

SPECIES PROFILE

Pied-billed Grebe

Podilymbus podiceps

Federal Listing: Not listed

State Listing: Endangered

Global Rank: G5

State Rank: S1B

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ELEMENT 1: DISTRIBUTION AND HABITAT

1.1 Habitat Description

Pied-billed grebes inhabit a range of wetlands, especially ponds or slow portions of streams with dense stands of emergent vegetation (Muller and Storer 1999). In the Northeast, they also appear to prefer areas with submerged aquatic beds (Gibbs et al. 1991). Nearby open water is needed for foraging and take-off prior to flight; sites in Maine averaged at least 34% open water (Gibbs et al. 1991). In Maine, most wetlands occupied by the species were those created by beavers (*Castor canadensis*) or by humans (Gibbs and Melvin 1992).

Two additional features appear critical in nest site selection: water depth of at least 25 cm (10 in) and emergent stem densities of at least 10 cm²/m² (0.15 in²/ft²) in adjacent wetland patches (Muller and Storer 1999). Home range size is variable, and may depend on habitat type and quality. In the prairie pothole region, home ranges average between 1 and 3.5 ha (2.5-8.75 ac, Muller and Storer 1999). In Maine, however, grebes rarely breed in wetlands less than 5 ha (12 ac) in size (Gibbs et al. 1991, Gibbs and Melvin 1992), suggesting that home range needs may be larger in this part of the country. Alternatively, lower population densities in the Northeast may allow grebes to be more selective since available habitat is not saturated.

All sites in New Hampshire where the species has occurred regularly contain open water and surrounding cattail (*Typha* sp.) marsh and may include ponds

or small lakes (Center Harbor, Jefferson, Lyman, Tuftonboro), beaver ponds (Nottingham, Hopkinton, Durham), fens or slow streams (Alton, Danbury, Pittsburg, Sutton), impoundments (Dummer, Peterborough, Springfield, Wentworth, Newington), sewage lagoons (Exeter, Rochester), and backwaters of larger lakes (Errol, Hebron). With the exception of sewage ponds, most pied-billed grebe habitat includes some woody vegetation such as alder (*Alnus* sp.) or buttonbush (*Cephalanthus occidentalis*).

1.2 Justification

Lacking consistent statewide coverage makes it difficult to evaluate changes in New Hampshire's pied-billed grebe population, although sighting data indicate a decline (Foss 1994, NHBR). The species has shown declines over much of its range elsewhere in the Northeast and is absent from large areas of apparently suitable habitat in Vermont (Laughlin and Kibbe 1985) and Massachusetts (Petersen and Meservey 2003). In New York, although declines have been noted (Andrle and Carroll 1988), recent atlas data do not suggest any change in the species' range, and it may even be increasing slightly (New York State Department of Environmental Conservation 2004). The latter trend may reflect a general increase in the central part of the of the species' range based on the BBS (see below). In addition, the loss and degradation of wetlands in most of New England make the species particularly vulnerable to decline.

Winter abundance data from the CBC (National Audubon Society 2002) suggest that grebe populations in the eastern United States have been stable or slightly increasing since the mid-1960s. The exception was a pronounced increase during the 1990s that was followed by a consistent decline between 2000 and 2004. The latter has resulted in grebes returning to pre-increase levels or slightly higher along the

Gulf and South Atlantic coasts. Grebes are probably better surveyed than many other species on the CBC, so these broad regional trends may accurately reflect trends in breeding populations, and in this case corroborate the increases noted by the BBS. However, such increases do not preclude declining populations in the Northeast (including New Hampshire), since the wintering locations of the region's breeding population are unknown.

1.3 Protection and Regulatory Status

- Migratory Bird Treaty Act (1918)
- New Hampshire Endangered Species Conservation Act (RSA 212A)
- See Marsh and Shrub Wetlands habitat profile for regulations pertaining to wetland habitats

1.4 Population and Habitat Distribution

The pied-billed grebe occurs throughout the state, but has always been rare and local in distribution (Foss 1994). Old regional ornithological works variously describe the species as a breeder, primarily a migrant, or absent, and a lack of comprehensive statewide coverage until relatively recently makes it difficult to ascribe any clear pattern to its distribution and abundance. Recent records of the species have come from all over the state, with the exception of the southwest and the White Mountains (figure 1). Within this range, there are 7 areas of more regular occurrence (see also elements 2.1 and 2.2):

- Extensive wetlands in Coos County
- Small wetlands in the Connecticut River valley between Hanover and Littleton
- Ponds around the northern portion of Lake Winnepesaukee
- Several larger wetlands in west-central New Hampshire (centered on northwestern Merrimack County)
- Upper Merrimack River Valley
- Southern Piscataquog River watershed
- Southeastern New Hampshire away from the immediate coast

Not all these areas have been occupied consistently, however, as a comparison of figures 1a and 1b indicates. Between 1984 and 1993, records were

somewhat concentrated in regions 1, 3, 4, and 5, and between 1994 and 2003 most records were from regions 1, 4, 6, and 7. Over the last 25 years (figure 1c), only 7 sites (indicated by black towns) have been used consistently by pied-billed grebes. Even at these sites, there are few records from 2000 onward. Whether this paucity reflects the species' actual absence or simply a lack of coverage is unknown.

Grebes show a similarly patchy distribution elsewhere in New England. Massachusetts probably hosts fewer than 20 pairs (Petersen and Meservey 2004), and the species is absent from apparently suitable habitat in much of the Champlain Valley of Vermont (Laughlin and Kibbe 1985). Grebes are more common in Maine, where one study documented them in 17% of available wetlands (Gibbs et al. 1991) and in 22% of Breeding Bird Atlas blocks (Adamus 1988).

1.5 Town Distribution Map

Not completed for this species.

1.6 Habitat Map

A pied-billed grebe habitat model for New Hampshire was modified from a model developed by US-FWS Gulf of Maine Project (Banner and Schaller 2001). An NHNHB composite wetland map provided the base map, in which contiguous wetlands were grouped into complexes and given attributes related to wetland size, proportions of different wetland types, and a number of additional variables related to threat and condition (see Marsh and Shrub Wetlands habitat profile). Potential grebe habitat was selected from the larger wetland data set using the following criteria ("wetlands" refers to "wetland complexes" as defined in the wetland habitat plan):

1. Elimination of all wetlands less than 5 hectares (12.5 acres).
2. Lacustrine wetlands (lakes: all wetland types beginning with "L") were added to adjacent wetlands in the New Hampshire Natural Heritage Inventory (NHNHI) wetland complex map. Three coverage values were recalculated for each resulting wetland:
 - a. Percent open water (lacustrine and "other," which includes wetlands coded as PAB and PUB)
 - b. Percent emergent marsh (PEM)
 - c. Percent shrub wetland (PSS)

- d. Elimination of wetlands with less than 25% or greater than 90% open water
 - e. Elimination of wetlands with greater than 90% shrub
3. Wetlands greater than 10 hectares (25 acres) were given a higher ranking than wetlands less than 10 ha (as per Gibbs et al. 1991).

Of 50 pied-billed grebe sites in the NHHI database, this model correctly identified 24. Several sites were not identified because they are located in semi-isolated wetlands connected to lakes or rivers. As a result, they were eliminated from the model at step 3. Other grebe locations not captured by the model include wetlands that were not identified by the National Wetland Inventory (NWI) maps, or wetlands whose current condition is different from that coded on the NWI maps. For instance, some sites currently contain an area of open water because of recent beaver activity, whereas the NWI maps indicate a continuous emergent marsh or shrub swamp. Because of the inaccuracies in the underlying NWI data, and difficulties related to wetlands associated with large water bodies, a modeling approach is not a valuable tool for identifying potential grebe habitat at this time.

1.7 Sources of Information

Basic natural history information in this profile was largely gathered from the literature cited in element 5. Habitat modeling was informed by the Gulf of Maine Program (Banner and Schaller 2001) and wetland mapping conducted by NHHB. Data on grebe distribution in New Hampshire were compiled from NHBR, a database maintained by NHA.

1.8 Extent and Quality of Data

Information on pied-billed grebe distribution in New Hampshire is limited by habitat inaccessibility and inconsistency of coverage. Because grebes have a history of both patchiness and site fidelity, the discontinuation of regular visits to a given site can significantly alter our broader knowledge of current statewide distribution. Thus, the absence of reports from a known breeding site cannot be taken as evidence of the species' absence.

1.9 Distribution Research

To fill the significant gaps in the knowledge of grebe distribution in New Hampshire, it would be valuable to implement a statewide monitoring program for this and other wetland birds. Surveys should target known or high-potential sites (as identified by habitat mapping) and use methods consistent with other efforts in the region. Marsh bird monitoring is a priority project in BCR 30, and a coordinated regional effort would be invaluable in understanding trends in distribution and abundance of this and other wetland species throughout the Northeast.

ELEMENT 2: SPECIES/HABITAT CONDITION

2.1 Scale

New Hampshire's known pied-billed grebe locations are here divided into three conservation units based on the type of management known to be in place and the potential for future management. The 24 recently active pied-billed grebe sites in New Hampshire were placed into one of these three categories based on available information (table 1). These three types are:

- **Impoundment-associated wetlands.** These wetlands are associated with some sort of water control structure, thus theoretically allowing water levels to be regulated. Included in the category are many Wildlife Management Areas, Lake Umbagog, Pontook Reservoir, and reservoirs associated with flood control projects.
- **Sewage ponds.** In some wastewater treatment facilities, ponds associated with certain stages of treatment contain emergent vegetation that mimics the structure of natural wetlands. Grebes have used such habitats in the past, and inactive sewage ponds may retain suitable habitat and thus the potential to attract grebes.
- **Natural wetlands.** All remaining wetlands in the state are in this category, which includes those associated with the backwaters of larger rivers (Reed's Marsh, Town?), beaver ponds (Nottingham, Durham), small ponds and lakes (Cherry Pond, Copp's Pond Towns?), and bogs and fens (Scott's Bog, Town?).

2.2 Relative Health of Populations

In the absence of consistent data, populations in a given unit can only be evaluated indirectly, through a combination of population persistence and the number of occupied sites within a unit. Table 1 includes all sites where grebes were reported during the breeding season in at least 2 different years within any 5-year period since 1980. Sites shaded gray meet the criteria of a) grebes present in at least 4 years since 1980, b) confirmed breeding in at least 1 year, and c) grebes present in at least 1 year since 1990. Sites are grouped by region as described in element 2.1.

Twelve sites meet these criteria and could thus be considered “priority” grebe locations in the state. Of these sites, only Copp’s Pond, Cascade Marsh, the Rochester lagoons, and the Umbagog marshes have hosted more than a single pair of grebes in a given year, and even at these sites more than a single pair is rare. Potential sites identified through habitat mapping cannot be reliably evaluated for population health, although their overall condition can be assessed using the same geographic information system (GIS) methods as developed for wetland habitats as a whole.

2.3 Population Management Status

The pied-billed grebe is not currently managed in New Hampshire.

2.4 Relative Quality of Habitat Patches

There are no data with which habitat quality could be evaluated for this species. The habitat model, which generates scores from 0.5 to 1.5, could be used as an approximation of habitat quality on a statewide scale.

2.5 Habitat Patch Protection Status

Of the 24 recent locations for the species in table 1, 15 (62.5%) are protected in whole or in part by easement or fee-simple. Of protected areas, 7 are impoundments (conservation unit A) and 8 are natural wetlands (conservation unit B). Protected status of potential locations will be unknown until such locations have been identified.

2.6 Habitat Management Status

At Cascade Marsh, management of water levels to benefit pied-billed grebes has been in place since the 1980s (E. Robinson, New Hampshire Fish and Game (NHFG), personal communication). Water levels at this site are first lowered after ice goes out to levels suitable for grebes while still allowing for vegetation growth. This water level is maintained through the summer and is raised in September when grebes are no longer nesting. It is feasible to apply similar water level management at 3 additional grebe sites in State Wildlife Management Areas (Hirst, MacDaniel’s Marsh, Danbury Bog; TOWNS?? E. Robinson, NHFG, personal communication).

2.7 Sources of Information

Data on site occupancy were compiled from NHBR. Information pertaining to management at some grebe sites (state wildlife management areas) was obtained from the NHFG (E. Robinson, NHFG, personal communication).

2.8 Extent and Quality of Data

As indicated above, data on pied-billed grebes and their habitat in New Hampshire are inconsistent. There are no data on management activity at the majority of sites where the species is known to occur.

2.9 Condition Assessment Research

In the absence of comprehensive information on grebe distribution in the state, any assessment of population/habitat condition would be premature. When grebe distribution is better understood, additional research will be useful in determining why apparently suitable potential habitat is unoccupied. However, even this research will need to consider the regionally low population size, because the species’ absence from a site may just as easily reflect low colonization rates as low habitat quality.

ELEMENT 3: SPECIES AND HABITAT THREAT ASSESSMENT

3.1.1 Altered Hydrology (Water Withdrawal and Drawdowns)

A) Exposure Pathway

Many suitable wetlands are located above man-made dams. The purpose of such dams includes creation of impoundments for recreation, hydroelectric power, flood control, and wildlife management. If water levels rise or fall significantly during the nesting season, grebe nests may be flooded or grounded. Nest flooding is likely to result in either egg or nestling mortality and may cause adults to abandon the nest. If grebes do not abandon a nest after water levels fall, the nest may be more exposed to terrestrial predators. In either case, changes in vegetation following a change in water level may also make the nest more visible to predators.

B) Evidence

Although anecdotal evidence is conflicting, studies suggest that changing climatic conditions and variable water levels are to blame for a significant percentage of unsuccessful nests (Glover 1953, F. von Mertens, NHBR, observer, personal communication). These studies corroborate suspicions that lower water levels increase threats from terrestrial predators.

3.2 Sources of Information

Information on threats to pied-billed grebes was taken from the literature and from lists of threats developed as part of regional bird conservation planning (BCRs 14 and 30, etc.). Threats developed for Marsh and Shrub Wetlands profiles were also used with modification in development of the threat rankings for pied-billed grebe.

3.3 Extent and Quality of Data

In the absence of detailed study at the vast majority of pied-billed grebe breeding locations in New Hampshire, it is difficult to provide specifics on how any particular threat affects the species here. Data are similarly lacking on most potential broad-based threats.

3.4 Threat Assessment Research

Although various environmental pollutants have been proposed as threats to pied-billed grebes (Gibbs and Melvin 1992), there are few, if any, data on the presence and effects of such contaminants on grebe

populations. Given increasing concern for the effects of mercury in other aquatic birds, it may be valuable to expand mercury research to grebes and other marsh-nesting birds.

Hunting and fishing in wetlands has the potential to introduce lead shot and sinkers where they may be ingested by grebes. However, ingestion and mortality have not been documented in pied-billed grebes or any other North American grebe species, though lead is recognized as a major source of mortality in loons and some fish-eating raptors (H. Vogel, Loon Preservation Committee, personal communication). Nonetheless, given the smaller size and secretive nature of grebes, mortality is almost certainly underdocumented.

Additional research is necessary on the effects of human disturbance, particularly that caused by small watercraft (larger and faster watercraft are less of an issue in areas used by grebes). There are currently few, if any, data on the incidence of nest abandonment or failure caused by such watercraft. In the absence of such data it is premature to propose conservation actions such as no-entry zones for this species. Finally, although grebes are known to use wetlands dominated by non-native, invasive plants (Esler 1992, Whitt et al. 1999), there are few data on their productivity in such habitats or on how regularly they are occupied.

ELEMENT 4: CONSERVATION ACTIONS

4.1.1: Stabilize water levels during the nesting season at reservoirs or impounded areas that support pied-billed grebes. This action fits within the "Restoration and Management" category, but also has elements of "Regulation and Policy," as follows. Appropriate water level management as described below should be instituted as a standard NHFG activity at state Wildlife Management Areas that support or potentially support grebes. It would also be beneficial to determine ownership and management policy of dams associated with other grebe sites, and to improve grebe nesting success at these locations.

A) Threat: Altered Hydrology

B) Justification

If water levels are maintained at levels present during nest initiation, the threat is eliminated, along with attendant stresses. The action can be implemented

at single locations where the threat can potentially occur

If the action is implemented at the appropriate time, the affected population will benefit immediately.

Given that water levels can be controlled, careful monitoring of both local conditions and the status of a grebe nesting attempt will allow for either additional adjustment of water level (e.g., if high rains cause water to rise) or cessation of the action (e.g., if the grebes abandon for other reasons and the action is no longer necessary)

C) Conservation Performance Objective

This action requires knowledge of the presence and potential breeding of pied-billed grebes at a location where water levels are subject to human manipulation. At the least, the potential for implementation of this action should be acknowledged at sites where it is possible and where there is a history of use by pied-billed grebes. This action will need to be implemented no later than completion of nest-building activity, when the position of the grebe nest above the bottom will be relatively fixed. Water levels will need to be maintained at that level until the young grebes have left, or are likely to have left, the nest.

D) Performance Monitoring

Implementation of this action can be monitored by checking water levels over the course of the breeding season. With the exception of rain-induced flooding (see below), there should be no significant changes in water level between May and September.

E) Ecological Response Objective

Increase likelihood that grebes nesting in impounded areas produce young. Increased productivity in turn increases the pool of potential recruits into the New Hampshire breeding population.

F) Response Monitoring

In addition to local monitoring of productivity at action sites, it will be necessary to continue monitoring grebes at a broader scale to determine if there are any effects on the statewide population. Such monitoring could be more intensive at suitable wetlands closer to the implementation site (although there are no data on natal dispersal distances in this species).

G) Implementation At the one site where this action has been implemented (Cascade Marsh Wildlife Management Area, Sutton) water levels were lowered in April – after ice out – to levels suitable for pied-billed grebes. Although site-specific conditions may result in this level varying among sites, enough water should remain to allow for nest site selection (minimum 25 cm), foraging, and take off. At least 34% of the total wetland area should remain open water of sufficient depth.

Water levels should be maintained at this level through the summer and allowed to rise in September. Although this action maintains water level at a depth and extent suitable to grebes, it can be negated by rain that floods impounded areas too quickly for additional water to be released. Such events can destroy grebe nests or cause abandonment, but are beyond the scope of this action. Depending on location, implementation of this Action may require cooperation between state agencies (NHFG, Department of Environmental Services, Department of Resource and Economic Development), power companies, the USACE, and private citizens.

H) Feasibility

In most cases, the partnerships described above already exist in some form. In addition, this action is inexpensive. Where impoundments are associated with hydroelectric dams, maintenance of water levels may simply not be possible. Many impoundments are drawn down to during the summer to encourage vegetation that will provide food for waterfowl in the fall. When this was done at Cascade Marsh (Town?), increased vegetation did not deleteriously affect waterfowl habitat= (E. Robinson, NHFG, personal communication).

4.2 Conservation Action Research

Given the patchy distribution of pied-billed grebes in New Hampshire and the highly variable nature of the sites they occupy, it is not clear that any one conservation action will have a dramatic effect on the population. The majority of occupied sites are already conserved in some manner, and as a result the only broadly applicable conservation strategy is the maintenance of appropriate water levels at sites where this is possible. In light of this, the most important

conservation action of this and other wetland birds in New Hampshire is the implementation of a standardized inventory and monitoring plan (coordinated on a regional scale). Such a program would provide much-needed information on distribution and population trends at a larger scale – a scale that is perhaps more indicative of the health of this species' population in the northeast. Once baseline data are collected, other conservation actions may be reconsidered.

ELEMENT 5: REFERENCES

5.1 Literature:

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5.2 Data Sources:

- National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. <http://www.audubon.org/bird/cbc>. Accessed 2005 February 8.
- New Hampshire Bird Records, New Hampshire Audubon, Concord, New Hampshire, USA.

ELEMENT 6: LIST OF FIGURES

- Figure 1. Distribution of recent (1980-2004) breeding season records of pied-billed grebe in New Hampshire. Towns are coded according to the number of years in each period when grebes were reported: yellow = 1, red = 2-5, black = > 5.
- Table 1. Sites hosting pied-billed grebes in at least two years since 1980. See text for details.

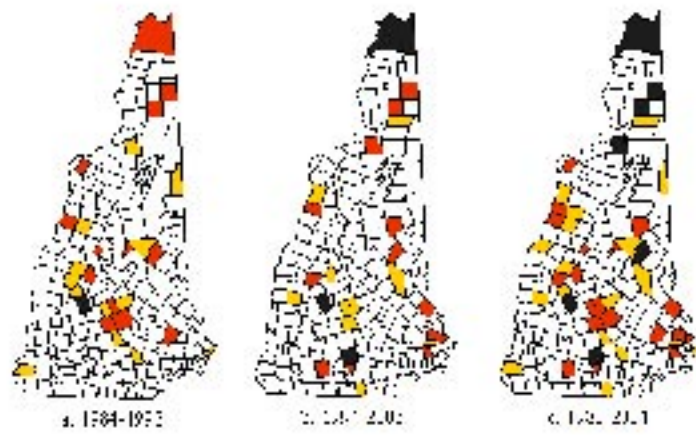


Figure 1

Table 1. Sites hosting pied-billed grebes in at least two years since 1980. See text for details.

| Region/Town | Wetland | Conservation Unit Type (Section 2.1) | # years reported (1980-2004) | Most recent report | # probable or confirmed nestings |
|----------------------------|--------------------------|--------------------------------------|------------------------------|--------------------|----------------------------------|
| North Country | | | -29 | -2002 | -5 |
| Dummer | Pontook Reservoir | A | 9 | 2002 | 2 |
| Errol | Lake Umbagog marshes | A | 6 | 2001 | 1 |
| Jefferson | Cherry Pond | C | 6 | 2003 | 0 |
| Pittsburg | East Inlet | C | 8 | 2000 | 2 |
| Central Connecticut Valley | | | -6 | -1998 | -3 |
| Lyman | Dodge Pond | C | 2 | 1986 | 2 |
| Orford | Reed's Marsh | C | 2 | 1991 | 1 |
| Piermont | Lily Pond | C | 2 | 1998 | 0 |
| Lakes Region | | | -10 | -1998 | -5 |
| Center Harbor | Winona R./L. Waukewan | C | 2 | 1988 | 2 |
| Tamworth | Hemingway Pond | C | 2 | 1989 | 0 |
| Tuftonboro | Copp's Pond | C | 6 | 1998 | 3 |
| West-Central Wetlands | | | -30 | -2004 | -16 |
| Hebron | Hebron Marsh | C | 2 | 1992 | 0 |
| Danbury | Danbury Bog | A | 3 | 2002 | 0 |
| Springfield | MacDaniel's Marsh | A | 4 | 1998 | 1 |
| Sutton | Cascade Marsh | A | 21 | 2004 | 15 |
| Upper Merrimack Valley | | | (9+) | -2002 | -4 |
| Boscawen | Hirst WMA | A | 4 | 1993 | 2 |
| Concord | South End Marsh | C | 2 | 1988 | 2 |
| Hopkinton | Chase sanctuary | C | 3+ | 2002 | 0 |
| Piscataquog Watershed | | | (5+) | -2003 | (3+) |
| Mont Vernon | Roby Pond | C | 2 | 1997 | 2 |
| New Boston | Great Meadow | C | 3+ | 2003 | 1+ |
| Coastal Wetlands | | | -20 | -2004 | -10 |
| Durham | Packers Falls Road Marsh | C | 4 | 2004 | 1 |
| Exeter | Sewage ponds | B | 5 | 2003 | 2 |
| Newington | Stubb's Pond | A | 3 | 2002 | 0 |
| Nottingham | Rollin's Brook | C | 4 | 1990 | 3 |
| Rochester | Sewage ponds | B | 4 | 1997 | 4 |

Distribution of Pied-billed Grebe in New Hampshire

Distribution

-  Known
-  Potential
-  Historic



Known = confirmed breeding observations as reported in the NH Natural Heritage Bureau's Element Occurrence Database and obtained from NH Bird Records and the NH Breeding Bird Atlas, Audubon Society of New Hampshire.
Potential = possible breeding and other observations from the same data sources.
Historic = observations greater than 20 years old.

