Decline in the population of Hooded Grebe *Podiceps gallardoi*?

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Debido a las experiencias ganadas durante una visita a varios lagos de Patagonia en diciembre del 2006, y a los datos de la literatura respectiva, parece justificado tocar alarma con respecto al futuro del Macá Tobiano *Podiceps gallardoi*, endémico de la región. En estos momentos no existe prueba alguna de un dramático descenso del número de la población de esta especie, de cualquier forma. No obstante, son amenazas importantes para esta especie altamente especializada los cambios climáticos que impactan los niveles de agua así como el cultivo de peces en las aguas de cría, lo cual podría destruir la presa invertebrada de los macás y, a la vez, la vegetación flotante que necesitan para construir nidos.

Hooded Grebe *Podiceps gallardoi*, discovered as recently as 1974, is almost endemic to prov. Santa Cruz, Argentine Patagonia. It feeds mainly on snails and nests colonially on floating mats of water milfoil *Myriophyllum elatinoides*[2]. Numbers possibly were never high and the most recent evaluation by O'Donnell & Fjeldså[9] suggested a total population of 3,000–5,000 individuals, whilst Imberti *et al*.[4] speculated as to a possible decrease in numbers and raised concern as to the future of the species. During a visit to the Strobel Plateau, the main breeding area of the Hooded Grebe[2], several waterbodies were visited in order to acquire data concerning possible threats to the species at its breeding sites.

Survey area and methods

On 24–28 December 2006, ten localities, each with one or more waterbodies, on the Strobel Plateau and the area slightly north of it, including the Meseta del Asador, were visited (Table 1). Sites 1–2 and 5–6 are part of the Meseta Lago Strobel, whilst sites 7–8 are on the Meseta del Asador Norte, both plateaux identified as key breeding areas by Fjeldså[2] and Johnson[5]. Sites 3–4 are at lower elevations near the Strobel Plateau, whilst 9–10 are within Perito Moreno National Park, north-west prov. Santa Cruz, in the north of the species' main breeding area. Only a small part of the huge Lago Belgrano could be surveyed, as the major part is a protected area to which access is subject to authorisation. Using a GPS, the location and elevation of all localities visited were recorded (see Table 1), and any grebes present were counted. Based on the surrounding vegetation, water levels were assessed with respect to those in preceding years. Occurrence of emerging and floating water vegetation was also noted. Interviews with local people added further valuable information. My findings were evaluated against the literature.

Results

Sites visited and major findings are summarised in Table 1. Hooded Grebes were only encountered at two sites. On Meseta del Strobel, a pair was found together with a single Silvery Grebe *P. occipitalis*, at estancia La Colorada (site 1): the rather small lake was judged unsuitable for nesting due to the absence of floating vegetation and its size. Water levels there were perhaps c.2 m below those earlier in the season. At site 2, also within estancia La Colorada, known as lagunas Encadenadas and used in previous years for nesting (in 1998, 99 nests of Hooded Grebes were counted[7]), only Silvery Grebes were present. There too, water levels were c.3 m below their height earlier in the season, in

Table 1. Sites visited and numbers of grebes present (*P. g.* = *Podiceps gallardoi*, *P. o.* = *P. occipitalis*).

No.	Name/ description of site	Elevation (m)	Emergent vegetation	Grebe numbers	
				P. g.	*P. o.*
1	estancia La Colorada	824	absent	2	1
2	estancia La Colorada	819	absent	0	±70
3	estancia La Angostura	417	absent	0	±100
4	río Chico Valley	638	some parts with emergent vegetation	0	2
5	estancia Río Capitán, Laguna del Torro and 3 nearby lagoons	625	partially covered with *Myriophyllum*	0	0
6	estancia Los Corrales	833	absent	0	0
7	estancia Sierra Andina, Laguna Mariana	1,084	*Myriophyllum*	13	16
8	estancia Sierra Andina, in total three lagoons at little distance one from another	1,008	at least in one absent	0	0
9	Perito Moreno National Park, Lagunas del Mié	881	parts with emergent vegetation	0	0
10	Perito Moreno National Park, Lago Belgrano	816	little emergent vegetation	0	0

consequence the water area was split into two distinct parts and the nesting area of 1998 was on dry land. No floating vegetation was noted. However intra-annual as well as inter-annual variation in the water levels at both these sites, and many others, is a known factor (S. Imberti *in litt*. 2007). The four lakes at estancia Río Capitán (site 5), despite the presence of water milfoil and their relative protection from prevailing winds by adjoining hills, yielded no grebes. Water levels were only slightly below normal. The lake at estancia Los Corrales (site 6) proved unsuited for breeding Hooded Grebes, whilst the two localities below the Strobel Plateau (3–4), held only Silvery Grebes. Laguna Tonchi, at estancia la Angostura, visited on successive days, experienced an overnight increase in its Silvery Grebe population from c.30 to almost 100 birds. These were displaying, although the absence of lake vegetation prohibited nesting. The lake held no Hooded Grebes.

On the Meseta del Asador Norte, 13 Hooded and 16 Silvery Grebes formed a single group within a carpet of rather dense water milfoil at Laguna Mariana (site 7). Due to low water levels, c.2–3 m below their highest, this lake was also divided into two clearly separated parts. This location generally offers almost no protection against the high winds prevalent in the area, but nevertheless Hooded Grebes were displaying and males were presenting milfoil to potential mates, dropping it conspicuously on and in front of their breasts. According to local people, the grebes occasionally moved from one part of the lake to the other. Laguna Mariana may represent a new nesting location, albeit within a known breeding area. Those lakes at the second location on this meseta (site 8) lacked visible vegetation and, at present water levels, were too shallow to meet the nesting requirements of the grebes, although their rock walls afforded some shelter.

That part of Lago Belgrano (site 9) that could be surveyed did not seem to hold plenty of food suited for the smaller grebes, whilst the Lagunas del Mie (site 10) were extremely windblown. Whilst no grebes were recorded during the present field work, Hooded Grebes have been observed there on several occasions (S. Imberti pers. comm.).

Interviews with local people revealed two major threats to the grebe populations in Patagonia, namely climate change and fish stocking. Recent Patagonian winters have been marked by reduced snowfall but without increased (compensatory) rainfall at other seasons. Whilst a relatively short-term beneficial side-effect of global warming is a relatively stable inflow to some of these lakes due to glacier-melt, waterbodies more dependent on precipitation have experienced a rapid drop in water levels. The construction of access routes has made some high-altitude lakes more accessible and the owners of some estancias appear to have profited by stocking formerly fish-free waterbodies with Salmonidae, principally Rainbow Trout *Oncorhynchus mykiss*. On the Strobel Plateau alone, 37 lagoons are used for fish farming, with the produce sold to a commercial company[8]. The fish compete for prey with the grebes and limit vegetation growth.

Literature data

In 1984, the total population was estimated at 5,000 individuals or more, mainly nesting at 47–49°S, with subsidiary populations south to 50°20'S[2]. Johnson & Serret[6] indicated that the breeding range lay between 46°50'S and 50°72'S. The main area comprises the lava plateau of the Meseta del Strobel, between the large caldera lakes Cardiel and Strobel, and covers some 1,200 km^2 at 300–1,200 m. This plateau harbours c.560 small lakes and ponds, most of them 5–15 m below the general land surface. In 1984, a count over 256 km^2 and 118 lakes yielded 522 adult Hooded Grebes, with 163 young and 18 nests still with eggs. On Lago del Islote, an additional 730 Hooded Grebes, of which just 14 pairs were nesting, were counted, leading to a population estimate for the plateau of 3,130 individuals[2]. Beltrán *et al*. (in Johnson & Serret[6]) noted presence at 130 pre-cordilleran lagoons with six lagoons (del Sello, Toldería Grande, Toldería Chica, del Islote, C232 and C199) holding 40% of the population. A more recent estimation by O'Donnell & Fjeldså[9] noted 3,000–5,000 individuals and led to the species being classified as Low Risk. However, Fjeldså[3] considered the species Vulnerable whilst admitting a lack of evidence for a decline in numbers.

Typical breeding sites of Hooded Grebes consist of crater lakes at some altitude, where the slightly elevated surrounding rock walls and dense floating carpets of milfoil offer their nests at least some protection from Patagonia's prevailing strong winds, one of the principal natural threats to the survival of their clutches. In the absence of fish, these waterbodies develop 'high standing crops of macro-zooplankton, amphipods *Niphargus* and snails *Lymnaea diaphana*' which constitute the main prey of both adult and young grebes[3]. Consequently, nesting is depending on the local development of vegetation and may start at some sites and in some years as early in December, but at others only in late February[2], whilst breeding numbers on any given lake may vary greatly between years[2]. Pairs raise a mean 0.2 young[9] with, in addition to strong winds which may swamp the grebe's nests, predation of eggs and young by Kelp Gulls *Larus dominicanus*[3] and competition for nesting sites with coots *Fulica* sp. the main contributory factors to the species' extremely low productivity.

According to Fjeldså[2] the majority of the Hooded Grebe population could winter close to the main breeding area, on large lakes that apparently do not wholly freeze. However, Johnson & Serret[6] found the río Coyle estuary and some nearby sheltered bays on the Atlantic Ocean to hold important wintering numbers, and Imberti *et al*.[4] confirmed migration to the vicinity of the estuaries of the rivers Gallegos and Coyle, to where the grebes retreat in autumn when their breeding lakes freeze over. But the same authors found little evidence for the winter presence of the species in the southern Chilean fjords or other areas on the Atlantic coast.

Discussion

Following Fjeldså[1], the Hooded Grebe's main problem is over-specialisation, mainly a consequence of interspecific competition with Silvery Grebes that force it to specialise on snails and to restrict itself to the most exposed habitat. Its absence from any of the lagoons visited below 800 m, even on the lagoons of estancia Río Capitan which are rather close to Lago Quiroga, a site where the species is suspected to breed regularly, seems to provide further proof of this grebe's restriction to the most elevated and windblown habitats during the breeding season, though more data are required to prove or disprove this hypothesis. Though evidence for a dramatic decline in the population of Hooded Grebe is lacking, there is strong rationale to at least certify an increased risk to the species. Our absence of knowledge about its true numbers mainly stems from the inaccessibility of the breeding lakes, making any survey with pretensions to completeness a long and arduous exercise. Furthermore, the extended nesting period contributes to the difficulty of organising a comprehensive survey. Due to the harsh winter climate and our limited knowledge of the species' wintering sites (though a great deal of useful negative information has been acquired: S. Imberti *in litt*. 2007), any non-breeding season census is also liable to deliver only partial results, although nonetheless still provide a useful barometer of Hooded Grebe status and population levels, as demonstrated by the recent Imberti *et al*.[4] survey.

Therefore, rather than solely attempting to monitor the population, priority should also be given to the detection and, if possible, prevention of changes affecting the grebes' habitat. Threats so far identified are of two types: climatic and anthropogenic.

Climate change could, I speculate, already be affecting water levels at nesting lakes of Hooded Grebes. In this already cold and dry region, with historically just c.300 mm precipitation p.a., a further reduction of rain- and snowfall, and prolonged dry periods could make the great many lakes not reliant on glacier-melt rapidly unsuitable for nesting, either due to insufficient water (depth and area), or by impacting vegetation growth and feeding conditions. Increasing temperatures will also contribute to higher evaporation (i.e. water loss), but might, to some extent, prove beneficial to the development of milfoil, and the macrozooplankton and invertebrate prey of the grebe. In most regions, climate change is associated with more extreme weather conditions in general. This means potential increases in the number and force of storms, drier weather with annual precipitation becoming more concentrated and thus perhaps provoking floods. Such conditions undoubtedly hold fewer prospects for successful breeding by Hooded Grebes.

Action appears more plausible to counteract the second threat, namely the stocking of high-altitude lakes in Santa Cruz with fish. Whilst it will be difficult or impossible to reverse the situation at waters already stocked with trout, the stocking of additional, especially more remote, lakes with trout must be halted. Site 2, a rather regular breeding site until 1998 (L. Bernacchi pers. comm.) and at least occasional nesting locality (0–150 pairs p.a.) since then (S. Imberti *in litt*. 2007), could be lost if the owners were to introduce fish there, as has been rumoured.

The threat is real. In their study of the lakes of the Meseta del Strobel, Lancelotti *et al*.[8] concluded that whilst other waterbirds breeding in the region prefer turbid lagoons with abundant floating vegetation that are generally more shallow, the greatest abundance of Hooded Grebes was on deep and vegetated lakes. The fish industry prefers also the deeper lakes, often with a greater surface area and little vegetation. There is, however, no clear-cut separation of deep lagoons between those with little covering vegetation and those with abundant vegetation. On many lakes, the quantity of emerging macrophytes changes seasonally and inter-annually in line with their hydrological and morphometrical characteristics. In consequence, at least theoretically, trout production is possible on such lakes, providing the harvesting of fish is carefully planned, and might prove difficult in some years. The consequences for *P. gallardoi* could be dramatic as trout could destroy the rich food supply essential for the grebe. J. Fjeldså (pers. comm.) argues that most of the grebe's breeding lakes are isolated, with no connecting streams. Certain lakes, connected by streams thus permitting natural dispersal by trout, are poorly suited for Hooded Grebes (e.g. at the northern edge of the Strobel Plateau), offering the potential that some lakes, if subject to close regulation, could be used for trout farming without significantly impacting the grebe.

It is uncertain to what extent local fish producers are aware of the dangers of their actions for the survival of the Hooded Grebe, a protected species[8]. The requirements of both overlap to a large extent, so ultimately the remoteness of the grebe's breeding lakes might offer its best protection, as in the near future there should be no commercial argument for stocking such lakes with fish. However, longer term, such remoteness may not act as an effective deterrent and, without efficient control, even a few fish in the most isolated lagoons will present a threat to the grebe, which appears trapped within a clearly delimited niche due to competition with Silvery Grebe[2].

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