

Human Intrusions and Disturbance

The ‘human intrusion and disturbance’ category (IUCN 6) includes all threats from human activities that alter, destroy, and disturb habitats and species associated with non-consumptive uses of biological resources. These threats include habitat conversion or degradation and disturbance to species that may result in mortality or reduced reproductive success. These threats can be placed into three categories (IUCN Level 2):

- Recreational activities: People spending time in nature or traveling in vehicles outside of established transport corridors, usually for recreational reasons.
- War, civil unrest, and military activities: Actions by formal or paramilitary forces without a permanent footprint.
- Work and other activities: People spending time in or traveling in natural environments for reasons other than recreation, military activities, or research.

Risk Assessment Summary

The human intrusions and disturbance category was evaluated for 158 unique threats across 22 habitats and 80 species (Table 4-16). The majority of threat assessment scores were ranked as low (n=108, 68%), followed by moderate (n = 37, 23%) and high ranking threats (n = 13, 8%). Low threat ranks were often associated with a perceived localized effect of the threat and a lack of information to document the threat, and do not necessarily represent a lack of effects.

Recreation included 139 of the 158 threats (88%) that were evaluated. Recreation was identified as a high threat for two habitats and eight species, and as a moderate threat to five habitats and twenty species (Table 4-16). Coastal habitats, beach-nesting birds, and bats were the most affected by the threat. The most common direct threats to species included mortality from off highway recreation vehicles (OHRV) or foot trampling and disturbance from recreational walkers, hikers and boaters in close proximity to nesting, roosting or foraging locations. Habitats were most threatened by degradation from vehicles and foot-traffic and from shoreline hardening.

War, civil unrest and military activities were evaluated for only one species and were considered a low threat.

Work and other activities included 14 of the 158 threats (9%) that were evaluated under the human intrusions and recreation threat category. Three species-threat combinations were ranked as high, four as moderate, and seven as low. Species assessed included bats and several species of nesting birds.

Known Wildlife Exposure Pathways

Direct Mortality

The most obvious impact of recreational activity on wildlife is direct mortality. Carelessly walking across a coastal island or on a dune may result in death by stepping on chicks and eggs. Motorized vehicles on beaches that are used for public safety or maintenance may run over unprotected piping plover nests or chicks (US Fish and Wildlife Service 1996). Airport mowing may crush upland sandpiper nests (NHFG Data). Freshwater mussels, especially brook floaters, can be easily crushed by

wheeled vehicles operating in water or humans stepping on individual mussels in water. Local populations of freshwater mussels may be impacted when recreation is more frequent (e.g., beaches, fishing access points).

Fourteen percent of loon mortality in New England from 1989 to 1996 was due to boat trauma (Miconi et al 2000). Lead toxicosis from lead fishing tackle was the cause of death for nearly 50% of loons collected in NH from 1989-2010 (Grade 2011). Studies on recreational impact to tiger beetle populations have indicated populations were low to nonexistent where heavy recreational activities were observed, and abundance increased in areas where recreational use was limited and vehicles prohibited (US Fish and Wildlife Service 1990).

Recreation trails near important basking, foraging, or nesting areas can disrupt turtle behavior and facilitate incidental or intentional collection of turtles. A long-term study in Connecticut documented the extirpation of two wood turtle populations following an increase in human recreation (Garber and Burger 1995). The irrational fear that many people have of snakes may lead to snake mortality wherever human encounters occur. Snakes that may bask on trails are vulnerable to being run over by mountain bikes or OHRVs, and dogs have killed black racers on recreational trails at multiples sites in NH (NHFG Data). Bat exclusion measures placed on buildings during summer months may trap and kill pups.

Species Disturbance

Human disturbance can either be intentional or unintentional. Activities such as wildlife viewing, fishing, climbing, spelunking, boating, or simply hiking through an animal's territory can cause unintentional disturbance. However, given the wide range of recreational activities that may impact wildlife and the variation in tolerance between species, a specific understanding of the impacts to many species is lacking (Snetsinger and White 2009).

Disturbance may alter behavior, including nest abandonment and foraging behavior. Repeated nest-flushing of piping plovers by people or dogs may result in nest abandonment or failure, and intensive beach-use and associated mechanical beach cleaning may alter the feeding behavior of chicks (Burger 1991; Staine and Burger 1994). Similarly, flushing of shorebirds during migration may compromise their ability to forage and thus put on enough fat to successfully complete migration (Harrington and Drilling 1996).

High densities of recreational trails that are often present on lands conserved for wildlife may affect a suite of species, particularly when heavily used by people walking or training dogs, and there is increasing evidence that such "low impact" recreation can affect bird populations (Miller et al 1998, Banks and Bryant 2007, Steven et al 2011). During any time of the year, water-based recreation can deprive animals of roosting or feeding habitats whereas, in the breeding season, boating disturbance can cause reduced reproductive success or may otherwise render potential breeding areas unsuitable (Knight and Cole 1995). Motorboats, canoes and kayaks have a significant impact on behavior of common loons during pre-nesting and nesting stages in NH (McCarthy 2010). Off shore boating activities (whale watching, fishing, tour boats) can flush nesting and staging terns from coastal islands, causing them to use up energy reserves (US Fish and Wildlife Service 1994).

Disturbance of cave-hibernating bats by cave explorers stresses energy reserves (Thomas 1995) increasing the risk of mortality, particularly bats already affected by White Nose Syndrome. The presence of recreational climbers or low flying aircraft can frighten cliff nesting birds from their nests, and may result in adults inadvertently kicking out eggs or chicks from the nest (White et al 2002). Noise

disturbance from off highway recreational vehicles and boats may cause detectable changes in behaviors (Bowles 1995). Species that nest, bask or forage in active and abandoned sand and gravel pits may be disturbed by OHRVs or target-shooters. Maintenance of man-made structures may disturb several bird species that utilize them for nesting or roosting.

Habitat Conversion or Degradation

Habitat degradation, modification, and pollution are indirect forms of impact. Virtually all types of recreation can modify vegetation, soil, water, and microclimates, which in turn can impact species dependent upon those habitats (Cole and Landres 1995). The trampling of beach grass along coastal dunes can reduce the integrity of dunes and make them vulnerable to blowouts. While robust in their ability to withstand severe environmental conditions, alpine communities and their soils have low tolerances for trampling (Sperduto and Cogbill 1999). Substantial reductions in both vegetation cover and height, as well as soil erosion, results from all levels of trampling caused by hikers, with communities dominated by dwarf heath shrubs and erect forbs being least resistant (Cole 1995, Cole and Monz 2002).

The removal of vegetation to create new climbing routes can cause wind and rain to wash away any remaining soil in the cracks, preventing new plants from being established (Camp and Knight 1991). Rock climbing can introduce non-native species by propagules traveling on climbing equipment, shoes, and clothing that are transferred from one location to another (McMillian and Larson 2002). Snow-based recreation can also affect soils and vegetation. The most pronounced impacts are those associated with ski-resort development that can involve tree cutting and ground surface leveling and facility construction. Snowmobiling damages shrubs and saplings (Neumann and Merriam 1972) and may change species composition (Keddy et al. 1979). Water resources are impacted both by water-based recreational activities such as motor boating and canoeing and by land-based activities such as fishing, hiking, and off-road vehicle travel. Trampling and other recreational impacts to shorelines can alter flow regimes and eliminate protective cover. It can also result in increased sedimentation and turbidity (Cole and Landres 1995).

Research Needs

- Monitor recreation access points and high use areas where they have the potential to impact critical habitats and species in greatest conservation need.
- Determine the impacts of OHRVs on wildlife and habitats in New Hampshire.
- Determine the impacts from disturbance (i.e., OHRV use, target-shooting) to species that utilize sand and gravel pits.
- Monitor use of off-road vehicle trails near wetlands to determine to what extent users are leaving trails and riding in wetlands (i.e. monitor erosion, sediment, and nutrient inputs)
- Evaluate the impacts that dog-walking and training and other recreational activities have on wildlife on NHFG WMAs and other state lands
- Assess the impacts of recreational activities, including tour boats, to island nesting birds

Table 4-16. Habitats and species at highest risk from the effects of human intrusions and disturbance (threats ranking as *low* not included here). IUCN Level 2 provided if evaluated to that level. Some habitats and species were evaluated for multiple specific threats separately and therefore listed multiple times below. See Appendix E for additional information on specific threats and rankings.

Habitat	IUCN Level 2	Overall Threat Score
Alpine	Recreational activities	M
Caves and Mines	Recreational activities	M
Dunes	Recreational activities	H
Estuarine	Not specified	M
High Elevation Spruce-Fir Forest	Recreational activities	M
Lowland Spruce-Fir Forest	Recreational activities	M
Salt marsh	Recreational activities	H
Talus Slopes, Rocky Ridges	Recreational activities	M
Species	IUCN Level 2	Overall Threat Score
Bald Eagle	Recreational activities	M
Big Brown Bat	Work & other activities	H
Big Brown Bat	Recreational activities	M
Brook Floater	Recreational activities	M
Cliff Swallow	Work & other activities	H
Cobblestone Tiger Beetle	Recreational activities	M
Common Loon	Recreational activities	M
Common Nighthawk	Work & other activities	M
Common Tern	Recreational activities	M
Dwarf Wedgemussel	Recreational activities	M
Eastern Small-footed Bat	Recreational activities	H
Frosted Elfin	Recreational activities	M
Horseshoe Crab	Not specified	M
Karner Blue Butterfly	Recreational activities	M
Least Terns	Recreational activities	H
Little Brown Bat	Recreational activities	H
Little Brown Bat	Work & other activities	H
Northern Long-eared Bat	Recreational activities	H
Northern Long-eared Bat	Work & other activities	M
Peregrine Falcon	Work & other activities	M

Peregrine Falcon	Recreational activities	M
Piping Plover	Recreational activities	H
Red Knot	Recreational activities	M
Ruddy Turnstone	Recreational activities	M
Sanderling	Recreational activities	M
Semipalmated Sandpiper	Recreational activities	M
Softshell Clam	Not specified	M
Timber Rattlesnake	Recreational activities	M
Tri-colored Bat	Recreational activities	H
Tri-colored Bat	Work & other activities	M
Whimbrel	Recreational activities	M
White Mountain Arctic	Recreational activities	M
White Mountain Fritillary	Recreational activities	M
Willet	Recreational activities	M

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