major factors affecting the structure, diversity, and function of the system (FSH 2609.12).
Emphasis species	A species for which there is high public demand (FSM 2600). Normally, these species are those commonly hunted, fished, or trapped, and are often of significant economic value.
Special interest species	A species having high value for non-consumptive recreational, cultural, educational, religious, or scientific values (FSH 2609.12).
Species requiring special habitats	Habitats having productivity, rareness, or importance to a wildlife community such that the habitat itself is an important component of wildlife or fish diversity may be used to focus planning and management (FSH 2609.12). Examples are snags, bald eagle nest trees, and large woody debris in streams. Species requiring these special habitats or habitat components may be used to establish management goals and monitor effects of management on associated wildlife and fish.
Ecological indicator[1]	A species whose population dynamics reflect significant changes in the condition or productivity of an ecosystem (FSM 2600). These species may be used to indicate changes in the populations of other species with similar habitat relationships, or with similar susceptibility to environmental change.

[1]National direction on Management Indicator Species (FSH 2609.12) recognizes the uncertainty surrounding use of vertebrates as ecological indicators. Any species selected as an ecological indicator should have these characteristics: (1) limited adaptability to different environments; (2) population parameters that are highly related to local habitat conditions; (3) key population parameters that may feasibly and reliably be measured; and (4) habitat requirements that are affected by management. Any species selected to serve as an ecological indicator should be supported by a description of how its population trends are assumed to reflect trends in species richness or abundance of other species or biological communities (FSH 2609.12).

Factors affecting population abundance. In the fourth step, an assessment was made of the principal factors that affect population abundance of the species, and whether these factors are under the control of National Forest management. Species whose populations are controlled primarily by factors extrinsic to forest management were dropped from further consideration.

Monitoring feasibility. Feasibility of monitoring was the fifth and final evaluation carried out by the workgroups. Workgroup members were instructed to base these assessments on species characteristics that influence the efficacy of population estimation, rather than on levels of personnel and funding that may be available for monitoring. A rating scale of 1 to 3 was used to characterize the relative difficulty of population estimation. Species given a rating of 1 are relatively well suited to estimation of absolute population size or density. For species rated as 2, estimation of absolute abundance is problematic, such that monitoring will likely be based on relative indices of abundance. Species given a rating of 3 are very hard to locate and enumerate such that monitoring, if feasible at all, will be restricted to detection of population trends. Monitoring ratings were recorded, but were not used as a criterion to eliminate species from consideration as candidate MIS.

When all species had been processed through the five-step screening procedure, the workgroups were combined to carry out the final evaluations and selections of proposed MIS. Species that had passed screening were sorted into groups having similar habitat requirements and/or representing similar management concerns. The task group discussed each species to reach consensus on the attributes that qualified each species as an MIS. The ability of each species to be representative of other species was discussed so that a minimum number of species could be identified to meet planning needs at the Regional and Forest levels. Finally, species were added to the list to ensure that the MIS effectively represented the diversity of habitats in the Alaska Region.

Results

Species Evaluations

A total of 451 species were evaluated, including 57 species of fish and shellfish, 2 reptiles, 6 amphibians, 83 mammals, and 303 birds (Appendix B). Of this number, 12 were identified in the first step of the evaluation as proposed MIS at the national (Resources Planning Act) level of planning. These were the pink, chum, coho, chinook, and sockeye salmon, steelhead, Sitka black-tailed deer, pine marten, river otter, northern goshawk, osprey, and hairy woodpecker (USDA Forest Service 1985).

In the second step of the evaluation, 229 species (51% of total) were placed in one or more category of potential MIS. These included 1 reptile, 35 species of fish and shellfish, 68 mammals, and 125 birds. The remaining 222 species were eliminated from further consideration. The majority of the species eliminated were pelagic seabirds and migratory birds that do not make significant use of habitats on National Forest lands in Alaska.

Sixty-five percent (i.e., 148 species) of the remaining 229 wildlife, fish, and shellfish species were determined in the third step of the evaluation to represent a significant diversity or productivity issue at the local, Forest, or Regional level. Some of the more common issues associated with these species were population viability; demand for sport, commercial, or subsistence use; sensitivity to environmental change; and special habitat needs. The remaining 81 species were dropped from further consideration because they were not associated with issues related to Forest planning and management.

Sixty-eight percent (i.e., 100 species) of remaining species tested positive in the fourth step of the evaluation procedure. The principal factors that affect population abundance of these species are under control of National Forest management. The group included 14 fish and shellfish species, 24 mammals, and 62 birds. The majority of the 48 species eliminated at this step were marine mammals and shellfish populations that are controlled primarily by factors extrinsic to management activities of National Forests.

Monitoring feasibility ratings were assigned to the 100 species remaining in the analysis, and the species were sorted into groups having similar habitat requirements and/or relationships to management. Species of local distribution or management concern were removed from the list and recommended for consideration in project-level planning. Through discussion and consensus among the MIS task group members, the remaining species were reduced to the minimum set believed necessary to meet planning needs at the Forest and Regional levels.

Recommended Regional and Forest MIS

The list of recommended MIS for Regional level planning includes 6 species of fish, 1 shellfish, 11 mammals, and 8 birds (Table 3). In addition to these species, the Dall sheep, trumpeter swan, dusky Canada goose, and spruce grouse were recommended for the Chugach National Forest. Additional species recommended for the Tongass National Forest were the Vancouver Canada goose, blue grouse, and red-breasted sapsucker. With one exception (ptarmigan), the MIS consist of individual species. The three ptarmigan species (rock, willow, and white-tailed ptarmigan) have both overlapping and non-overlapping ranges in the Alaska Region. Ptarmigan species occurring in a given area may be used individually or collectively as MIS for alpine habitats. The Regional and Forest lists include all proposed Resources Planning Act indicators that occur in the Alaska Region except the chum salmon. This anadromous fish is effectively represented by the pink salmon.

Use of major habitat categories by the recommended MIS is summarized in Table 4. The true fir and shore pine forest types, which occur in limited distribution in the Alaska Region, are not included in the listing of major habitat categories used by the recommended MIS (Table 4). Although several of the MIS may use true fir and shore pine habitats where available, these forest types are not known to be the exclusive or optimal habitat of any species. Similarly, muskegs are not known to provide exclusive or optimal habitat for any species. Therefore, although species utilize muskegs, no MIS were identified specifically to represent this habitat category.

The extent to which the recommended MIS are believed to use forest successional stages for feeding and reproduction is summarized in Table 5. Most of the MIS are also associated with special habitat features that are essential components of their habitat, as indicated in the species narratives.

Table 3. Species of wildlife, fish, and shellfish proposed for use as Management Indicator Species at the Forest and Regional levels of planning on National Forests in Alaska.

Species	Chugach National Forest	Tongass National Forest	Region
Fish and Shellfish			
Pink Salmon*[1]	X	X	X
Coho salmon*	X	X	X
Sockeye salmon*	X	X	X
Chinook salmon*	X	X	X
Cutthroat trout	X	X	X
Steelhead*	X	X	X
Butter clam	X	X	X
Mammals			
Red squirrel	X	X	X
Beaver	X	X	X
Long-tailed vole	X	X	X
Gray wolf	X	X	X
Black bear	X	X	X
Brown bear	X	X	X
Pine marten*	X	X	X
River otter*	X	X	X
Sitka black-tailed deer*	X	X	X
Moose	X	X	X
Mountain goat	X	X	X
Dall sheep	X		
Birds			
Trumpeter swan	X		
Vancouver Canada goose		X	
Dusky Canada goose	X		
Common merganser	X	X	X
Northern goshawk*	X	X	X
Osprey*	X	X	X
Bald eagle	X	X	X
Blue grouse		X	
Spruce grouse	X		
Ptarmigan spp.	X	X	X
Red-breasted sapsucker		X	
Hairy woodpecker*	X	X	X
Brown creeper	X	X	X
Orange-crowned warbler	X	X	X

[1]Starred species (*) are identified as Management Indicator Species at the national (Resources Planning Act) level (USDA Forest Service 1985).

Table 4. Major categories of habitat used by the Management Indicator Species recommended for the Alaska Region.

Species	Spruce/ Hemlock Forest	Interior Spruce Forest
Pink salmon		
Coho salmon		
Sockeye salmon		
Chinook salmon		
Cutthroat trout		
Steelhead trout		
Butter clam		
Red squirrel	X	X
Beaver		
Long-tailed vole		
Gray wolf	X	X
Black bear	X	X
Brown bear	X	X
Pine marten	X	X
River otter	X	
Sitka black-tailed deer	X	
Moose	X	X
Mountain goat	X	X
Dall sheep		
Trumpeter swan		
Vancouver Canada goose	X	
Dusky Canada goose		
Common merganser	X	X
Northern goshawk	X	X
Osprey	X	X
Bald eagle	X	
Blue grouse	X	
Spruce grouse	X	X
Ptarmigan spp.		
Red-breasted sapsucker	X	
Hairy woodpecker	X	X
Brown creeper	X	X
Orange-crowned warbler	X	X

Habitat Categories								
Deciduous Forest or Shrub	Deciduous/ Conifer Forest	Alpine/ Tundra	Grass/ Sedge Meadow	Estuarine	Marsh	Riverine	Lacustrine	Intertidal
				X		X		X
				X	X	X	X	
				X		X	X	
				X		X		
						X	X	
				X		X		
				X				X
X	X					X		
			X					
		X	X					
		X	X					
				X		X		
		X						
X	X							
		X						
		X						
					X		X	
			X	X				
			X		X			
X	X			X			X	
	X							
	X							
X	X							
		X						
	X							
	X							
X	X							

Table 5. Forest successional stages that are most important (1), moderately important (2), or least important (3) to recommended Management Indicator Species that use forest habitat for reproduction (R) or feeding (F) (Source: Alaska Region Wildlife Habitat Relationships Data Base, USDA Forest Service 1984).

Species	Successional Stage				
	New Opening	Seedling/ Sapling	Pole Timber	Young Sawtimber	Old Growth
Red squirrel				2R, 2F	1R, 1F
Beaver		2F	2F		2F
Long-tailed vole	1R, 1F	2R, 2F			3R, 3F
Gray wolf	3F	3R, 2F	3F	2R, 3F	2R, 1F
Black bear	2F	2R, 2F	3R, 3F	3R, 3F	1R, 2F
Brown bear	2F	3R, 2F	3R, 3F	2F	2R, 2F
Pine marten		3R, 3F	3F	2R, 2F	1R, 1F
River otter	3R	3R	3R	2R	1R
Sitka black-tailed deer	3R	2R, 2F	3R, 3F	3R, 3F	1R, 1F
Moose	2F	3R, 1F			1R, 1F
Mountain goat					2F
Vancouver Canada goose					1R, 2F
Northern goshawk	2F	2F	3R, 3F	2R, 2F	1R, 1F
Osprey					2R
Bald eagle	3F			3F	1R, 1F
Blue grouse	2F	3R, 1F	3R	3R, 3F	1R, 1F
Spruce grouse		2F	2F	3R, 2F	1R, 1F
Willow ptarmigan	3F	2R, 2F			3R, 2F
Rock ptarmigan	2F	2F			
White-tailed ptarmigan	3F	2F			
Hairy woodpecker		3R, 2F	3F	3F	1R, 1F
Brown creeper				3F	1R, 1F
Orange-crowned warbler	3R, 2F	1R, 1F			2R, 2F

Selected information on biology and status is provided in the species narrative section of this document. In these narratives, "feasibility of monitoring" reflects the professional judgements that the MIS task group expressed during the species evaluation procedure. The ratings of 1, 2, and 3 were used to characterize species as being least difficult, moderately difficult, and most difficult to monitor, respectively. More comprehensive information on the recommended MIS is contained in the data bases and other information resources of the Alaska Region, Wildlife and Fisheries Management Program, Juneau, Alaska.

Recommendations for MIS in Project Planning

The listing of recommended Regional and Forest MIS is a select subset of the species that met the screening criteria (Fig. 1) for eligible MIS. Collectively, these species are representative of the issues and management opportunities that exist at the broad (Regional and Forest) levels of planning. When a Forest Plan is implemented through individual projects, effects on wildlife and fish resources must be considered on a site-specific basis. Selected species that actually occur within the area affected by the project are featured in the project plan to address local concerns and management opportunities associated with the project. Through project planning, these species influence the specific types and locations of treatments applied in the project, the timing of activities, project evaluation through monitoring, and other aspects of project design.

Although species must be evaluated and selected for project planning on a case-by-case basis, the selection process may be facilitated by information generated during the identification of Regional and Forest MIS. The following recommendations are provided to promote evaluation of species for consideration in project planning.

1. It is recommended that the interdisciplinary planning teams, in selecting species for project planning, give first consideration to the Forest MIS that occur within the project area. These species should be used whenever possible to address habitat management concerns associated with the project. Other local species may then be selected to address wildlife and fish concerns and management opportunities specific to the local area.

2. In selecting these other local species for project planning, the interdisciplinary planning teams are advised to consider the listing of species that were carried to level 5 of the MIS evaluation procedure but were not recommended as Regional or Forest MIS (Table 6). These species have been determined to meet the eligibility requirements of MIS. The listing of level 5 species should be examined to: (a) determine which species occur within the project area; and (b) identify species that may be used in planning to address habitat management concerns and opportunities associated with the project.

3. The interdisciplinary planning teams are also advised to consider certain marine birds and mammals that were identified by the MIS task group as requiring special consideration to protect important areas of traditional habitat use. These species did not reach level 5 of the evaluation process because their populations are controlled primarily by factors other than forest management. Nonetheless, they should be considered in projects that may affect their use of traditional habitat areas, including: (a) known nesting colony sites of the fork-tailed storm petrel, Leach's storm petrel, double-breasted cormorant, Brandt's cormorant, pelagic cormorant, red-faced cormorant, glaucous-winged gull, black-legged kittiwake, common murre, thick-billed murre, rhinoceros auklet, horned puffin, and tufted puffin; (b) offshore areas receiving regular use by the sea otter; (c) traditional haulout sites of the northern sea lion and Steller sea lion; and (d) known pupping areas of the harbor seal.

Table 6. Species other than recommended Regional and Forest MIS that meet the eligibility requirements for Management Indicator Species. They are recommended for consideration in selecting species for project level planning.

Great blue heron	Saw-whet owl
Tundra swan	Northern flicker
Brant	Downy woodpecker
Snow goose	Black-backed woodpecker
Mallard	Three-toed woodpecker
Northern pintail	Alder flycatcher
Green-winged teal	Tree swallow
Blue-winged teal	Boreal chickadee
Cinnamon teal	Chestnut-backed chickadee
American wigeon	Golden-crowned kinglet
Common goldeneye	Townsend's warbler
Bufflehead	Pine siskin
Harlequin duck	Red crossbill
Hooded merganser	White-winged crossbill
Red-tailed hawk	Little brown myotis
Peale's peregrine falcon	Long-legged bat
American peregrine falcon	Snowshoe hare
Tundra peregrine falcon	Northern flying squirrel
American kestrel	Sitka mouse
American oystercatcher	Northern red-backed vole
Solitary sandpiper	Gapper's red-backed vole
Common snipe	Coronation Island vole
Arctic tern	Muskrat
Aleutian tern	Mink
Pigeon guillemot	Wolverine
Marbled murrelet	Lynx
Western screech owl	Pacific herring
Great horned owl	Chum salmon
Northern hawk owl	Northern pike
Northern pygmy owl	Red king crab
Great gray owl	Dungeness crab
Boreal owl	Japanese abalone

Species Narratives

Pink salmon
Oncorhynchus gorbuscha

Selection criteria:
Emphasis species (sport and commercial)
National RPA indicator
Species requiring special habitats (spawning gravel)
Keystone species (important seasonal food source for bears, bald eagles, and other species)

Habitats preferred:
Riverine
Upper intertidal

Special habitat features:
Riffles

Food habits:
Fresh water—some nymphal and larval insects
Salt water—euphausids, copepods, amphipods, fish, and squid

Reproduction:
Two-year-old adults enter spawning streams from June through mid-October. Spawning takes place from mid-July to late October. Number of eggs per fish ranges from 800 to 2000, with an average of 1500 to 1900. Hatching occurs from late December to late February. Alevins emerge from the gravel in April or early May and move within several weeks to saltwater. Estimated survival from egg to returning adult ranges from 0.46 to 23.10 percent.

Distribution and abundance:
Stikine Area—Abundant
Chatham Area—Abundant
Ketchikan Area—Abundant
Chugach N.F. — Abundant

Feasibility of monitoring:
Moderately difficult

References:
Wickett 1958; Hunter 1959; McNeil 1966; Salo 1967; Krueger 1981; Vallion et al. 1981

Coho Salmon
Oncorhynchus kisutch

Selection criteria:
Emphasis species (sport and commercial)
National RPA indicator
Species requiring special habitats (spawning and rearing habitat)
Keystone species (important seasonal food source for bears, bald eagles, and other species)

Habitats preferred:
Lacustrine
Riverine

Special habitat features:
Pools
Riffles
Large woody debris in streams

Food habits:
Fresh water—Aquatic and terrestrial insects (i.e., Dipteran larvae, Trichoptera, Plecoptera, and Coleoptera); fish
Salt water—fish (80%) (mostly herring and sand lance) and invertebrates (20%)

Reproduction:
Fish 3 to 5 years old (mostly age 4) enter spawning streams in early fall as a prelude to spawning from September through January. The number of eggs per fish ranges from 1440 to 5700 and averages 2100 to 2800. Fry emerge from spawning gravels in May or June and remain in freshwater streams 1 to 3 years (mostly 2 years). Estimated survival from egg to returning adult is 0.18 percent.

Distribution and abundance:
Stikine Area—Abundant
Chatham Area—Abundant
Ketchikan Area—Abundant
Chugach N.F.—Abundant

Feasibility of monitoring:
Most difficult

References:
Chapman 1965; Hall and Lantz 1969; Bustard and Narver 1975; Alaska Department of Fish and Game 1979; Peterson 1982

Sockeye Salmon
Oncorhynchus nerka

Selection criteria:
Emphasis species (sport and commercial)
National RPA indicator
Species requiring special habitats (spawning and rearing habitat)
Keystone species (important seasonal food source for bears, bald eagles, and other species)

Habitats preferred:
Lacustrine
Riverine
Estuarine

Special habitat features:
Brackish estuaries (rearing)
Oligotrophic lakes (rearing)

Food habits:
Fresh water - insects and their larvae, Cladocera, copepods, and amphipods
Salt water - euphausids, amphipods, copepods

Reproduction:
Four to 6 year old adults return to spawning waters (primarily stream system with a lake) from June through August. Spawning occurs from late July to October. Number of eggs per female ranges from 2200 to 4300 with an average of 3500. Alevins emerge from the spawning gravel from April through June; the juveniles then rear in lake and stream habitats for 1 to 3 years before migrating to salt water. Estimated survival from egg to returning adult ranges from 0.10 to 0.30 percent.

Distribution and abundance:
Stikine Area—Common
Chatham Area—Common
Ketchikan Area—Common
Chugach N.F.—Common

Feasibility of monitoring:
Most difficult

References:
Foerster 1968; Hartman and Burgner 1972; Hoopes 1972; LeBrasseur et al. 1978

Chinook Salmon
Oncorhynchus tshawytscha

Selection criteria:
Emphasis species (sport and commercial)
National RPA indicator
Species requiring special habitats (spawning and rearing habitat)
Keystone species (important seasonal food source for bears, bald eagles, and other species)

Habitats preferred:
Riverine

Special habitat features:
Deep pools
Riffles
Large river systems
Large woody debris in streams

Food habits:
Fresh water - terrestrial and aquatic insects (i.e., chironimid larvae, pupae, and adults; corixids [water boatmen]; caddisflies); Crustacea
Salt water - herring, pilchard, sand lance, squid, and crustaceans

Reproduction:
Most return to spawn at age 4 or 5 but spawning age ranges from 3 to 7 years. Mature fish enter rivers and streams May through July. Spawning takes place July through August. Females carry from 3000 to 14000 eggs with an average of 4800. Hatching occurs in late winter or early spring; alevins emerge 2 to 3 weeks after hatching. Most fry remain in fresh water for 1 year before migrating to salt water. Estimated survival from egg to returning adult is 0.05 percent.

Distribution and abundance:
Stikine Area—Common
Chatham Area—Common
Ketchikan Area—Common
Chugach N.F.—Common

Feasibility of monitoring:
Most difficult

References:
Lister and Genoe 1970; Reiser and Bjornn 1979; Alaska Department of Fish and Game 1979

Cutthroat Trout
Salmo clarki

Selection criteria:
Emphasis species (sport)

Habitats preferred:
Lacustrine
Riverine
Estuarine (anadromous form)

Special habitat features:
Pools
Riffles

Food habits:
Insects (aquatic and terrestrial), plankton, crustaceans, crayfish, salmon eggs, and migrating juvenile salmon

Reproduction:
Three or 4 year old anadromous fish enter spawning streams in late autumn through early winter. Spawning occurs from February to May. Number of eggs per female ranges from 1100 to 1700. Eggs hatch in 6 to 7 weeks; alevins remain in the redd for 1 to 2 weeks. Migration from the spawning stream to larger rivers, lakes, or salt water may occur immediately or up to 4 years later; or, fish may remain in the stream or lake as resident species. They are repeat spawners, able to spawn and return to salt water.

Distribution and abundance:
Stikine Area—Common
Chatham Area—Common
Ketchikan Area—Common
Chugach N.F.—Uncommon to common, depending on locality

Feasibility of monitoring:
Moderately difficult (freshwater form)
Most difficult (anadromous form)

References:
Hartman and Gill 1968; Hall and Lantz 1969; Cooper 1970; Armstrong 1971

Steelhead Trout
Salmo gairdneri

Selection criteria:
Emphasis species (sport)
National RPA indicator

Habitats preferred:
Riverine

Special habitat features:
Riffles

Food habits:
Insects, euphausids, copepods, amphipods, and young fishes (e.g., sand lance, eulachon, herring)

Reproduction:
Four to 6 year old fish return to streams and spawn in fall, winter, or spring. From 200 to 8000 eggs may be deposited by each female. Eggs hatch after 4 to 7 weeks. Alevins emerge after 3 to 7 days following hatching. Most young remain in fresh water for 2 or 3 years. Steelhead are repeat spawners, able to spawn and return to salt water.

Distribution and abundance:
Stikine Area—Common
Chatham Area—Common
Ketchikan Area—Common
Chugach N.F.—Uncommon

Feasibility of monitoring:
Most difficult

References:
Shapovalov and Taft 1954; Maher and Larkin 1955; Withler 1966; Bustard and Narver 1975; Van Hulle 1985

Butter Clam
Saxidomus giganteus

Selection criteria:
Emphasis species (sport)
Ecological indicator (intertidal habitat)

Habitats preferred:
Intertidal zone

Special habitat features:
Rocky intertidal substrate

Food habits:
Filter feeders

Reproduction:
Spawning occurs at age 3 for many clams. Spawning may occur in August although there is much variation. Larvae appear as bivalved veligers within 2 weeks after spawning. At the end of 4 weeks they settle down onto the gravel.

Distribution and abundance:
Stikine Area—Abundant
Chatham Area—Abundant
Ketchikan Area—Abundant
Chugach N.F.—Abundant

Feasibility of monitoring:
Moderately difficult

References:
Fraser and Smith 1928; Fraser 1929

Red Squirrel
Tamiasciurus hudsonicus

Selection criteria:
Ecological indicator (forests mature enough to produce cone crops)

Habitats preferred:
Spruce/hemlock forest
Interior spruce forest

Special habitat features:
Stands of cone-producing trees
Cavities in trees and snags

Territory/home range:
Home range of 3.2 acres (1.3 ha) for males and 3.7 acres (1.5 ha) for females. Territories ranging in size from 0.5 acre (0.2 ha) to 3 acres (1.2 ha) are defended.

Food habits:
Mainly spruce cones; other coniferous cones and buds, mushrooms, fruits, insects, eggs, young birds, carrion

Reproduction:
Breeding season extends from late April through May. Gestation is approximately 35 days. Young are born from late May through June. Mean litter size is 4 with a range of 1 to 8. One litter is produced per year throughout most of this squirrel's range.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult

References:
Brink and Dean 1966; Smith 1970; Wolff and Zazada 1975

Beaver
Castor canadensis

Selection criteria:
Emphasis species (furbearer)
Keystone species (creates pond habitats for other species)

Habitats preferred:
Deciduous forest and shrub
Deciduous/conifer forest

Special habitat features:
Riparian habitat

Territory/home range:
Home ranges may be as large as 500 acres (200 ha). Territories may range from 25 acres (10 ha) to 125 acres (50 ha).

Food habits:
Bark and twigs of alder, willow, aspen, cottonwood, and birch; cattails, sedges, and water lilies. Stores food underwater for winter.

Reproduction:
Breeding occurs between January and March. Gestation lasts approximately 100 days. Kits are born from late April through June. Typical litters contain 3 or 4 young with a range from 1 to 9. Adult females produce 1 litter per year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least to moderately difficult

References:
Hakala 1952; Buckley and Libby 1955; Boyce 1974; Jenkins and Busher 1979

Long-tailed Vole
Microtus longicaudus

Selection criteria:
Ecological indicator (regenerating forests)

Habitats preferred:
New openings created by disturbance
Seedling/sapling stages of forest succession

Special habitat features:
Grasses, sedges, forbs

Territory/home range:
Home range varies from 0.25 acre (0.1 ha) to 10 acres (4 ha)

Food habits:
Grasses, sedges, bulbs, and bark of small twigs

Reproduction:
Breeding season extends from April to September. Gestation period varies from 20 to 23 days. Parturition extends from May through September; 5 is the average litter size with a range of 1 to 10. Three or 4 litters may be produced per year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Uncommon permanent resident

Feasibility of monitoring:
Least difficult

References:
Jenkins 1948; Cowan and Guiguet 1973; Johnson and Johnson 1982

Gray Wolf
Canis lupus

Selection criteria:
Emphasis species (furbearer)
Special interest species

Habitats preferred:
Uses a wide variety of habitats

Special habitat features:
Openings (e.g., sedge flats, muskeg) adjacent to den sites and used for rendezvous sites
Habitat must support prey base

Territory/home range:
Home ranges have been reported that vary in size from 36 mi^2 (94 km^2) to 5000 mi^2 (13000 km^2).

Food habits:
Deer, beaver, mountain goat, moose, hares, mice, grouse, ptarmigan, salmon, berries

Reproduction:
Breeding may occur from mid-March to early April. Gestation period is 63 days. Parturition occurs between mid-May and early June. Average litter size is 6, but it may range from 1 to 14. The dominant female in the pack breeds once a year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult

References:
Burkholder 1959; Rausch 1967; Pimlott et al. 1969; Mech 1970; Van Ballenberghe et al. 1975; Gasaway et al. 1983; Peterson et al. 1984

Black Bear
Ursus americanus

Selection criteria:
Emphasis species (game)
Species requiring special habitats (interspersion of successional stages)

Habitats preferred:
Spruce/hemlock forest
Interior spruce forest
Alpine/tundra
Grass/sedge meadows (especially saline grassflats)

Special habitat features:
Large standing snags and down trees for dens
Small clearcuts may improve forage production
Requires interspersion of successional stages

Territory/home range:
Home range size varies from 27 mi^2 to 40 mi^2 (70 km^2 to 100 km^2) for males and 4 mi^2 to 12 mi^2 (10 km^2 to 30 km^2) for females

Food habits:
Spring to early summer—grasses, sedges, skunk cabbage, carrion
Summer—berries, deer cabbage, salmon
Fall—berries, grasses

Reproduction:
Breeding occurs from mid-June through mid-July with a peak in activity in late June. Gestation lasts 7 to 8 months with most fetal development occurring during the last 6 to 8 weeks because of delayed implantation. Cubs are born in winter dens at the end of January or the beginning of February. Normal litter size is 2, but may range from 1 to 4. Adult females normally produce young every other year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult

References:
Erickson 1965a; Jonkel and Cowan 1971; Hatler 1972; McIlroy 1972; Modafferi 1982

Brown Bear
Ursus arctos

Selection criteria:
Emphasis species (game)
Special interest species

Habitats preferred:
Hemlock/spruce forest
Inland spruce forest
Alpine/tundra
Grass/sedge (especially saline grassflats)

Special habitat features:
Large expanses of habitat
Protection from human disturbance

Territory/home range:
Home ranges vary from approximately 15 mi^2 (40 km^2) to 40 mi^2 (100 km^2) for males and from 5 mi^2 (13 km^2) to 15 mi^2 (40 km^2) for females

Food habits:
Spring to early summer—skunk cabbage, grasses, sedges, forbs, carrion
Late summer to fall—berries, salmon, insects, carrion

Reproduction:
Time of breeding extends from late May through mid-July with a peak in mid-June. Gestation period ranges from 194 to 278 days with a mean of 245 days (delayed implantation occurs). Parturition occurs in the den from late January through February. Litter size ranges from 1 to 4 with a mean of 2.2. Females produce young every 2 to 5 years with an average of every 3 years.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult

References:
Erickson 1965b; Pearson 1975; Murie 1981

Pine Marten
Martes americana

Selection criteria:
Emphasis species (furbearer)
Species requiring special habitats (mature forest)
National RPA indicator

Habitats preferred:
Spruce/hemlock forest
Interior spruce forest

Special habitat features:
Old growth
Large standing and down dead wood

Territory/home range:
Minimum home range size is about 0.4 mi^2 (1 km^2) for females and about 0.75-1.2 mi^2 (2-3 km^2) for males

Food habits:
All seasons (especially winter)—small mammals
Summer—birds and their eggs, fruits and berries, and insects

Reproduction:
Breeding usually occurs in July or August. Gestation period is 220 to 276 days. Parturition is most common in April, but varies from mid-March to late April. Litter size averages slightly less than 3 young per female. Adult females produce one litter per year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult
Alaska Department of Fish and Game currently requires sealing of all trapped marten

References:
de Vos 1952; Lensink et al. 1955; Hawley and Newby 1957; Soutiere 1979; Steventon and Major 1982

River Otter
Lutra canadensis

Selection criteria:
Emphasis species (furbearer)
Species requiring special habitats (beach fringe timber)
National RPA species

Habitats preferred:
Spruce/hemlock forest
Riverine
Estuarine

Special habitat features:
Beach fringe timber
Riparian habitat

Territory/home range:
Size of home range varies depending upon availability of resources (e.g., 4 to 8 mi^2 [10 to 20 km^2] in southeast Alaska)

Food habits:
Fish (primarily sculpins and rockfish), crabs, and occasional invertebrates other than crabs

Reproduction:
Breeding occurs from late winter through spring with a peak in May. Active gestation lasts approximately 50 days, total gestation period ranges from 288 to 375 days due to delayed implantation. Parturition occurs from March through May with a peak in April. Litter sizes range from 1 to 6 with 2 to 4 young produced most commonly. Adult females produce 1 litter per year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult
Alaska Department of Fish and Game requires sealing of all trapped river otter

References:
Larsen 1983; Melquist and Hornocker 1983; Larsen 1984; Stenson et al. 1984

Sitka Black-tailed Deer
Odocoileus hemionus sitkensis

Selection criteria:
Emphasis species (game)
Species requiring special habitats (old growth)
National RPA indicator

Habitats preferred:
Spruce/hemlock forest
Alpine/tundra (summer range)

Special habitat features:
Old growth
Beach fringe and other selected old-growth stands (winter range)

Territory/home range:
Summer and winter home range averaged 195 acres (79 ha). Most deer probably move less than 6 miles (10 km) between summer and winter ranges

Food habits:
Spring—beach grasses, sedges
Early summer—skunk cabbage, marsh marigold, and other forbs
Winter—bunchberry and other evergreen forbs, *Vaccinium* shrubs

Reproduction:
Time of breeding extends from mid-October to late December with the peak occurring in mid-November. Length of gestation period averages 210 days with a range of 183 to 212 days. Parturition peaks in mid-June but extends from late May through early July. Litter size is usually 1 or 2 and occasionally 3.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult
Alaska Department of Fish and Game and USDA Forest Service are currently involved in a cooperative program designed to monitor long-term population trends through counts of pellet groups on permanently established transects.

References:
Bloom 1978; Wallmo and Schoen 1979; Wallmo and Schoen 1980; Hanley 1984; Schoen and Kirchhoff 1985

Moose
Alces alces

Selection criteria:
Emphasis species (game)

Habitats preferred:
Deciduous or mixed deciduous/conifer forest
Interior spruce forest
Spruce/hemlock forest

Special habitat features:
Riparian shrub and bottomlands
Old-growth forest (winter)

Territory/home range:
Home ranges are generally small ranging from 2 mi^2 (5 km^2) to 4 mi^2 (10 km^2)

Food habits:
Summer—willow, birch, forbs, grasses, sedges
Winter—willow, birch, alder, lichens

Reproduction:
Breeding season extends from mid-September to mid-October. Gestation period is approximately 240 days. Parturition occurs from mid-May to mid-June. Usually one calf is born; twins occur occasionally; triplets are rare. Eighty to 90 percent of adult females become pregnant annually.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Uncommon permanent resident
Ketchikan Area—Uncommon permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Moderately difficult
Alaska Department of Fish and Game conducts annual censuses of moose and monitors the moose harvest through tag returns

References:
Pimlott 1961; LaResche et al. 1974; Peterson 1974; Doerr 1983

Mountain Goat
Oreamnos americanus

Selection criteria:
Emphasis species (game)
Special interest species

Habitats preferred:
Alpine/tundra
Spruce/hemlock forest (winter)
Interior spruce forest (winter)

Special habitat features:
Cliffs and steep terrain
Forest habitat adjacent to alpine habitat

Territory/home range:
Home ranges are usually between 8 mi^2 (20 km^2) and 10 mi^2 (25 km^2)

Food habits:
Summer—primarily deer cabbage, also grasses, sedges, and low shrubs
Winter—hemlock and blueberry browse, dried grasses, lichens, mosses

Reproduction:
Breeding occurs from late November through late December. Gestation lasts approximately 180 days. Parturition generally occurs from mid-May through June. Usually one kid is born, but twins are not uncommon. Adult females breed once a year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least to moderately difficult
Alaska Department of Fish and Game currently conducts annual aerial surveys of mountain goat populations throughout their range on National Forests in Alaska. All mountain goats harvested are required to be registered with the State.

References:
Klein 1953; Hjeljord 1971; Fox 1978 and 1983

Dall Sheep
Ovis dalli

Selection criteria:
Emphasis species (game)
Special interest species

Habitats preferred:
Alpine/tundra

Special habitat features:
Rocky slopes, ridges, and cliffs

Territory/home range:
Size of home range varies from 125 acres (50 ha) in the winter to 6900 acres (2800 ha) in the spring and fall

Food habits:
Grasses, sedges, forbs, and willow

Reproduction:
Breeding occurs from November through December. Gestation lasts from 165 to 180 days. Lambing occurs between late April and late June. The majority of ewes give birth to only 1 lamb a year, although twins are occasionally born.

Distribution and abundance:
Stikine Area—Does not occur
Chatham Area—Does not occur
Ketchikan Area—Does not occur
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least to moderately difficult

References:
Geist 1971; Nichols 1978; Lawson and Johnson 1982

Trumpeter Swan
Cygnus buccinator

Selection criteria:
Sensitive species
Special interest species

Habitats preferred:
Marsh
Lacustrine

Special habitat features:
None reported

Territory/home range:
70 acres (30 ha) to 150 acres (60 ha) per nesting pair

Food habits:
Freshwater aquatic plants (stems, leaves, seeds, rootstalks, tubers); cygnets may consume many insects

Reproduction:
The breeding season lasts from mid-April through early May. Incubation period ranges from 33 to 37 days. Hatching occurs during May. Clutch size ranges from 1 to 10 and averages 5. One brood is raised per year.

Distribution and abundance:
Stikine Area—Uncommon permanent resident
Chatham Area—Uncommon permanent resident
Ketchikan Area—Uncommon permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least difficult
The U.S. Fish and Wildlife Service conducts annual surveys of trumpeter swan nesting and wintering populations in Alaska

References:
Monson 1956; Banko 1960; Bellrose 1976; Hansen et al. 1971

Vancouver Canada Goose
Branta canadensis fulva

Selection criteria:
Emphasis species (game)
Species requiring special habitats

Habitats preferred:
Spruce/hemlock forest
Grass/sedge meadows (saline grassflats)
Estuarine

Special habitat features:
Old growth
Riparian habitat

Territory/home range:
Closest distance observed to nearest neighbor was 260 feet (80 m)

Food habits:
Primarily skunk cabbage, blueberry, and sea lettuce

Reproduction:
Breeding occurs from early through late April. Incubation ranges from 24 to 30 days. Hatching occurs during May. Clutch size ranges from 2 to 10 with a mean of 5. Renesting may occur if the initial nest is disturbed.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Rare permanent resident

Feasibility of monitoring:
Least difficult
The U.S. Fish and Wildlife Service is developing methodology to conduct winter counts of the Vancouver Canada goose throughout southeast Alaska

References:
Harrington 1977; Van Horn et al. 1979; Lebeda 1980; Lebeda and Ratti 1983

Dusky Canada Goose
Branta canadensis occidentalis

Selection criteria:
Sensitive species
Emphasis species (game)
Special interest species

Habitats preferred:
Grass/sedge meadows (saline grassflats)
Marsh

Special habitat features:
None reported

Territory/home range:
300 foot (90 m) radius around nests in best nesting habitat

Food habits:
Primarily shoots and seeds of sedges

Reproduction:
Breeding occurs from mid-May to late May. Incubation period lasts from 28 to 33 days. Hatching generally occurs in late June. Clutch size averages 5.6 eggs with a range of 4 to 9. Renesting will occur if the initial nest is destroyed.

Distribution and abundance:
Stikine Area—Common migrant
Chatham Area—Common migrant
Ketchikan Area—Common migrant
Chugach N.F.—Common summer resident

Feasibility of monitoring:
Least difficult
U.S. Fish and Wildlife Service monitors population trends on the breeding grounds (i.e., Copper River Delta)

References:
Trainer 1959; Hansen 1962; Chapman et al. 1969; Bromley 1976; Timm et al. 1979

Common Merganser
Mergus merganser

Selection criteria:
Emphasis species (game)
Species requiring special habitats

Habitats preferred:
Spruce/hemlock forest
Deciduous forest
Deciduous/conifer forest
Estuarine

Special habitat features:
Nesting cavities in trees or snags within riparian habitat

Territory/home range:
Home ranges generally include 2 to 3 miles (3.2 to 4.8 km) of river

Food habits:
Primarily fish (e.g., salmon, trout); crustaceans; aquatic vegetation

Reproduction:
Breeding period extends from early to late April. Incubation lasts from 32 to 35 days. Hatching occurs from early May to early June. Clutch size ranges from 6 to 17 with an average of 9.2. One brood is raised per year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least difficult
The U.S. Fish and Wildlife Service is developing methodology to conduct brood counts for breeding ducks in southeast Alaska, which would provide monitoring data for the common merganser.

References:
White 1957; Johnsgard 1975; Bellrose 1976

Northern Goshawk
Accipiter gentilis

Selection criteria:
Sensitive species
Special interest species
National RPA indicator

Habitats preferred:
Spruce/hemlock forest
Interior spruce forest
Deciduous/conifer forest

Special habitat features:
Old growth

Territory/home range:
Reported home range sizes have varied from 524 acres (212 ha) to 6086 acres (2463 ha).

Food habits:
Grouse, ptarmigan, showshoe hare, red squirrel and other small mammals, some passerine birds.

Reproduction:
The breeding season extends from late March to early May. The incubation period lasts 28 to 29 days. Hatching occurs from late May to early June. Clutch size ranges from 1 to 5 with 3 and 4 most common. One clutch is raised per year.

Distribution and abundance:
Stikine Area—Uncommon permanent resident
Chatham Area—Uncommon permanent resident
Ketchikan Area—Uncommon permanent resident
Chugach N.F.—Uncommon permanent resident

Feasibility of monitoring:
Most difficult

References:
McGowan 1975; Reynolds and Wight 1978; Reynolds et al. 1982; Reynolds 1983

Osprey
Pandion haliaetus

Selection criteria:
Sensitive species
Special interest species
Species requiring special habitats
National RPA indicator

Habitats preferred:
Spruce/hemlock
Interior spruce
Deciduous/conifer

Special habitat features:
Riparian habitat
Nest and perch trees near lakes, rivers, and estuaries

Territory/home range:
Hunting range may extend up to 6 miles (10 km) from the nest. The area surrounding the nest is defended

Food habits:
Fish that swim at or near water surface

Reproduction:
The breeding season extends from mid-April to mid-May. Incubation lasts from 34 to 40 days. Hatching occurs from late May to late June. Clutch size ranges from 1 to 4 with 3 most common. One brood is raised per year.

Distribution and abundance:
Stikine Area—Rare summer resident and migrant
Chatham Area—Rare summer resident and migrant
Ketchikan Area—Rare summer resident and migrant
Chugach N.F.—Rare summer resident and migrant

Feasibility of monitoring:
Least difficult (distribution is very restricted in the Alaska Region)

References:
Ogden 1975, 1977; Garber, et al. 1974; Hughes nd.

Bald Eagle
Haliaeetus leucocephalus

Selection criteria:
Special interest species
Species requiring special habitats

Habitats preferred:
Spruce/hemlock forest
Deciduous and deciduous/conifer mixed forest

Special habitat features:
Old-growth beach fringe timber
Riparian habitat
Requires nest and perch trees adjacent to shores and rivers

Territory/home range:
0.5 mile (0.8 km) radius from nest

Food habits:
Primarily fish (e.g., herring, salmon, smelt); waterfowl; sea birds

Reproduction:
Time of breeding extends from early April through late April. Mean incubation period is 35 days. Hatching occurs from early May through late May. Clutch size ranges from 1 to 3, typically is 2. One brood is produced per year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least difficult
U.S. Fish and Wildlife Service currently monitors nests in selected areas in southeast Alaska and determines status of nests throughout this area.

References:
Corr 1974; Ofelt 1975; Sherrod et al. 1976; Grubb and Hensel 1978; Hodges 1982; Hodges et al. 1979; Hodges and Robards 1982; Hansen and Hodges 1985

Blue Grouse
Dendragapus obscurus

Selection criteria:
Emphasis species (game)

Habitats preferred:
Spruce/hemlock forest
Seedling/sapling stages of succession

Special habitat features:
Old growth

Territory/home range:
Territory size for males generally ranges from 1 to 2 acres (0.4 to 0.8 ha) in the spring; breeding season home range of females is approximately 40 acres (16 ha).

Food habits:
Spring - new buds, leaves, flowers
Summer to fall - primarily blueberries
Winter - spruce and hemlock needles and buds

Reproduction:
The breeding season extends from mid-March through early June with a peak of activity in late April. Incubation lasts from 24 to 26 days. Hatching occurs from late April through late June with a peak in mid-May. Clutch size ranges from 6 to 12 with 7 to 8 most common. One brood is raised per year.

Distribution and abundance:
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Does not occur

Feasibility of monitoring:
Least difficult
Alaska Department of Fish and Game conducts an annual survey of small game hunters to obtain a subjective index of the population density of blue grouse.

References:
Fowle 1960; Mussehl 1963; Bendell and Elliott 1966 and 1967

Spruce Grouse
Dendragapus canadensis

Selection criteria:
Emphasis species (game)

Habitats preferred:
Spruce/hemlock forest
Interior spruce forest

Special habitat features:
Old growth

Territory/home range:
Males establish a territory 5 to 9 acres (2 to 3.6 ha) in size during the breeding season; home ranges vary from 250 to 370 acres (100 to 150 ha) for females and 250 to 740 acres (100 to 300 ha) for males.

Food habits:
Summer - bluberries, cranberries, flowers, and green leaves
Winter - spruce buds and needles

Reproduction:
The breeding season extends from April through May with a peak in late April. Incubation ranges from 23 to 24 days. Hatching occurs from May to mid-June with a peak in mid-May. Clutch size ranges from 4 to 12 but typically is 6 to 8 eggs. One brood is raised per year.

Distribution and abundance:
Stikine Area—Rare permanent resident
Chatham Area—Rare permanent resident
Ketchikan Area—Rare permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least to moderately difficult
Alaska Department of Fish and Game conducts an annual survey of small game hunters to obtain an index of the population density of spruce grouse.

References:
Ellison 1966, 1971, 1972, 1973, and 1974

Ptarmigan
Lagopus spp.

Selection criteria:
Emphasis species (game)

Habitats preferred:
Alpine/tundra

Special habitat features:
Rock outcrops; shrubs, grass, forbs

Territory/home range:
Males defend a breeding territory of 15 to 50 acres (6 to 20 ha) in the spring.

Food habits:
Summer - insects, berries, leaves, flowers, seeds
Winter - buds, catkins, and twigs of alder, willow, and birch

Reproduction:
Breeding occurs from late April through May. Incubation generally lasts 21 to 23 days. Hatching occurs from mid-May to early July. Clutch sizes range from 5 to 17 with a mean of 7. One brood is raised per year.

Distribution and abundance:

Rock ptarmigan
Stikine Area—Common permanent resident
Chatham Area—Common permanent resident
Ketchikan Area—Common permanent resident
Chugach N.F.—Common permanent resident

White-tailed ptarmigan
Stikine Area—Uncommon permanent resident
Chatham Area—Uncommon permanent resident
Ketchikan Area—Uncommon permanent resident
Chugach N.F.—Rare permanent resident

Willow ptarmigan
Stikine Area—Uncommon permanent resident
Chatham Area—Uncommon permanent resident
Ketchikan Area—Uncommon permanent resident
Chugach N.F.—Common permanent resident

Feasibility of monitoring:
Least to moderately difficult
Alaska Department of Fish and Game conducts an annual survey of small game hunters to obtain an index of the population density of ptarmigan.

References:
Roberts 1963; Weeden 1965a, 1965b, and 1969; McGowan 1972; Moss 1974

Red-breasted Sapsucker
Sphyrapicus ruber

Selection criteria:
Keystone species (primary excavator of cavities used by other species)
Species requiring special habitats

Habitats preferred:
Spruce/hemlock forest
Deciduous/conifer forest

Special habitat features:
Old growth
Snags

Territory/home range:
Territory size ranges from 1.6 to 16 acres (0.7 to 6.1 ha); average size is 5.3 acres (2.1 ha).

Food habits:
Mainly coniferous tree sap; also ants and other insects; some fruits and berries in the winter

Reproduction:
The breeding season extends from mid-April to early May. Incubation ranges from 12 to 14 days. Hatching occurs throughout May. Clutch size ranges from 3 to 7 but typically is 5. One brood per year.

Distribution and abundance:
Stikine Area—Rare winter visitant, uncommon summer resident, uncommon migrant
Chatham Area—Rare winter visitant, uncommon summer resident, uncommon migrant
Ketchikan Area—Rare winter visitant, uncommon summer resident, uncommon migrant
Chugach N.F.—Accidental winter visitant, accidental migrant

Feasibility of monitoring:
Moderately difficult

References:
Lawrence 1967; Erskine and McLaren 1972; Rushmore 1973; Tate 1973; Crockett and Hadow 1975

Hairy Woodpecker
Picoides villosus

Selection criteria:
Species requiring special habitats
National RPA indicator

Habitats preferred:
Spruce/hemlock forest
Interior spruce forest
Deciduous/conifer forest

Special habitat features:
Snags

Territory/home range:
Territory size ranges from 6 to 8 acres (2.4 to 3.2 ha).

Food habits:
Larvae of wood-boring beetles; other insects; seeds and berries in winter

Reproduction:
The breeding season lasts from mid-March to mid-April. Incubation lasts 11 to 12 days. Hatching occurs late March through late April. Clutch size ranges from 3 to 6 with an average of 4. One brood is produced per year.

Distribution and abundance:
Stikine Area—Uncommon permanent resident
Chatham Area—Uncommon permanent resident
Ketchikan Area—Uncommon permanent resident
Chugach N.F.—Uncommon permanent resident

Feasibility of monitoring:
Moderately difficult

References:
Kilham 1960; Lawrence 1967; Conner et al. 1975

Brown Creeper
Certhia americana

Selection criteria:
Species requiring special habitats

Habitats preferred:
Spruce/hemlock forest
Interior spruce forest

Special habitat features:
Old growth

Territory/home range:
No information reported

Food habits:
Insectivorous: bark insects

Reproduction:
Breeding occurs from early May through mid-May. Incubation lasts 14 to 15 days. Hatching occurs from mid-May through late May. Clutch sizes range from 4 to 8 but are commonly 5 or 6. Produces 1 or 2 broods per year.

Distribution and abundance:
Stikine Area—Uncommon permanent resident
Chatham Area—Uncommon permanent resident
Ketchikan Area—Uncommon permanent resident
Chugach N.F.—Uncommon permanent resident

Feasibility of monitoring:
Moderately difficult

References:
Noble 1977; Scott et al. 1977; Davis 1979

Orange-crowned Warbler
Vermivora celata

Selection criteria:
Ecological indicator (regenerating forests)

Habitats preferred:
Deciduous forest and shrub
Deciduous/conifer forest
Seedling/sapling stages of succession

Special habitat features:
Dense shrubs for nesting

Territory/home range:
Approximately 5 acres (2 ha)

Food habits:
Leaf-eating beetles, caterpillars, plant lice, scale insects

Reproduction:
Breeding occurs from late May to early June. Incubation ranges from 8 to 12 days with a mean of 10 days. Hatching occurs from early June through mid-June. Clutch size ranges from 3 to 6 with an average of 4 to 5.

Distribution and abundance:
Stikine Area—Common summer resident, common migrant
Chatham Area—Common summer resident, common migrant
Ketchikan Area—Common summer resident, common migrant
Chugach N.F.—Common summer resident, common migrant

Feasibility of monitoring:
Moderately difficult

References:
Griscom and Sprunt 1957; Ficken and Ficken 1962; Noble 1977

Appendix

Appendix A. Members of the task force assembled to identify Management Indicator Species for the Alaska Region of the USDA Forest Service.

Name	Agency Affiliation	Position Title
Aho, Richard	USDA Forest Service	Area Fishery Biologist
Doerr, Joseph	ADF&G[1]	Habitat Biologist
Dunaway, David	USDA Forest Service	Regional Wildlife Biologist
Elliott, Steven	ADF&G	Fishery Biologist
Faris, Tamra	NMFS[2]	Marine Biologist
Flynn, Rodney	ADF&G	Game Biologist
Gibbons, David	USDA Forest Service	Regional Fishery Biologist
Gunstrom, Gary	ADF&G	Research Supervisor Region 1 (Fish)
Henke, Virgil	USDA Forest Service	Area Wildlife Biologist
Hruska, Carl	USDA Forest Service	District Wildlife Biologist
Hughes, Jeffrey	ADF&G	Biologist
Imamura, Kenneth	ADF&G	Assistant Management Biologist (Fish)
Janik, Phillip	USDA Forest Service	Regional Director, Wildlife and Fish
Prather, Martin	USDA Forest Service	District Wildlife and Fish Biologist
Rice, Kenneth	USDA Forest Service	District Wildlife Biologist
Saunders-Ogg, Linda	USDA Forest Service	District Wildlife Biologist
Sidle, Winifred	USDA Forest Service	Regional Coordinator, Wildlife & Fish Habitat Relationship Program
Sigman, Marilyn	ADF&G	Habitat Biologist
Suring, Lowell	USDA Forest Service	Wildlife Biologist
Williamson, Donald	USFWS[3]	Fish and Wildlife Biologist

[1]Alaska Department of Fish and Game
[2]National Marine Fisheries Service
[3]U.S. Fish and Wildlife Service

Appendix B. Results of the evaluation of 451 species of birds, mammals, birds, fish, and shellfish considered during the identification of management indicator species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Common loon	*Gavia immer*		X			
Yellow-billed loon	*Gavia adamsii*		X			
Arctic loon	*Gavia arctica*		X			
Red-throated loon	*Gavia stellata*		X			
Red-necked grebe	*Podiceps grisegena*	X				
Horned grebe	*Podiceps auritus*	X				
Western grebe	*Aechmophorus occidentalis*	X				
Pied-billed grebe	*Podilymbus podiceps*	X				
Short-tailed albatross	*Diomedea albatrus*		X			
Black-footed albatross	*Diomedea nigripes*	X				
Laysan albatross	*Diomedea immutabilis*	X				
Northern fulmar	*Fulmarus glacialis*	X				
Pink-footed shearwater	*Puffinus creatopus*	X				
Flesh-footed shearwater	*Puffinus carneipes*	X				
Buller's shearwater	*Puffinus bulleri*	X				
Sooty shearwater	*Puffinus griseus*	X				
Short-tailed shearwater	*Puffinus tenuirostris*	X				
Manx shearwater	*Puffinus puffinus*	X				
Mottled petrel	*Pterodroma inexpectata*	X				
Fork-tailed storm-petrel	*Oceanodroma furcata*			X		
Leach's storm petrel	*Oceanodroma leucorhoa*			X		
Double-crested cormorant	*Phalacrocorax auritus*			X		
Brandt's cormorant	*Phalacrocorax penicillatus*			X		
Pelagic cormorant	*Phalacrocorax peligicus*			X		
Red-faced cormorant	*Phalacrocorax urile*			X		
Great blue heron	*Ardea herodias*				X	
American bittern	*Botaurus lentiginosus*		X			
Tundra swan	*Cygnus columbianus*				X	
Trumpeter swan	*Cygnus buccinator*				X	Chugach NF
Whooper swan	*Cygnus cygnus*	X				
Greater white-fronted goose	*Anser albifrons*		X			
Vancouver Canada goose	*Branta canadensis fulva*				X	Tongass NF
Dusky Canada goose	*Branta canadensis occidentalis*				X	Chugach NF
Lesser Canada goose	*Branta canadensis paruipes*	X				
Aleutian Canada goose	*Branta canadensis leucorpareia*		X			
Cackling Canada goose	*Branta canadensis minima*	X				
Brant	*Branta bernicla nigricans*				X	
Snow goose	*Chen caerulescens*				X	
Emperor goose	*Chen canagica*	X				
Ross' goose	*Chen rosii*	X				
American black duck	*Anas rubripes*	X				
Mallard	*Anas platyrhynchos*				X	
Gadwall	*Anas strepera*		X			
Northern pintail	*Anas acuta*				X	
Green-winged teal	*Anas crecca*				X	
Garganey	*Anas querquedula*	X				
Blue-winged teal	*Anas discors*				X	
Cinnamon teal	*Anas cyanoptera*				X	
Northern shoveler	*Anas clypeata*	X				
Eurasian wigeon	*Anas penelope*	X				
American wigeon	*Anas americana*				X	
Wood duck	*Aix sponsa*	X				
Common pochard	*Aythya ferina*	X				
Canvasback	*Aythya valisineria*		X			
Redhead	*Aythya americana*		X			
Ring-necked duck	*Aythya collaris*		X			
Greater scaup	*Aythya marila*		X			

[1]These levels refer to the steps in the procedure (Fig. 1) that was used to evaluate species for consideration as MIS. The "X" indicates the highest level to which the species was retained in the evaluation.

Appendix B, continued. Results of the evaluation of 451 species of birds, mammals, fish, and shellfish considered during the identification of Management Indicator Species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Lesser scaup	*Aythya affinis*		X			
Tufted duck	*Aythya fuligula*	X				
Common goldeneye	*Bucephala clangula*				X	
Barrow's goldeneye	*Becephala islandica*		X			
Bufflehead	*Bucephala albeola*				X	
Oldsquaw	*Clangula hyemalis*		X			
Harlequin Duck	*Histrionicus histrionicus*				X	
Steller's eider	*Polysticta stelleri*	X				
Common eider	*Somateria mollissima*	X				
King eider	*Somateria spectabilis*	X				
Spectacled eider	*Somateria fischeri*	X				
White-winged scoter	*Melanitta fusca*		X			
Surf scoter	*Melanitta perspicillata*		X			
Black scoter	*Melanitta nigra*		X			
Ruddy duck	*Oxyura jamaicensis*	X				
Hooded merganser	*Lophodytes cucullatus*				X	
Smew	*Mergellus albellus*	X				
Common merganser	*Mergus merganser*				X	Region
Red-breasted merganser	*Mergus serrator*		X			
Northern goshawk	*Accipiter gentilis*				X	Region
Sharp-shinned hawk	*Accipiter striatus*		X			
Red-tailed hawk	*Buteo jamaicensis*				X	
Swainson's hawk	*Buteo swainsoni*		X			
Rough-legged hawk	*Buteo lagopus*		X			
Golden eagle	*Aquila chrysaetos*		X			
Osprey	*Pandion haliaetus*				X	Region
Northern harrier	*Circus cyaneus*		X			
Bald eagle	*Haliaeetus leucocephalus*				X	Region
Gyrfalcon	*Falco rusticolus*		X			
Peale's peregrine falcon	*Falco peregrinus pealei*				X	
American peregrine falcon	*Falco peregrinus anatum*				X	
Tundra peregrine falcon	*Falco peregrinus tundrius*				X	
American kestrel	*Falco sparverius*				X	
Merlin	*Falco columbarius*			X		
Blue grouse	*Dendragapus obscurus*				X	Tongass NF
Spruce grouse	*Dendragapus canadensis*				X	Chugach NF
Ruffed grouse	*Bonasa umbellus*		X			
Rock ptarmigan	*Lagopus mutus*		X			Region
White-tailed ptarmigan	*Lagopus leucurus*		X			Region
Willow ptarmigan	*Lagopus lagopus*		X			Region
Sandhill crane	*Grus canadensis*				X	
Sora	*Porzana carolina*	X				
American coot	*Fulica americana*	X				
American oystercatcher	*Haematopus bachmani*				X	
Eurasian dotterel	*Charadrius morinellus*	X				
Semi-palmated plover	*Charadrius semipalmatus*	X				
Killdeer	*Charadrius vociferus*	X				
Mongolian plover	*Charadrius mongolus*	X				
Lesser golden-plover	*Pluvialis dominica*	X				
Black-bellied plover	*Pluvialis squatarola*	X				
Marbled godwit	*Limosa fedoa*	X				
Hudsonian godwit	*Limosa haemastica*	X				
Bar-tailed godwit	*Limosa lapponica*	X				
Whimbrel	*Numenius phaeopus*	X				
Bristle-thighed curlew	*Numenius tahitiensis*	X				
Upland sandpiper	*Bartramia longicauda*	X				
Greater yellowlegs	*Tringa melanoleuca*		X			
Lesser yellowlegs	*Tringa flavipes*		X			
Solitary sandpiper	*Tringa solitaria*				X	
Terek sandpiper	*Xenus cinereus*	X				
Spotted sandpiper	*Actitis macularia*	X				

Appendix B, continued. Results of the evaluation of 451 species of birds, mammals, fish, and shellfish considered during the identification of Management Indicator Species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Gray-tailed tattler	*Heteroscelus brevipes*	X				
Wandering tattler	*Heteroscelus incanus*	X				
Ruddy turnstone	*Arenaria interpres*	X				
Black turnstone	*Arenaria melanocephala*	X				
Wilson's phalarope	*Phalaropus tricolor*	X				
Red-necked phalarope	*Phalaropus lobatas*	X				
Red phalarope	*Phalaropus fulicaria*	X				
Common snipe	*Gallinago gallinago*				X	
Short-billed dowitcher	*Limnodromus griseus*	X				
Long-billed dowitcher	*Limnodromus scolopaceus*	X				
Surfbird	*Aphriza virgata*	X				
Red knot	*Calidris canutus*	X				
Sanderling	*Calidris alba*	X				
Semipalmated sandpiper	*Calidris pusilla*	X				
Western sandpiper	*Calidris mauri*	X				
Rufous-necked stint	*Calidris ruficollis*	X				
White-rumped sandpiper	*Calidris fuscicollis*	X				
Least sandpiper	*Calidris minutila*	X				
Baird's sandpiper	*Calidris bairdii*	X				
Pectoral sandpiper	*Calidris melanotos*	X				
Sharp-tailed sandpiper	*Calidris acuminata*	X				
Rock sandpiper	*Calidris ptilocnemis*	X				
Stilt sandpiper	*Calidris himantopus*	X				
Dunlin	*Calidris alpina*	X				
Curlew sandpiper	*Calidris ferruginea*	X				
Buff-breasted sandpiper	*Tryngites subruficollis*	X				
Ruff	*Philomachus pugnax*	X				
Pomarine jaeger	*Stercorarius pomarinus*	X				
Parasitic jaeger	*Stercorarius parasiticus*	X				
Long-tailed jaeger	*Stercorarius longicaudus*	X				
South Polar skua	*Catharacta maccormicki*	X				
Glaucous gull	*Larus hyperboreus*	X				
Glaucous-winged gull	*Larus glaucescens*	X				
Slaty-backed gull	*Larus schistisagus*	X				
Herring gull	*Larus argentatus*	X				
Thayer's gull	*Larus thayeri*	X				
California gull	*Larus californicus*	X				
Ring-billed gull	*Larus delawarensis*	X				
Mew gull	*Larus canus*	X				
Common black-headed gull	*Larus ridibundus*	X				
Franklin's gull	*Larus pipixcan*	X				
Bonaparte's gull	*Larus philadelphia*	X				
Ivory gull	*Pagophila eburnea*	X				
Black-legged kittiwake	*Rissa tridactyla*		X			
Red-legged kittiwake	*Rissa brevirostris*	X				
Sabine's gull	*Xema sabini*	X				
Arctic tern	*Sterna paradisaea*				X	
Aleutian tern	*Sterna aleutica*				X	
Black tern	*Chlidonias niger*	X				
Common murre	*Uria aalge*	X				
Thick-billed murre	*Uria lomvia*	X				
Pigeon guillemot	*Cepphus columba*				X	
Marbled murrelet	*Brachyramphus marmoratus*				X	
Kittlitz's murrelet	*Brachyramphus brevirostris*	X				
Ancient murrelet	*Synthliboramphus antiquus*	X				
Cassin's auklet	*Ptychoramphus aleuticus*	X				
Parakeet auklet	*Cyclorrhynchus psittacula*	X				
Crested auklet	*Aethia cristatella*	X				
Least auklet	*Aethia pusilla*	X				
Rhinoceros auklet	*Cerorhinca monocerata*	X				
Horned puffin	*Fratercula corniculata*			X		

Appendix B, continued. Results of the evaluation of 451 species of birds, mammals, fish, and shellfish considered during the identification of Management Indicator Species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Tufted puffin	*Fratercula cirrhata*			X		
Band-tailed pigeon	*Columba fasciata*	X				
Rock dove	*Columba livia*	X				
Mourning dove	*Zenaida macroura*	X				
Western screech owl	*Otus kennicottii*				X	
Great horned owl	*Bubo virginianus*				X	
Snowy owl	*Nyctea scandiaca*		X			
Northern hawk owl	*Surnia ulula*				X	
Northern pygmy owl	*Glaucidium gnoma*				X	
Barred owl	*Strix varia*		X			
Great grey owl	*Strix nebulosa*				X	
Short-eared owl	*Asio flammeus*		X			
Boreal owl	*Aegolius funereus*				X	
Saw-whet owl	*Aegolius acadicus*				X	
Common nighthawk	*Chordeiles minor*		X			
Black swift	*Cypseloides niger*		X			
Vaux's swift	*Chaetura vauxi*		X			
Anna's hummingbird	*Calypte anna*		X			
Rufous hummingbird	*Selasphorus rufus*		X			
Belted kingfisher	*Ceryle alcyon*		X			
Northern flicker	*Colaptes auratus*				X	
Red-breasted sapsucker	*Sphyrapicus ruber*				X	Tongass NF
Hairy woodpecker	*Picoides villosus*				X	Region
Downy woodpecker	*Picoides pubescens*				X	
Black-backed woodpecker	*Picoides arcticus*				X	
Three-toed woodpecker	*Picoides tridactylus*				X	
Eastern kingbird	*Tyrannus tyrannus*	X				
Western kingbird	*Tyrannus verticalis*	X				
Say's phoebe	*Sayornis saya*	X				
Alder flycatcher	*Empidonax alnorum*				X	
Hammond's flycatcher	*Empidonax hammondii*	X				
Western flycatcher	*Empidonax difficilis*		X			
Western wood-pewee	*Contopus sordidulus*	X				
Olive-sided flycatcher	*Contopus borealis*	X				
Horned lark	*Eremophila alpestris*	X				
Violet-green swallow	*Tachycineta thalassina*		X			
Tree swallow	*Tachycineta bicolor*				X	
Bank swallow	*Riparia riparia*	X				
Northern rough-winged swallow	*Stelgidopteryx serripennis*		X			
Barn swallow	*Hirundo rustica*	X				
Cliff swallow	*Hirundo pyrrhonota*	X				
Purple martin	*Progne subis*	X				
Gray jay	*Perisoreus canadensis*	X				
Steller's jay	*Cyanocitta stelleri*	X				
Black-billed magpie	*Pica pica*	X				
Common raven	*Corvus corax*		X			
Northwestern crow	*Corvus caurinus*	X				
Clark's nutcracker	*Nucifraga columbiana*	X				
Black-capped chickadee	*Parus atricapillus*	X				
Mountain chickadee	*Parus gambeli*		X			
Boreal chickadee	*Parus hudsonicus*				X	
Chestnut-backed chickadee	*Parus rufescens*				X	
Red-breasted nuthatch	*Sitta canadensis*		X			
Brown creeper	*Certhia americana*				X	Region
Dipper	*Cinclus mexicanus*		X			
Winter wren	*Troglodytes troglodytes*	X				
American robin	*Turdus migratorius*	X				
Varied thrush	*Ixoreus naevius*		X			
Hermit thrush	*Catharus guttatus*		X			
Swainson's thrush	*Catharus ustulatus*	X				

Appendix B, continued. Results of the evaluation of 451 species of birds, mammals, fish, and shellfish considered during the identification of Management Indicator Species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Grey-cheeked thrush	*Catharus minimus*	X				
Mountain bluebird	*Sialia currucoides*	X				
Northern wheatear	*Oenanthe oenanthe*	X				
Townsend's solitaire	*Myadestes townsendi*	X				
Golden-crowned kinglet	*Regulus satrapa*				X	
Ruby-crowned kinglet	*Regulus calendula*	X				
Siberian accentor	*Prunella montanella*	X				
Black-backed wagtail	*Motacilla lugens*	X				
Yellow wagtail	*Motacilla flava*	X				
Water pipit	*Anthus spinoletta*	X				
Red-throated pipit	*Anthus cervinus*	X				
Bohemian waxwing	*Bombycilla garrulus*		X			
Cedar waxwing	*Bombycilla cedrorum*	X				
Northern shrike	*Lanius excubitor*	X				
European starling	*Sturnus vulgarus*	X				
Warbling vireo	*Vireo gilvus*	X				
Red-eyed vireo	*Vireo olivaceus*	X				
Philadelphia vireo	*Vireo philadelphicus*	X				
Tennessee warbler	*Vermivora peregrina*	X				
Orange-crowned warbler	*Vermivora celata*		X			Region
Yellow warber	*Dendroica petechia*	X				
Magnolia warber	*Dendroica magnolia*	X				
Yellow-rumped warbler	*Dendroica coronata*	X				
Cape May warbler	*Dendroica tigrina*	X				
Townsend's warbler	*Dendroica townsendi*				X	
Blackpoll warbler	*Dendroica striata*	X				
Northern waterthrush	*Sieurus noveboracensis*	X				
MacGillivray's warbler	*Oporornis tolmiei*	X				
Common yellowthroat	*Geothlypis trichas*	X				
Wilson's warbler	*Wilsonia pusilla*	X				
American redstart	*Setophaga ruticilla*	X				
Western meadowlark	*Sturnella neglecta*	X				
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	X				
Red-winged blackbird	*Agelaius phoeniceus*	X				
Rusty blackbird	*Euphagus carolinus*	X				
Brewer's blackbird	*Euphagus cyanocephalus*	X				
Common grackle	*Quiscalus quiscula*	X				
Brown-headed cowbird	*Molothrus ater*	X				
Western tanager	*Piranga ludoviciana*	X				
Savannah sparrow	*Passerculus sandwichensis*		X			
Dark-eyed junco	*Junco oreganus*		X			
American tree sparrow	*Spizella arborea*	X				
Chipping sparrow	*Spizella passerina*	X				
Harris' sparrow	*Zonotrichia querula*	X				
White-crowned sparrow	*Zonotrichia leucophrys*		X			
Golden-crowned sparrow	*Zonotrichia atricapilla*	X				
White-throated sparrow	*Zonotrichia albicollis*	X				
Fox sparrow	*Passerella iliaca*	X				
Lincoln's sparrow	*Melospiza lincolnii*	X				
Song sparrow	*Melospiza melodia*	X				
Lapland longspur	*Calcarius lapponicus*	X				
Smith's longspur	*Calcarius pictus*	X				
Snow bunting	*Plectrophenax nivalis*	X				
McKay's bunting	*Plectrophenax hyperboreus*	X				
Brambling	*Fringilla montifringilla*	X				
Evening grosbeak	*Coccothraustes vespertinus*	X				
Eurasian bullfinch	*Pyrrhula pyrrhula*	X				
Purple finch	*Carpodacus pupureus*	X				
Pine grosbeak	*Pinicola enucleator*	X				
Rosy finch	*Leucosticte arctoa*		X			

Appendix B, continued. Results of the evaluation of 451 species of birds, mammals, fish, and shellfish considered during the identification of Management Indicator Species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Hoary redpoll	*Carduelis hornemanni*	X				
Common redpoll	*Carduelis flammea*	X				
Pine siskin	*Carduelis pinus*				X	
Red crossbill	*Loxia curvirostra*				X	
White-winged crossbill	*Loxia leucoptera*				X	
Masked shrew	*Sorex cinereus*	X				
Montane shrew	*Sorex monticolus*	X				
Water shrew	*Sorex palustris*			X		
Glacier Bay water shrew	*Sorex alaskanus*		X			
Pygmy shrew	*Sorex hoyi*	X				
Little brown myotis	*Myotis lucifugus*				X	
Keen's myotis	*Myotis keenii*	X				
Long-legged bat	*Myotis volans*				X	
California myotis	*Myotis californicus*	X				
Silver-haired bat	*Lasionycteris noctivagans*	X				
Big brown bat	*Eptesicus fuscus*	X				
Collared pika	*Ochotona collaris*		X			
Snowshoe hare	*Lepus americanus*				X	
Least chipmunk	*Eutamias minimus*	X				
Hoary marmot	*Marmota caligata*		X			
Arctic ground squirrel	*Citellus undulatus*		X			
Red squirrel	*Tamiasciurus hudsonicus*				X	Region
Northern flying squirrel	*Glaucomys sabrinus*				X	
Beaver	*Castor canadensis*				X	Region
Deer mouse	*Peromyscus maniculatus*	X				
Sitka mouse	*Peromyscus sitkensis*				X	
Bushy-tailed woodrat	*Neotoma cinerea*	X				
Northern red-backed vole	*Clethrionomys rutilus*				X	
Gapper's red-backed vole	*Clethrionomys gapperi*				X	
Meadow vole	*Microtus pennsylvanicus*		X			
Tundra vole	*Microtus oeconomus*			X		
Long-tailed vole	*Microtus longicaudus*				X	Region
Coronation Island vole	*Microtus coronarius*				X	
Singing vole	*Microtus miurus*		X			
Muskrat	*Ondatra zibethecus*				X	
Northern bog lemming	*Synaptomys borealis*		X			
Black rat	*Rattus rattus*	X				
Norway rat	*Rattus norvegicus*	X				
House mouse	*Mus musculus*	X				
Meadow jumping mouse	*Zapus hudsonicus*		X			
Western jumping mouse	*Zapus princeps*		X			
Porcupine	*Erethizon dorsatum*		X			
Baird's bottle-nosed whale	*Berardius bairdii*			X		
North Pacific beaked whale	*Mesoplodon stejnegeri*			X		
Goose-beaked whale	*Ziphius cavirostris*			X		
Sperm whale	*Physeter macrocephalus*			X		
White whale	*Delphinapterus leucas*			X		
Striped porpoise	*Stenella coeruleoalba*			X		
Northern right whale dolphin	*Lissodelphis borealis*			X		
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*			X		
Killer whale	*Orcinus orca*			X		
Grampus dolphin	*Grampus griseaus*			X		
Long-finned pilot whale	*Globicephala melaena*			X		
Harbor porpoise	*Phocoena phocoena*			X		
Dall's porpoise	*Phocoenoides dalli*			X		
Gray whale	*Eschrichtius robustus*			X		
Fin whale	*Balaenoptera physalus*			X		
Sei whale	*Balaenoptera borealis*			X		
Minke whale	*Balaenoptera acutorostrata*			X		
Blue whale	*Balaenoptera musculus*			X		
Humpback whale	*Megaptera novaeangliae*			X		

Appendix B, continued. Results of the evaluation of 451 species of birds, mammals, fish, and shellfish considered during the identification of Management Indicator Species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Right whale	*Balaena glacialis*			X		
Coyote	*Canis latrans*		X			
Gray wolf	*Canis lupis*				X	Region
Red fox	*Vulpes vulpes*		X			
Black bear	*Ursus americanus*				X	Region
Alaskan brown bear	*Ursus arctos*				X	Region
Raccoon	*Procyon lotor*	X				
Marten	*Martes americana*				X	Region
Fisher	*Martes pennanti*	X				
Ermine	*Mustela erminea*		X			
Least weasel	*Mustela nivalis*		X			
Mink	*Mustela vison*				X	
Wolverine	*Gulo gulo*				X	
River otter	*Lutra canadensis*				X	Region
Sea otter	*Enhydra lutris*			X		
Lynx	*Lynx canadensis*				X	
Northern fur seal	*Callorhinus ursinus*		X			
Northern sea lion	*Eumetopias jubata*			X		
California sea lion	*Zalophus californianus*			X		
Steller sea lion	*Eumetopias jubata*			X		
Northern elephant seal	*Mirounga angustirostris*		X			
Harbor seal	*Phoca vitulina*			X		
Sitka black-tailed deer	*Odocoileus hemoinus sitkensis*				X	Region
Moose	*Alces alces*				X	Region
Caribou	*Rangifer tarandus*			X		
Mountain goat	*Oreamnos americanus*				X	Region
Dall sheep	*Ovis dalli*				X	Chugach NF
Pacific leatherback turtle	*Dermochelys coriacea*		X			
Garter snake	*Thamnophis sirtalis*	X				
Roughskin newt	*Taricha granulosa*	X				
Northwestern salamander	*Ambystoma gracile*	X				
Long-toed salamander	*Ambystoma macrodactylum*	X				
Western toad	*Bufo boreas*	X				
Spotted frog	*Rana pretiosa*	X				
Wood frog	*Rana sylvatica*	X				
Pacific lamprey	*Entosphenus tridentatus*	X				
River lamprey	*Lampetra japonica*	X				
Western brook lamprey	*Lampetra richardsoni*	X				
Green sturgeon	*Acipenser medirostris*	X				
White sturgeon	*Acipenser transmontanus*	X				
American shad	*Alosa sapidissima*	X				
Pacific herring	*Clupea harengus pallasi*				X	
Lake whitefish	*Coregonus clupeaformis*	X				
Pink salmon	*Oncorhynchus gorbuscha*				X	Region
Chum salmon	*Oncorhynchus keta*				X	
Coho salmon	*Oncorhynchus kisutch*				X	Region
Sockeye salmon	*Oncorhynchus nerka*				X	Region
Chinook salmon	*Oncorhynchus tshawytscha*				X	Region
Mountain whitefish	*Prosopium williamsoni*	X				
Cutthroat trout	*Salmo clarki*				X	Region
Rainbow trout (steelhead)	*Salmo gairdneri*				X	Region
Arctic char	*Salvelinus alpinus*			X		
Brook trout	*Salvelinus fontinalis*		X			
Dolly varden	*Salvelinus malma*		X			
Lake trout	*Salvelinus namaycush*		X			
Arctic grayling	*Thymallus arcticus*		X			
Rainbow smelt	*Osmerus mordax*	X				
Longfin smelt	*Spirinchus thaleichthys*	X				
Eulachon	*Thaleichthys pacificus*		X			
Northern pike	*Esox lucius*				X	
Longnose sucker	*Catostomus catostomus*	X				

Appendix B, continued. Results of the evaluation of 451 species of birds, mammals, fish, and shellfish considered during the identification of Management Indicator Species (MIS) for the Alaska Region.

Common Name	Scientific Name	Level of Evaluation[1]				Recommended Regional and Forest MIS
		2	3	4	5	
Pacific cod	*Gadus macrocephalus*		X			
Threespine stickleback	*Gasterosteus aculeatus*	X				
Burbot	*Lota lota*	X				
Coastrange sculpin	*Cottus aleuticus*	X				
Prickly sculpin	*Cottus asper*	X				
Slimy sculpin	*Cottus cognatus*	X				
Red king crab	*Paralithodes camtschatica*				X	
Blue king crab	*Paralithodes platypus*			X		
Brown crab	*Lithodes aquispina*			X		
Dungeness crab	*Cancer magister*				X	
Tanner crab	*Chionocoetes bairdi*			X		
Broken-backed shrimp	*Heptacarpus sp.*	X				
Side-striped shrimp	*Pandalopsis dispar*			X		
Humpy shrimp	*Pandalopsis goniurus*			X		
Spot shrimp	*Pandalopsis platyceros*			X		
Pink shrimp	*Pandalopsis borealus*			X		
Coon-stripe shrimp	*Pandalopsis hypsinotus*			X		
Japanese abalone	*Haliotis kamtschatkana*				X	
Nuttall's cockle	*Clinocardium nuttallii*		X			
Alaska surf clam	*Spisula alaskana*		X			
Butter clam	*Saxidomus giganteus*				X	Region
Pacific littleneck	*Protothaca staminea*		X			
Pacific razor clam	*Siliqua patula*			X		
Geoduc clam	*Panope generosa*			X		
Weathervane scallop	*Pecten caurinus*	X				
Northwest neptuna	*Neptunea lyrata*	X				
Neptuna	*Neptunea pribiloffensis*	X				
Octopus	*Octopus dolfleini*		X			
Green sea urchin	*Strongylocentrotus franciscanus*	X				
Red sea cucumber	*Parastichopus californicus*	X				

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