Exhibit 25

The Nature Conservancy

Species Management Abstract

Common Loon

(Gavia immer)

To the User:

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Natural History, Condition, Management/Monitoring, Research, Information Sources

I. IDENTIFIERS

Common Name: COMMON LOON

Global conservation status rank from the Association for Biodiversity Information: G5

General Description:

Plumage differences between the sexes are indistinguishable. In alternate (breeding) plumage, the head and neck are velvety black with a slight greenish gloss. Across the throat is a prominent transverse bar of short, vertical white streaks; on either side of the neck is a collar of similar, longer white streaks, not quite meeting in the center of the throat or the back of the neck. The bill is black, and the iris is brownish ruby. The upperparts are black with a greenish gloss, heavily spotted with white, each feather (except the unmarked upper tail coverts) with a pair of white, squarish subterminal spots, smallest on the upper mantle, back and rump, and largest on the scapulars. The underparts are mainly white, the sides of the breast are streaked black and white, and the flanks are black with small white spots. The tail is short, with 16-20 feathers, and entirely black. The wings are narrow and pointed, about 35 cm long (unflattened), with 11 primaries and 22-23 secondaries. The remiges are blackish with dark shafts, and the tips of the inner secondaries have single or paired white spots. The coverts are similar to the upperparts but have more circular subterminal spots. The wing lining is mostly white. The legs are black on the outer side paling to grayish or white inside; the webs of the feet are mostly white above, and black with white centers below (Palmer 1962, Jackson 1976, Johnsgard 1987, McIntyre 1988).

Although some overlap exists between the sexes, within pairs, males are consistently larger than females (Barr 1973, McIntyre 1988). Adults measure about 1 m in length outstretched (Palmer 1962, McIntyre 1988). Weight varies geographically and within populations, with adults ranging from 2.7 kg to more than 6.3 kg (McIntyre 1988). Sexual dimorphism is most pronounced in bill length and depth (McIntyre 1975, Storer 1988). Some structures of the digestive tract are larger in males, suggesting possible food partitioning by pair members (Barr 1973).

The definitive alternate plumage is acquired by a complete molt between January and March, which renders birds flightless for nearly a month (Woolfenden 1972, McIntyre 1988). This plumage is not acquired until the third or fourth summer (McIntyre 1986).

The basic (winter) plumage is acquired by a partial molt of contour feathers beginning in late summer and lasting through fall (although earlier in unsuccessful breeders and immatures). In this plumage the forehead, crown and back are grayish-brown, and the chin, throat and foreneck are white. The bill is brownish-gray to pale bluish-gray or horn colored. The iris is brown. The upperparts are brownish-gray, the feathers margined with paler gray, with a few black and white feathers occasionally retained in adults. The underparts are mainly white, with a brownish, streaked appearance on the sides of the breast and flanks. The tail is dark brown, tipped with white (Bent 1919; Johnsgard 1987; McIntyre 1986, 1988).

The juvenal plumage begins to emerge at about one month. This plumage is similar to the adult basic plumage, although the upperparts have paler and more conspicuous feather margins than those of adults, and the throat and sides of the neck are more finely streaked with brown. Flight feather growth is completed at 12-13 weeks of age, and this entire plumage is worn until the following summer when a complete molt produces another, more adult- like basic plumage (Palmer 1962, McIntyre 1988).

Newly-hatched chicks undergo two successive changes of downy plumage. The first down is blackish, paler on the throat, upper breast and flanks, and white on the lower breast and belly. This is replaced at 10-14 days of age by the second downy plumage of primarily brownish-gray feathers, which are replaced by the juvenal contour feathers at four weeks (Palmer 1962, McIntyre 1988).

NESTS: Nests are nearly always built at the water's edge. Substrates range from masses of aquatic and terrestrial vegetation, to moss, to bare soil, sand or rock, to depressions in old muskrat (ONDATRA ZIBETHICUS) houses (McIntyre 1988). Nests are typically large, bulky structures composed of vegetation, if available, but may consist simply of scrapes in the bare soil or duff, or may be placed directly on rocky substrate (Bent 1919, McIntyre 1988). Some are built on sedge or ericaceous bog mats, and occasionally partially rotted, semi-submerged logs are used (McIntyre 1988). Nest materials often include clumps of partially decayed aquatic vegetation, roots and rhizomes (McIntyre 1975, 1988). Nest diameters average 56-66 centimeters outside, 24.5-33 centimeters inside, and 3-7.6 centimeters deep (Olson and Marshall 1952, McIntyre 1975, Sutcliffe 1980).

EGGS: Subelliptical to ovoid in shape and vary from deep-olive to light-brown in color, most being deep-olive brown with irregular dark brown or black spots. Dimensions average 86.5-91.5 mm by 54-57 mm, and weights average 140-160 g.

VOCALIZATIONS: See Barklow (1979), Klein (1985), McIntyre (1988), Miller (1988), Palmer (1962), Rummel and Goetzinger (1975), Sjolander and Agren (1972) for descriptions of vocalizations.

Diagnostic Characteristics:

See Stallcup (1994) for information on identification of North American loons.

II. STEWARDSHIP SUMMARY

Nest on islands or backwater areas on lakes with adequate fish prey. Pairs typically raise one or two chicks, but failure is common and compensated sometimes by renesting. On the northern breeding grounds in Canada, populations appear to be stable or increasing. However, at the southern edge of their range in the Northeast, breeding loons have gradually drawn northward in the past century. Many types of disturbances threaten loons at their breeding sites, including lakeshore development, human recreational disturbance, predation, fluctuating water levels at nest sites, entanglement in fishing gear, environmental pollutants, and loss of prey due to acidic rain. Identification, monitoring and protection of nest sites in areas of human use are essential to the continued nesting success. Wintering areas along the Pacific and Atlantic coasts also require protection from the damages of oil spills. More information is needed about wintering areas, distribution, and numbers (Rimmer 1992).

III. NATURAL HISTORY

Range:

Breeding season abundance map from the North American Breeding Bird Survey

Winter season abundance map from the Christmas Bird Count

BREEDING: Iceland, Greenland, and across Canada and the northern U.S. to Alaska, south to

California, Montana, North Dakota, Iowa, Illinois, Indiana, Ohio, Pennsylvania, New York, southern New England, and Nova Scotia (AOU 1983).

NON-BREEDING: mainly along Pacific coast from Aleutians to Baja California and Sonora, along Atlantic and Gulf coasts from Newfoundland to Florida and west to Texas, and in western Palearctic along Atlantic coast to northwestern Africa (AOU 1983). In North America, most concentrated in winter along the South Carolina coast, around Vancouver Island, in northern California, along the Gulf Coast adjacent to the Florida panhandle, and along the Atlantic seaboard from Massachusetts to Maine (Root 1988).

Habitat:

BREEDING: Lakes containing both shallow and deep water areas (McIntyre 1975, 1988; Strong 1985). Water clarity is an important component of breeding habitat selection. Loons are visual predators and generally need clear visibility to at least three to four m (McIntyre 1988), although they can adapt to some conditions of low water clarity (McIntyre 1975). In studies comparing lakes with and without loons, higher turbidity has been suggested as a factor influencing lack of occupancy (Barr 1973, McIntyre 1988).

Availability of nest sites also influences habitat selection. Most studies have shown that small islands (usually < 2.5 ha) are strongly preferred over mainland nest sites (Olson and Marshall 1952, Vermeer 1973, McIntyre 1975, Titus and VanDruff 1981, Strong 1985), and that quiet, backwater sites may be selected over mainland sites (Strong 1985). Loons have been found nesting in marshy portions of lakes in water depths no greater than 0.5 m (Alvo 1981). If natural islands are lacking or are unsuitable due to human disturbance or other factors, loons will readily use shoreline nest sites. Optimal nest sites, as measured by degree of success, include overhead cover to conceal eggs from predators, protection from wind and waves, good visibility by incubating adults, and a steep slope adjacent to the nest for adequate underwater approaches and exits (McIntyre 1975, 1983, 1988).

Brood-rearing areas are typically located in shallow coves of fairly uniform depth, sheltered from prevailing winds and wave action, and are independent of nest site location (McIntyre 1983, Strong 1985). Adults tending chicks prefer shallow water areas (< 2 m) close to land (< 150 m) (Strong 1985, Strong and Bissonette 1989). Deepwater areas (4 m) distant from land (250 m) are avoided by feeding adults and adults tending chicks, but are often used for social interactions (Strong 1985). Breeding adults usually feed outside of nursery areas (Strong 1985), occasionally outside of their territories (McIntyre 1983), and may visit nearby lakes for feeding (Miller and Dring 1988).

NON-BREEDING: Inland lakes and rivers and coastal waters during migration. Most nonbreeding subadults apparently remain in coastal areas during breeding season. Winter primarily in coastal marine habitats, including bays, coves, channels, inlets and other shallow areas (Bent 1919, McIntyre 1988, Palmer 1962). Some individuals overwinter on inland lakes and rivers, although this appears to be largely weather influenced (McIntyre 1988). While shallow, inshore waters appear to be utilized more frequently than deeper, offshore waters (McIntyre 1978, Daub 1989), some use continental shelf waters up to 100 m in depth and 100 km from land (Haney 1990). In the southeastern U.S. (between 29 degrees and 35 degrees North latitude), wintering loons were most common in waters up to 19 m deep but were rare or absent a season (Olson and Marshall 1952, McIntyre 1975). Nests lost early in the season are more likely to be replaced than those lost later (McIntyre 1988). Replacement clutches have been initiated as late as early July in Vermont (Kaveney and Rimmer 1989). If waters rise during incubation, loons continue adding to the nest's height to prevent flooding (McIntyre 1988). Replacement nests tend to have smaller outside dimensions (McIntyre 1975). Nest bowls are often reused in subsequent years, and occasionally within years for replacement clutches (Strong et al. 1987).

CLUTCH SIZE AND INCUBATION: Most clutches contain two eggs, and most one-egg clutches result from loss of the first egg (McIntyre 1975, Titus and VanDruff 1981). Three-egg clutches are very rare (Bent 1919, McIntyre 1988), and only two four-egg clutches have been reported (Nelson 1983, Zicus et al. 1983). Second eggs are smaller than first eggs, and eggs in replacement clutches are smaller than those in original clutches (McIntyre 1988). Both pair members incubate, beginning with the laying of the first egg, for an average period of 28-29 days, ranging from 26-31 days (Bent 1919, Olson and Marshall 1952, Palmer 1962, McIntyre 1975). An adult is present at the nest 99 percent of the time, and the eggs hatch within a day of one another (McIntyre 1975).

CHICK REARING: Chicks leave the nest within 24 hours of hatching and are soon moved to nursery areas (McIntyre 1988). In Saskatchewan, nurseries were located an average of 500 m from nest sites and occupied about 15 percent of territory size (McIntyre 1983). Both adults tend the young by feeding, carrying and defending them for several weeks. Chicks are carried on their parents' backs until they reach three weeks of age (McIntyre 1975). Although chicks are capable of short dives at the time of nest departure and may capture some fish by the second or third week (McIntyre 1975), they are fed largely by their parents until eight weeks of age (McIntyre 1988). Adults aggressively defend chicks underwater and on the surface (McIntyre 1988). Most juveniles are capable of flight at 11-12 weeks (Barr 1973, McIntyre 1975), and some leave their small, natal lakes or parental territories shortly afterwards (McIntyre 1975).

NESTING SUCCESS: Breeding success varies considerably among populations. Most failures occur during incubation, from factors such as predation, flooding or stranding due to water level fluctuations, and human intrusion (Olson and Marshall 1952, McIntyre 1975, Wood 1979, Titus and VanDruff 1981, Rimmer and Kaveney 1988). In Ontario, lack of attempted breeding was associated with small, brown, low-alkalinity lakes; successful breeding associated with large, clear, high-alkalinity lakes; unsuccessful breeding resulted primarily from brood mortalities on acidic lakes, most likely due to shotage of suitable food for young (Alvo et al. 1988).

Chick survival is relatively high, especially after chicks reach two to three weeks of age (McIntyre 1988). However, Alvo et al. (1988) recently found higher mortality of older chicks on highly acidified lakes in Ontario, due to presumed starvation from an inadequate food base. Fledging success (percent of hatched chicks fledged) from a sample of 1,500 pairs across the breeding range averaged 80 percent (range = 67-94 percent) (McIntyre 1988). Productivity (number of fledglings per pair) of this sample averaged 0.60 and varied widely between 0.22 for nine pairs in Minnesota (McIntyre 1975) and 0.97 for 132 pairs in New York (Parker and Miller 1988).

SITE FIDELITY: Appear to be faithful to breeding territories. Banded adults have been recaptured on the same breeding territory in subsequent years (McIntyre 1974, Yonge 1981, Eberhardt 1984). Yearly reuse of nest sites and nursery areas has been documented (Strong et al. 1987, Jung 1991), but it is not known whether the same individuals were involved. Sonograms of yodel calls suggest that individual males return to the same territory each year (McIntyre 1988, Miller 1989). Little is known about mate fidelity of breeding pairs.

IV. CONDITION

Threats:

Susceptible to human disturbance at breeding lakes (via development of shoreline areas and aquatic recreational activities), acid rain alterations of lake ecosystems, and mercury poisoning (USFWS 1987, Rimmer 1992; St. John, 1993). Also may be jeopardized in some areas by fluctuating water levels at the nest site and by increasing numbers of predators such as raccoons (Rimmer 1992).

HABITAT LOSS AND DEGRADATION: Direct and indirect effects of shoreline development may reduce the suitability of lakes for nesting. Although radical shoreline alteration and cottage construction appear to only rarely inhibit nest site selection, increased human activity around developments often does (McIntyre 1988, Sutcliffe 1980, Zimmer 1979). Hatching success decreased as the number of cottages within 150 meters of nests increased on lakes in central Ontario (Heimberger et al. 1983). McIntyre (1988) found that the number of lakes with territorial loons decreased with increasing shoreline development and recreational use in Minnesota between 1971-86.

Water-level fluctuations resulting from human-made dams can also reduce the suitability of a lake for breeding. Fair (1979) documented nest abandonment and predation following lake drawdowns in New Hampshire. On Stillwater Reservoir in New York, McIntyre (1988) found that nests were lost to inundation when water levels rose more than 20 cm. Breeding loons in an area of regulated water levels in Minnesota had significantly lower productivity than other populations on naturally fluctuating lake systems (Reiser 1988). Nesting may be delayed by water levels that fail to recede after snowmelt (Fair 1979, Strong 1985). Although poorly regulated lake levels can lead to nest losses, creation of reservoirs has increased the availability of suitable nesting habitat in some areas (e.g., McIntyre 1988).

HUMAN DISTURBANCE AND HUNTING: Recreational pressures may have contributed to declines in some populations, but loons generally can acclimate to moderate recreational lake use. While Ream (1976) suggested that disturbance of nest sites by canoeists in the Boundary Waters Canoe Area in Minnesota was the primary factor limiting productivity, Titus and VanDruff (1981) later found few negative impacts from recreational activities in the Boundary Waters Canoe Area. Smith (1981) reported identical productivity on both remote lakes and on lakes with established canoe routes in Alaska. In Maine, no significant difference in breeding success was found for loons on high human-use versus low human-use lakes (Christenson 1981). However, densities may be lower on heavily developed than on relatively undeveloped lakes (McIntyre 1988).

When incubating loons leave nests because of disturbance, they may not return for an hour or more, leaving the eggs vulnerable to predation and cooling (McIntyre 1975, Titus and VanDruff 1981). Loons exhibit behavioral modifications in response to moderate recreational activity on many lakes. On high human-use lakes, loons flush at shorter distances (Smith 1981, Titus and VanDruff 1981), flush less readily and less vigorously, vocalize less once flushed, and return to the nest more quickly than loons on remote lakes (Titus and VanDruff 1981).

Motorboats may impact loons more negatively than canoes due to differences in peak use and breeding periods. On Boundary Waters Canoe Area lakes, motorboat use is heaviest early in the season, when loons are nesting, while canoe use peaks in August after the nesting season (McIntyre 1988). Loons are more easily able to avoid canoes than motorboats, and chicks are less likely to be separated from their parents by canoes. Motorboat wakes in combination with high water levels may cause nest destruction (Vermeer 1973).

Although the sport shooting that impacted populations around 1900 is now illegal, loons continue to be intentionally killed on occasion, primarily by sport and commercial fishers who consider the birds to be direct competitors (McIntyre 1988). Of 29 dead loons necropsied in New York from 1972-86, three had been shot (Okoniewiski and Stone 1987). Loons are still taken for food by American Indians and Inuits. In northern Quebec, the annual harvest ranges from 2,500-6,500 loons, most of them common loons (Desgranges and Laporte 1979). This harvest is thought to be too high to support the region's current population of 12,000 pairs.

COMPETITION: Intraspecific competition may limit productivity. Sibling aggression can be severe, especially during food shortages, and may result in the death of the subordinate, usually younger, chick (Dulin 1987). Chicks that wander into adjacent territories may be killed by neighboring adult loons (McIntyre 1988). Severe fighting by adults has been documented, presumably over territorial ownership, and can lead to injury or nest abandonment (e.g., Kaveney and Rimmer 1989). Competition with aggressive, non-native mute swans (CYGNUS OLOR) has been documented in Michigan (McPeek and Evers 1989).

ENTANGLEMENT: Mortality is known to occur from entanglement in monofilament sports fishing line and in commercial fishing nets (Vermeer 1973, Okoniewski and Stone 1987). Commercial fish traps and nets in the Great Lakes pose a serious, although unquantified, threat to loons (McIntyre 1986, 1988). Loons are also caught in nets used during coastal fishing operations (McIntyre 1978). Most mortality from these sources goes unreported.

ENVIRONMENTAL POLLUTANTS: Organochlorines and their residues have been detected in eggs and carcasses. DDE levels in tissue from Minnesota in the 1960s may have had adverse, sublethal effects (Ream 1976, McIntyre 1988). Eggs with higher levels of DDE residues tend to have thinner shells than eggs with lower residue levels (Vermeer 1973, McIntyre 1975, Sutcliffe 1978, Fox et al. 1980), although no studies have demonstrated evidence of shell breakage. There appears to be no documentation of lowered productivity as result of elevated pesticide loads (Fox et al. 1980), and organochlorine levels have generally declined in loon tissue in recent years (Frank et al. 1983).

Heavy metal contaminants may pose the most widespread, irreversible and deadly threat (McIntyre 1988). Methylmercury poisoning has been implicated in lowered productivity (Barr 1986) and winter mortality (Stroud and Lange 1983, Alexander 1985). Mercury is released into the environment during the operation of chlor-alkali and wood pulp plants, and through treatments of agricultural seeds (McIntyre 1988). Lake acidification may accelerate the release of mercury into the water column, hastening its uptake through the aquatic food chain (Barr 1986, trematodes and renal coccidia (Stroud and Lange 1983). These parasites are believed to have caused hemorrhagic entritis and contributed to the pronounced emaciation of many dead birds. Loons are afflicted by a host-specific black fly (SIMULIUM EURYADMINICULUM), which may act as a vector and transmit a blood parasite (McIntyre 1975, 1988).

Trend:

Population trend data from the North American Breeding Bird Survey

Large declines in breeding populations were recorded in the northeastern U.S. over the past several decades prior to the 1990s (Rimmer 1992). A northward range contraction has been documented within the last 100-150 years, and several states that once supported breeding loons have lost them (McIntyre 1988). See USFWS (1987), Johnsgard (1987), and Hands et al. (1989) for regional status in United States. More recently, North American Breeding Bird Survey (BBS) data indicate a significant 2.2% annual increase in North America, 1966-1989 (Droege and Sauer 1990). In the heart of their breeding range, populations appear to be stable or increasing. See Rimmer (1992) for details on status in northeastern U.S., where breeding populations in the early 1990s were stable or slowly increasing and wintering populations were variable but without a significant upward or downward trend.

Populations at Besnard Lake, Saskatchewan, increased from 1976 to 1990, possibly due to an increase in the numbers of small fishes that resulted from increased fishing pressure that disproportionately removed larger predatory fishes (Gerrard et al. 1993).

Restoration Potential:

The ability to habituate to moderate levels of lakeshore and recreational use indicates that populations may continue to survive if suitable breeding, staging, stopover and wintering habitats are available. Loons are currently increasing in Vermont, New Hampshire and Massachusetts, and populations appear to be stable in New York and Maine. Just as human-induced habitat changes and recreational pressures probably caused the widespread declines noted prior to the 1970s, integrated management programs have contributed to the recovery in much of their northeastern U.S. breeding range. The potential for continued recovery is favorable (Rimmer 1992).

V. MANAGEMENT/MONITORING

Preserve Selection & Design Considerations:

Because of vulnerability to habitat loss or degradation, lakes that support breeding loons or serve as important migratory stopover sites need protection (Rimmer 1992). Identification and protection of known nesting areas is an important strategy because loons exhibit strong year-to-year fidelity to old nest sites (Strong and Bissonette 1985). When possible, two or three alternate sites with characteristics of preferred nesting areas (e.g., islands, deadwaters, marshes, protected coves) should be protected on each breeding lake. Small islands (< 5 ha) and deadwaters should receive complete protection from development. Undeveloped buffer zones of at least 150 m should be left on either side of mainland nest sites or deadwater entrances (Strong and Bissonette 1985). Shoreline areas adjacent to known traditional nursery areas should also be protected, with minimum undeveloped buffer zones of 150 m from both ends of the nursery (Strong and

Bissonette 1985). Purchase of known nesting areas or suitable lakeshore breeding habitat by state or private conservation organizations, or acquisition of options to protect such lands from development (e.g., easements and zoning ordinances), may preserve loon nesting habitat (McPeek and Evers 1989).

Protection Needs:

Coastal wintering areas need protection from the damages of oil spills (Rimmer 1992).

Management Requirements:

Protection techniques have focused on the breeding season and have involved primarily management of both habitat and people (Rimmer 1992). Loons have responded successfully to management by private conservation groups and state agencies. Most of the organizations that conduct statewide monitoring programs also coordinate management efforts.

CONTROL OF WATER LEVELS: Nest losses caused by flooding can be reduced by maintaining constant water levels during the peak nesting period (Fair 1979, Wood 1979), usually mid- May to mid-July in New York and New England. Rises in water level are more detrimental than drawdowns, and small drawdowns may be acceptable if distances between nests and the water's edge are not greatly increased (Strong and Bissonette 1985). In areas of recent flooding, all flooded timber should be cut and removed to minimize the amount of driftwood on shorelines (Strong and Bissonette 1985).

NESTING PLATFORMS: Artificial nesting platforms may improve nesting success on lakes that lack natural islands and have poor shoreline nesting habitat, fluctuating water levels, or a history of low productivity. Platforms rise and fall with water levels and can counteract extreme fluctuations on lakes where loons are not considered in water management plans (Wood 1979). Platforms have increased nesting success in Minnesota (McIntyre and Mathisen 1977), New Hampshire (Sutcliffe 1979, Fair 1989), Vermont (Rimmer and Kaveney 1988), and Massachusetts (Lyons 1987). Platforms alone are unlikely to induce nesting on unoccupied lakes or territories (McIntyre and Mathisen 1977, Sutcliffe 1979) and should not be used as mitigation to development or water level manipulation (Strong and Bissonette 1985). Plans for the construction of loon platforms are available from the North American Loon Fund.

PREDATOR MANAGEMENT: Predators can be the major cause of breeding failure in some areas. Removal of raccoons by hunting or trapping has met with some success in New Hampshire, but is labor-intensive and expensive (Wood 1979), and probably of only temporary benefit. Nesting platforms may reduce mammalian predation, which often increases after water levels drop (Fair 1979, Sutcliffe 1979). Improved methods of garbage disposal could reduce nest predation by crows, gulls, and raccoons, which are often attracted to human refuse (Hands et al. 1989).

FISH TRAPS: Mortality on the Great Lakes from commercial fishing operations could be reduced by using traps that open at the top to allow loons to escape and also by more frequently checking traps for captured loons. A cooperative program must be developed between commercial fishers and government agencies (McIntyre 1986).

PUBLIC EDUCATION: Human disturbance during the nesting and chick-rearing periods can be volunteer observers are assigned a lake or portion thereof to monitor during a specified time period on a specified date, provide an additional means to estimate populations. These simultaneous counts provide an index of lake occupancy and productivity and can be used to refine statewide population totals. They are typically conducted in midsummer, just after the peak period of chick hatching.

Christmas Bird Counts should be continued to monitor trends in distribution and abundance in early winter. These data should ideally be complemented by those from more standardized, repeated surveys at specific concentration points throughout the winter (e.g., Lee and Arbuckle 1988). A coastwide winter loon watch would provide important information on wintering patterns (McIntyre 1986). Data on wintering loons could also be collected during aerial midwinter waterfowl surveys conducted by the U.S. Fish and Wildlife Service (D. Pence, pers. comm.).

VI. RESEARCH

Management Research Needs:

The North American Loon Fund annually provides small grants to researchers studying a diversity of topics on loon biology, behavior and conservation. A list of current and past projects that have received funding, as well as grant application guidelines, can be obtained by contacting the fund.

Wintering Distribution and Ecology. Detailed information on the precise wintering distribution and abundance is lacking. Little is known about the distribution of discrete breeding populations, the ecological requirements and social structure of wintering loons, the relationship between adults and juveniles, causes and rates of mortality, the impacts of environmental contaminants or oil spills, the effects of weather, the impacts of commercial fishing, the site preferences of individual loons or different age and sex classes, and the mobility of loons during winter. In addition to research addressing these topics, monitoring programs such as a coordinated coastal winter watch or midwinter aerial survey should be initiated.

More information is needed on migration routes and staging areas in spring and fall. Little is known about the habitat and feeding requirement during migration, the residence times of individuals on staging areas, the effects of weather or human disturbance on migrating loons, and age and sex differences in the timing, route selection and ecology of migrant loons. Coordinated migration watches should be conducted at strategic coastal and inland sites.

Studies are needed on the life history of juveniles between fledging and their return to northern lakes. Little is known about their ecological needs and habitat use, diet, migration routes, wintering distribution, movements during their two or more years as nonbreeders, causes and rates of mortality, social relationships and behavior, age at which the definitive alternate plumage is acquired, age at first breeding, and degree of philopatry to natal lakes.

Research is needed on the energetic requirements of adults and young, recruitment patterns of young and nonbreeders into breeding populations, effects of intraspecific competition on breeding status and success, site fidelity and territory turnover patterns, duration of pair bonds, and patterns of lake colonization or recolonization.

Levels of chemical contaminants in adults and eggs should be monitored on a regular basis. Studies should attempt to determine the biological consequences of chemical and heavy metal toxification so that discharge practices can be modified if necessary. Monitoring should be continued on the effects of lake acidification on breeding loons.

Studies should be undertaken to quantify and assess the impacts of entrapment in commercial fishing nets and traps.

Research is needed on the causes of type E botulism and how outbreaks can be prevented or minimized.

The answers to many important questions on loon movements, behavioral ecology and demography require the banding and marking of individual birds. The development of improved capture methods is essential. Protocols must be designed for individually marking discrete populations on both the breeding and wintering grounds. Feasibility studies should be initiated to design and test radio transmitters that can be used on loons (Rimmer 1992).

VII. ADDITIONAL TOPICS

VIII. INFORMATION SOURCES

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