PIED-BILLED GREBE *(Podilymbus podiceps)* DENSITIES IN A WESTERN NEW YORK WETLAND IMPOUNDMENT

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Abstract

Pied-billed Grebes are considered to be widespread, but uncommon breeders in New York (Andrle and Carroll 1988). They were reported on only 3% of the survey blocks of New York State's Breeding Bird Atlas (1980-1985) with most reports coming from managed state or federal wildlife areas. Forty-one active Pied-billed Grebe nests were located in May 2002 in a 64.8 hectare emergent wetland-impoundment. Studying habitat use at managed wetlands utilized by grebes-could help perpetuate the species in New York.

Introduction

The Pied-billed Grebe (*Podilymbus podiceps*) has an extensive breeding range in the western hemisphere from Hawaii and central and northeastern British Columbia east to Nova Scotia and south through North America, Central America, Bermuda, the West Indies, and into South America as far as central Chile and southern Argentina (A.O.U. Checklist 1998, Muller and Storer 1999). In New York State, Bull (1974) reports the species to be fairly well-distributed across the state, but least plentiful in the higher mountain areas of the Adirondacks and the Catskills. Marcotte (1998) summarizing 1988 Breeding Bird Atlas data essentially confirmed the same findings as Bull stating no evidence of the birds in the Adirondack High Peaks, the Catskills or the Allegany Hills, and listed most occurrences to be on state and federal wildlife areas.

The Tonawanda Wildlife Management Area (TWMA) has long been known to be used by Pied-billed Grebes for breeding. The TWMA is the westernmost portion of the wetland complex consisting of the federal Iroquois National Wildlife Refuge (INWR) and the state owned Oak Orchard Wildlife Management Area (OOWMA) located in Genesee and Orleans counties. The three properties are collectively known as the Alabama swamps after the local township. Situated on the Tonawanda Creek floodplain, the TWMA is largely shallow emergent wetland with limited areas of flooded timber and upland grass areas.

Research and data collection on the Pied-billed Grebe population at the Alabama swamps began in 1994. Surveys were conducted from mid-August through the first week of October and resulted in counts as high as 108 birds as late as 7 Oct (Seyler 1994). Nesting data were collected for several years on numbers of nests, egg rotation during incubation and the development of a field technique to determine the stage of incubation in grebe nests. The research however; has yet to be completed for publication (Seyler unpublished data).

Based partly on the nesting data collected by Seyler over the years on both Pied-billed Grebes and Least Bitterns *(Ixobrychus exilis)*, the need for more

research was obvious. In 1997 a graduate student, S. Lor, began nesting ecology studies on several marsh bird species including Pied-billed Grebes. The study area was select marshes from the three wetland areas (TWMA,, INWR ,OOWMA) constituting the Alabama swamps. In the second season of Lor's study, nest searches were conducted on 574 ha. of emergent marsh revealing 160 Pied-billed Grebe nests, 93 of which contained eggs or chicks (Lor 2000). The impoundment area of this paper, Ruddy Marsh, was included in Lor's study. Lor calculated Pied-billed Grebe nests to be at densities of 1 / 3.59 ha. of emergent marsh. In 2001 the nesting population of grebes in West Ruddy marsh was estimated to be 25 pairs (Seyler 2001).

Purpose

Pied-billed Grebes have long been known to breed on the Tonawanda Wildlife Management Area in western New York. Although past nesting studies have been done, the breeding population size has not been well-documented. By obtaining an accurate count of nests within a single impoundment, the entire population could be better estimated.

Methods

Foot searches were conducted in West Ruddy marsh. Two to three people waded in line about 10 meters apart through suitable nesting areas. Very dense cattail (*Typha spp*) stands were not searched. A small area consisting largely of standing and fallen dead timber was also omitted. Moderately dense to sparse areas of cattail, bur-reed (*Sparganium spp.*) and bull rush (*Scirpus spp*) were thoroughly covered. Nests were visibly marked with bright pink vinyl flagging tied to dry cattail stalks or narrow wooden stakes carried by the searcher. Care was taken to ensure that second nestings were not tallied as an additional nesting pair of birds.

Results

Nest searching began 8 May 2002 in West Ruddy Marsh on the Tonawanda Wildlife Management Area. All first nesting attempts were well underway and most eggs were hatching or very close to it. The solid islands of cattail and the few areas of very dense stands were not searched since such areas were not suitable for grebe nesting. Nest searching continued on 15 and 17 May. Nine days elapsed from the start of the searches until the entire impoundment was searched. Forty-one nests with eggs or chicks were located resulting in a nesting density of 1/1.58 ha. of emergent habitat.

Discussion

West Ruddy marsh was selected for intensive nest searching because of its high use by Pied-billed Grebes, its large size and easy access. West Ruddy marsh was constructed in 1970 and originally was a 139.7 ha. impoundment

bounded on three sides by earthen dikes and tapering into grasslands and green timber to the north. In 1997 the marsh was divided roughly in half with the construction of a north south dike creating East Ruddy and West Ruddy. East Ruddy is primarily flooded timber and presents only marginal habitat for Pied-billed Grebes.

West Ruddy is completely an emergent wetland. Only a few struggling live trees and a small remnant group of dead standing snags disrupts the emergent vegetation. The 64.8 ha. impoundment contains an estimated 52.6 ha. of emergent vegetation with the remaining 12.1 ha. as open water.(NYSDEC unpublished data). A borrow ditch, approximately 2 m. deep by 3 m. wide, created by the construction of the dike, runs the length of the western side providing about 1.7 kilometers of deep water. Water depth throughout the remainder of the marsh is much shallower. Nine water depth measurements were taken along a north/south transect at regularly spaced intervals in mid-June. The average depth was calculated at 51 cm. Cattail, both narrow-leaf (*Typhus augustafolia*) and broad-leaf (*T. latifolia*) is the dominant cover type with a visual estimation of about 80%. Purple loosestrife (*Lythrum salicaria*) constitutes about 10%, with bur-reed occupying roughly 8% and bull rush covering a small 2%.

West Ruddy marsh is high quality Pied-billed Grebe habitat and is likely the best site for the species in the Tonawanda Wildlife Management Area. It is attractive to the species because of it's large size, water depth and vegetative structure. At 64.8 ha. the marsh is well beyond the minimum size utilized by the species. Nudds (1982) found grebes to utilize wetlands as small as 0.3 ha. in Manitoba. In the state of Washington, 80% of Pied billed Grebe broods were observed on potholes ranging from 0.4 to 2.0 ha. (Yocum et al.1958). Faaborg (1976) surveyed over 500 ponds and lakes and only observed grebes on 44 seasonal or semi-permanent wetlands. He reported grebes to use wetlands of 0.6-7.0 ha. and that the birds appeared to avoid wetlands that were smaller or larger. Lor (2000) reported that more than 50% of the 160 Pied-billed Grebe nests were located in Ruddy Marsh. In contrast to reports of small scale habitats being used, Brown and Dinsmore (1986) reported grebes regularly use wetlands greater than 5 ha.

Pied-billed Grebes have been observed in all water bodies on the TWMA (pers. observ.) There is a great variability in the structure and size of impoundments from large open emergent marshes to green timber impoundments to small potholes with only vegetated borders. In some of the more obscure areas birds were observed feeding and loafing only and likely did not nest there.

Water control structures allow for water level management and the average depth of about 50 cm. is ideal for nesting. Researchers have listed the range of water depths at nest sites to be 0.14 m. to 0.90 m. (Andrle and Carroll 1988, Chabreck 1963, Lor 2000, Provost 1947, Sealy 1978). Sealy (1978) reported the average water depth at 31 nests to be 35.5 cm. with 4 nests in water between 14 and 24 cm. At one nest it was necessary for the adult bird to skitter across the surface for 2.1m. until it reached deeper water.

Habitat interspersion of vegetation to water in West Ruddy is close to the hemi-marsh as described by Weller and Spatcher (1965). Cattail, the dominant vegetation, is found in a wide range of densities from sparse to extremely dense

and from extensive swaths to very small clumps. There are few very dense stands. Most of the cattail areas have been perforated into various sized patches creating perfect habitat for several important marsh bird species. Purple loosestrife dominated the southwest corner over an area about 4.5 ha. in size to the exclusion of other plant species. Bur-reed and bull rush grew sporadically in small areas mostly toward the center of the impoundment.

Pied-billed Grebes avoid dense emergent vegetation. This was found to be true by Fredrickson and Reid (1986) who reported that grebes did not use areas of "dense" or "rank" emergent vegetative cover. Saunders (1926) reported that Pied-billed Grebes preferred areas with considerable open water and in the vicinity of floating water weeds. Shallow potholes surrounded by homogeneous stands of *Sciurpus* were found by Nudds (1982) to be preferred over deeper potholes that were utilized by Horned Grebes (*P. auritus*). Dense emergent vegetation is an impediment to Pied-billed Grebes and greatly reduces the suitability of an area to their nesting. They are stocky, swimming birds that move through emergent vegetation only when a waterway passage is possible. With legs placed far back on the body for life in the water, the birds are unable to climb through dense vegetation. High stem densities and accumulations of previous season growth act as barriers to birds that have evolved for swimming. Dense vegetation impedes movement, lowers visibility, decreases foraging areas and provides avenues for predators to reach grebe nests.

The species will tolerate dense emergent growth only if well infiltrated with water channels. They actually only occupy the water areas around the vegetation. Least Bitterns thrive in the same type of habitat by remaining in the vegetation. Flight and evasion is the survival method employed by both species. This is most often accomplished by silently slipping away without detection; grebes underwater and Least Bitterns through the vegetation. For this survival tactic to be successful for grebes two things are necessary; visibility to see approaching danger and an open water escape route. Dense emergent vegetation limits both, although some protection is provided through concealment. Areas with high stem densities and accumulations of old growth also provide a means for terrestrial predators to more readily gain access to floating grebe nests. Open water and sparsely vegetated areas are less often scoured by predators such as mink (*Mustela vison*) or raccoons (*Procyon lotor*).

Despite some reports that grebes prefer dense emergent vegetation (Provost 1947, Nudds 1982, Deusing 1939), the best nesting habitat structure for the grebes is sparse to moderate emergent vegetation and large areas of open water. Reports of such habitat use are not uncommon (Lor 2000, Abbott 1907, Chabreck 1963, Muller and Storer 1999, Saunders 1926). Some authors have offered possible reasons for such selections. When nests were found in emergent vegetation, Muller and Storer (1999) proposed that there are two overriding factors that determine whether a site is suitable: 1. water depth > 25 cm; 2. emergent vegetation basal stem density of at least 10 square cm. per square meter. Chabreck (1963) reported 52 % of 107 nests to be in the open water averaging 60 m. from the nearest stand of vegetation. Nearly all of the remaining nests were in small stands of wiregrass 1 to 5 ft. in diameter. Chabreck believed that site selection was based on the availability of widgeon grass (*Ruppia maritina*) to be used for nesting. Unobstructed visibility while on the nest was

also thought to be important.

At the Tonawanda/ Iroquois/ Oak Orchard wetland complex they avoid nesting in very dense cattail. Areas densely grown to cattail provide nesting opportunities only outside the vegetation along its edges or between clumps. In 1995 over thirty nests were located in the open water of a 300 acre impoundment on the Iroquois National Wildlife Refuge. Bur-reed grew very sparingly around the nests. A much denser stand of bur-reed existed a short distance away yet contained no grebe nests. Extensive growths of cattail were also present less than 100 m. from the area of nests (Seyler unpublished data)

Cattail marshes are most valuable to nesting grebes after the vegetation has been opened by muskrat activity. Feeding and lodge building activities of muskrats (*Ondatra zibethica*) permeate into dense stands effectively thinning them resulting in openings that allow for ease of movement by the aquatic grebes. Visibility is also greatly increased, which likely is a factor in site selection for a species that very actively defends a nesting territory.

Muskrats are primarily responsible for thinning the cattails and creating the 50/50 interspersion favorable to numerous species including the Black Tern (*Chlidonias niger*) (Seyler 1991, 93 Hickey and Malecki 1997) In addition to opening up the vegetation, the cut stalks left from their eating habits are used for nest construction.

Pied-billed Grebes are highly territorial and they will aggressively defend a territory against other grebes and even other bird species (Kilham 1954, Muller and Storer 1999).

Distances between nests were not recorded during this study with the exception of two nests fairly close in purple loosestrife. Those nests were found to be 34.8 m. apart. Lor (2000) reported the average distance between nests to be 114.4 m.

The summation of 41 active grebe nests in West Ruddy , found in the study described in this paper, resulted in a nesting density of 1 pair per 1.58 ha. of emergent marsh, a density more than twice the 3.59 pair per ha. found for the area by Lor. Lor's density was based upon the 1998 findings of 160 grebe nests over 574 ha. of emergent marsh searched. 67 of those nests were without eggs or chicks. No mention is made as to why these nests were considered in the calculations nor is the time frame stated over which the data was collected. The method used fails to take into consideration that grebes will make dummy nests and that they are very early nesters that often raise two broods in a season. Grebe nests remain intact long after their use. It would therefore be highly possible that some nesting pairs were counted twice. If the 67 empty nests contained eggshells then the data could be useful for documenting nesting attempts. Recalculating Lor's data using just nests with eggs or chicks yielded a density of 1 pair per 6.17 ha.

Greater densities have been reported; 1 pair per 1.4 ha where $n = 13$ (Provost 1947) and 1 pair per 1.09 ha., $n = 64$ (Otto 1983b). Perhaps the greatest density came from an 81 ha. Louisiana impoundment where 107 nests were reported by Chabreck (1963) for a density of 0.75 ha. per pair. Glover (1953) stated nesting territories to be < 2 ha. The number of breeding pairs in West Ruddy Marsh in this study was also much higher than the conservative estimate

of 25 pairs presented by Seyler the previous year (Seyler 2001). This is likely in large part due to the fact that the adjacent 53.4 ha. Wood Marsh was in draw down. Wood Marsh is part of the Tonawanda Wildlife Management Area and lies south of West Ruddy Marsh. It contained 49 ha. of emergent marsh and had supported a sizable number of grebe pairs. The removal of such a large area of nesting immediately adjacent to West Ruddy would naturally cause a direct increase in the nesting density in West Ruddy. Nesting grebe pairs establish a home range and within that range is a smaller area that is highly defended, especially against other grebes. The defended territory has been defined as an arc of about 45 m. around the nest (Glover 1953). Outside this nest territory, the home range will extend to include foraging and loafing areas. Grebes are able to exist peaceably with other grebes without incident within the home range so long as they remain outside the highly protected nest site area. Home ranges of neighboring pairs will often overlap significantly.

As with most species, the size of a territory is a function of the quality of the habitat. Birds in larger habitats were found to hold larger territories. Once territories are established, their boundaries are somewhat flexible if more birds move into the area. Muller (1995) recorded this situation as an established territory shrank from 0.4 ha. to 0.15 ha. as more birds moved in. The home range did not change however.

Grebe nests were not equally distributed throughout the impoundment. Large areas of seemingly suitable habitat did not contain grebe nests. There are a few possible reasons for this, the first being that there were micro habitats whose differences where not readily apparent. Secondly, there was more available habitat than there were birds to occupy it. Nesting habitat does not appear to be a limiting factor at the wetland site for the species. The last possibility is that grebes are semi-colonial nesters. During the breeding season, grebes appear almost social in large open areas and in the fall they are frequently found in small groups.

Conclusion

This report supports the habitat preference of Pied-billed Grebes to prefer the hemi-marsh situation with roughly 50% open water areas interspersed with emergent vegetation. It presents a better nesting population density factor from which the population of the Alabama swamps can be better estimated and it portrays the wetland complex to have a healthy and large breeding population.

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