

The Conservation Status of Raptors in Chile

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INTRODUCTION

Information about raptors in Chile is found primarily in general works on the taxonomy, distribution and biology of Chilean birds or as part of studies (mainly systematic) that include Chilean specimens. Miscellaneous notes on the biology of selected raptor species usually provide some information on their food and habitat preferences and a few accounts for particular localities mention the presence, breeding and comparative abundance of raptors. Information on their habitat requirements is scarce and primarily qualitative. No doubt the best quantitative information comes from studies of their diet, which concentrate on central Chile. A few other dietary studies deal with raptor populations in the southern parts of the country.

In short, the conservation status of Chilean raptors has scarcely been addressed, except for the necessarily brief treatment provided by Rottmann and Benoit (1983). In the following pages we present and discuss current knowledge pertaining to raptor conservation in Chile.

METHODS

We have reviewed all the published accounts which contain information on the status of raptors in Chile, augmented by verbal communications from competent wildlife biologists and our personal observations. For the purpose of our analysis, we have divided Chile into four regions, which roughly correspond with recognized vegetational and climatic units. Region 1: Northern Chile, from Arica to Copiapo; mainly warm desert areas, including oases and puna. Region 2: Central Chile, from Copiapo to Concepcion; mainly warm shrubland areas. Region 3: Southern Chile, from Concepcion to Quellon in Chiloe Island; mainly temperate forest areas. Region 4: Southernmost Chile, from Quellon to Cape Horn; mainly cold Nothofagus forests interspersed with steppe areas. For Falconiformes we follow the nomenclature of Brown and Amadon (1968; as modified by Ellis and Peres 1983); for Strigiformes we follow Clark et al. (1978); Araya (1985) has provided an updated list of the bird species found in Chile, which we present in modified form in Table 1.

LEGISLATION

On November 18, 1929, the first law (Law No. 4601) regulating the hunting of birds and mammals was passed (Republica de Chile 1929a). In the accompanying Decree (No 4844, 2nd Section; see Republica de Chile 1929b), Article 1 under Title I stated: "The hunting ban for mammals and birds will be the same and for all of the territory. It will begin on the 1st September every year and will terminate on the following 31st March. Consequently the hunting period will be between 1st April and 31st August

of every year." Article 2 under the same Title "forbids indefinitely the hunting, transportation, commercialization, possession, and industrialization of the following animals and birds:

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- "Birds of prey in general (Falconiformes), except for the peuco (Parabuteo unicinctus) and traro or carancho (Caracara plancus);

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- "Owls of any species (Strigiformes);"

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"Also forbidden is the transportation, possession, commercialization, extraction and exportation of the nestlings, eggs, feathers and other products or subproducts of the birds mentioned above ... "

The only two raptors left unprotected (and consequently subject to hunting during the corresponding period) were considered to be "harmful". Central Chilean farmers claimed that Parabuteo unicinctus preyed heavily on chickens (Housse 1945, Barros 1962, Johnson 1965, Rottmann pers. comm.), and sheep ranchers from Magallanes (which includes the Chilean part of Tierra del Fuego) claimed that Polyborus plancus killed substantial numbers of new-born lambs (Johnson 1965, Humphrey et al. 1970, Venegas and Jory 1979). In some areas and during some periods, bounty schemes were established to reduce populations of these two raptors (Johnson 1965). Central Chilean farmers used to exchange one live chicken for every Parabuteo killed (Rottmann, pers. comm.).

On March 9, 1972, a Decree (No. 40; see Republica de Chile 1972) was promulgated that set a limit to the number of individuals to be hunted. This stated that during the hunting period up to 80 individuals of non-banned birds could be killed in a single excursion (thus allowing heavy legal killing of Parabuteo and Polyborus).

On December 10, 1980, a new Decree (No. 354; see Republica de Chile 1980) was promulgated that modified the previous one. This stated that Polyborus could be hunted only in the Magallanes region. The reason for this modification was apparently that Polyborus was scarce everywhere in Chile except for Magallanes. The hunting status of Parabuteo has not been changed to date; during the hunting period it can be killed anywhere in Chile, but only up to 80 individuals daily!

Regulation of hunting activities within the country is effected by a Division of the Servicio Agrícola y Ganadero (SAG = Bureau of Livestock and Agriculture, part of the Agriculture Ministry). This Division de Protección de Recursos Naturales Renovables (DIPROREN = Division of Protection of Natural Renewable Resources) has ca. 300 employees in the whole country. SAG issues hunting licenses to individuals older than 18 years who pass an exam on hunting regulations. In 1985 about 12,000 licenses were issued (i.e., one in every thousand Chileans is a licensed hunter), and has remained at about this level for several years, the maximum number issued in one year having been 15,000. Enforcement of current regulations and bans is effected by carabineros (Chile's uniformed police), SAG inspectors, forest rangers of the Corporación Nacional

Table 1: The 28 species of raptors present in Chile, and their ranges within the country, arranged alphabetically within families.

Species	Latitudinal Range (degrees South)
Cathartidae:	
<u>Cathartes aura</u>	18 - 55
<u>Coragyps atratus</u>	18 - 44
<u>Vultur gryphus</u>	18 - 55
Pandionidae:	
<u>Pandion haliaetus</u>	18 - 40
Accipitridae:	
<u>Accipiter bicolor</u>	33 - 55
<u>Buteo brachyurus</u>	28 - 40
<u>Buteo poecilochrous</u>	18 - 25?
<u>Buteo polyosoma</u>	18 - 55
<u>Buteo ventralis</u>	36 - 55
<u>Circus buffoni</u>	32 - 36, 53 - 54
<u>Circus cinereus</u>	18 - 54
<u>Elanus leucurus</u>	27 - 42
<u>Geranoaetus melanoleucus</u>	18 - 55
<u>Parabuteo unicinctus</u>	30 - 44
Falconidae:	
<u>Falco femoralis</u>	18 - 38, 52 - 55
<u>Falco peregrinus</u>	18 - 55
<u>Falco sparverius</u>	18 - 55
<u>Milvago chimango</u>	28 - 55
<u>Phalcoboenus albogularis</u>	44 - 55
<u>Phalcoboenus australis</u>	54 - 56
<u>Phalcoboenus megalopterus</u>	18 - 36
<u>Polyborus plancus</u>	18 - 55
Tytonidae:	
<u>Tyto alba</u>	18 - 54
Strigidae:	
<u>Asio flammeus</u>	28 - 55
<u>Athene cunicularia</u>	18 - 54
<u>Bubo virginianus</u>	18 - 55
<u>Glaucidium brasilianum</u>	18 - 55
<u>Strix rufipes</u>	32 - 55

Table 2: Status of Chilean raptors corresponding to Regions 1 to 4 as described in the text.

Species	Residence Status				Breeding Status				Abundance Status				Population Status				Likely Causes			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Cathartidae																				
<u>C.aura</u>	R	R	R	R	B	B	B	B	A	A	C	C	S	S	S	S	?	?	?	?
<u>C.atratus</u>	R	R	R	-	B	B	B	-	C	A	A	-	D	S	S	-	-F	?	?	-
<u>V.gryphus</u>	R	R	R	R	B	B	B	B	F	C	C	A	D	D	D	S	-FK	-FK	-FK	?
Pandionidae																				
<u>P.haliaetus</u>	SV	SV	R	-	NB	NB	?	-	R	R	F	-	S	S	I	-	?	?	+HF	-
Accipitridae																				
<u>A.bicolor</u>	-	?	R	R	-	?	B	B	-	R	R	R	-	D	D	D	-	-HK	-HK	-HK
<u>B.brachyurus</u>	-	?	?	-	-	B	?	-	-	R	R	-	-	?	?	-	-	-	-	-
<u>B.poecilochrous</u>	R	-	-	-	?	-	-	-	C	-	-	-	?	-	-	-	-	-	-	-
<u>B.polyosoma</u>	-	R	R	R	-	B	B	B	-	C	C	C	-	D	D	D	-	-HK	-HK	F
<u>B.ventralis</u>	-	-	R	R	-	-	B	B	-	-	S	F	-	-	I	?	-	-	-HK	-
<u>C.buffoni</u>	-	OV	-	OV	-	?	-	?	-	R	-	R	-	-	-	?	-	?	-	?
<u>C.cinereus</u>	OV	R	R	R	?	B	B	B	R	F	F	A	?	D	D	I	-	-H	-H	+H
<u>E.leucurus</u>	-	R	R	-	-	B	B	-	-	C	C	-	-	I	I	-	-	+HF	+HF	-
<u>G.melanoleucus</u>	R	R	R	R	?	B	B	B	F	C	C	C	S	D	D	I	?	-HK	-HK	+HF
<u>P.unicinctus</u>	-	R	R	-	-	B	B	-	-	C	C	-	-	S	S	-	-	+HK	+HK	-
Falconidae																				
<u>F.femoralis</u>	R	R	R	R	?	B	?	?	F	F	R	S	?	I	?	S	-	H	-	?
<u>F.peregrinus</u>	SV	R	R	R	NB	B	?	B	R	R	R	F	?	?	?	?	-	-	-	-
<u>F.sparverius</u>	R	R	R	R	B	B	B	B	F	A	A	A	I	I	I	I	+HF	+HF	+HF	+HF
<u>M.chimango</u>	-	R	R	R	-	B	B	B	-	A	A	A	-	I	I	I	-	+HF	+HF	+HF
<u>P.albogularis</u>	-	-	-	R	-	-	-	?	-	-	-	S	-	-	-	?	-	-	-	-
<u>P.australis</u>	-	-	-	R	-	-	-	B	-	-	-	F	-	-	-	?	-	-	-	-
<u>P.megalopterus</u>	R	R	-	-	B	B	-	-	S	S	-	-	?	?	-	-	-	-	-	-
<u>P.plancus</u>	R	R	R	R	?	?	B	B	R	R	F	A	?	?	?	S	-	-	-	+FK
Tytonidae																				
<u>T.alba</u>	R	R	R	R	B	B	B	B	S	F	F	S	?	I	I	?	-	+HF	+HF	-
Strigidae																				
<u>A.flammeus</u>	-	R	R	R	-	B	B	B	-	S	S	F	-	D	D	I	-	-H	-H	+H
<u>A.cunicularia</u>	R	R	R	R*	B	B	B	B*	S	C	F	S*	?	I	I	D*	-	+HF	+HF	-HF
<u>B.virginianus</u>	R	R	R	R	B	B	B	B	F	C	F	C	S	S	S	I	?	?	?	+HF
<u>G.brasilianum</u>	R	R	R	R	B	B	B	B	?	C	F	C	S	I	S	S	?	+F	?	?
<u>S.rufipes</u>	-	R	R	R	-	?	B	B	-	R	C	C	-	D	D	D	-	-H	-H	-H

* Extirpated from Tierra del Fuego since the 1920s (Humphrey et al.1970).

KEY

Residence Status

R = Resident all year
SV = Summer Visitor
OV = Occasional Visitor
? = Status Unknown

Breeding Status

B = Breeding
NB = Non-breeding
? = Status Unknown

Abundance Status:

A = Abundant (more than 5 individuals can be seen or heard daily)
C = Common (1 - 5 individuals can be detected daily)
F = Frequent (1 individual can be detected weekly)
S = Scarce (1 individual can be detected monthly)
R = Rare (fewer than 5 individuals can be detected yearly)

Population Status:

I = Increasing
D = Decreasing
S = Stationary
? = Status Unknown

Likely Causes of Population Status:

K = Hunting (mainly illegal)
+H = Increasing habitat availability (for breeding/feeding)
-H = Decreasing habitat availability (for breeding/feeding)
+F = Increasing food availability (independently of habitat increase)
-F = Decreasing food availability (independently of habitat decrease)
? = Cause Unknown

Forestal (CONAF = National Forestry Corporation), and ad honorem inspectors (primarily members of hunting clubs and humane societies). According to Decree 2319 of August 24, 1978 (Republica de Chile 1978), infringements of the law are to be fined with up to a maximum of 10 minimum monthly wages for the Metropolitan Region (presently equivalent to U.S. \$750).

Since 1970, every licensed hunter is provided with a booklet that explains the current regulation and bans. The first six editions of this booklet were published by the Division de Pesca y Caza (= Division of Fishing and Hunting) of SAG. The seventh and latest one (1983) was published by CONAF, the National Forestry Corporation (see Rottmann and Benoit 1983). The current booklet is a 112-page, well-written document that includes colour photographs of the most common game birds and mammals, as well as of some of the protected ones.

PRESENT STATUS AND PRESUMABLE CAUSES

The residence, breeding, abundance and population status of the 28 raptor species found in Chile is presented in Table 2. Raptors that seem to be decreasing throughout the country are Vultur gryphus, Accipiter bicolor, Buteo polyosoma and Strix rufipes. Those declining in most of the country but increasing in southernmost Chile (Region 4) are Circus cinereus, Geranoaetus melanoleucus and Asio flammeus. Exactly the opposite pattern is shown only by Athene cucularia. Raptors that are seemingly increasing everywhere within their distributional ranges are Elanus leucurus, Milvago chimango, Falco sparverius, Tyto alba, and perhaps Buteo ventralis. The pattern "stationary or increasing" is exhibited by Pandion haliaetus, Buteo virginianus, Glaucidium brasilianum, and perhaps Falco femoralis. Only one raptor falls into the category of stationary or decreasing: Coragyps atratus. Strictly stationary appear to be Parabuteo unicinctus, Cathartes aura, and perhaps Polyborus plancus. Data on the population status of the seven remaining raptors are not available, and we cannot pass any judgement on their trends; the three species of Phalacroboenus are in general inadequately known. As seen in Table 2, the most important factors affecting the population status of raptors in Chile are: hunting pressure, habitat availability and food supply. They will be dealt with separately below.

Legal hunting of raptors affects only two cases: Parabuteo unicinctus and Polyborus plancus (Rottmann and Benoit 1983). As stated above, the first species is credited with raiding farm chicken roosts, and the second with raiding lambing areas. The only quantitative study on the food habits of Parabuteo unicinctus (Jaksic et al. 1980) shows that this species preys mainly on rodents, with birds as a minor component of the diet (though available, no chickens were preyed upon in the suburban area where the study was conducted). No quantitative information exists on the diet of P. plancus in Chile.

Illegal hunting is effected by two types of people: country-dwellers (farmers and ranchers) do it in the belief that large raptors kill poultry and livestock. City-dwellers become weekend hunters do it out of boredom and because raptors make easy targets. Species affected by these practices are primarily Vultur gryphus, Accipiter bicolor, Buteo polyosoma, Buteo ventralis and Geranoaetus melanoleucus. As a major threat to raptors, hunting seems to be decreasing in importance owing to a new environmental awareness (see below).

Habitat decrease is mainly due to human activities such as urban and agricultural development, clearing of forests and swamp draining. Forest (e.g. Accipiter bicolor, Strix rufipes) and marsh-dwelling raptors (Circus cinereus, Asio flammeus) seem to be the most affected (but see below). Many raptors once common in the lowlands have now retreated to mountainous areas (the Coastal and Andean Ranges), e.g. Geranoaetus melanoleucus and Buteo polyosoma. In Tierra del Fuego Island Athene cucularia was common before the introduction of sheep, whose trampling of their burrows (and associated reduction of their prey supply) has been claimed as the reason for their disappearance from the island (Humphrey et al. 1970).

What has been habitat deterioration for some has meant the opposite for open-land raptors that are now thriving in association with agricultural practices: Elanus leucurus, Falco sparverius and Milvago chimango (see Solar 1975). To a lesser degree, agricultural development seems to have also benefited Falco femoralis, Tyto alba and Athene cucularia. Parabuteo unicinctus seems to do well in human disturbed habitats (Housse 1945), and its populations should increase were it not heavily hunted. Perhaps the same applies to Polyborus plancus. Although Geranoaetus melanoleucus has suffered from hunting (Housse 1945) and decreased habitat availability in central and southern Chile (Elizalde 1970), its preferred hunting habitat (open lands) has increased in the southernmost part of the country (Magallanes) owing to forest clearance (Pisano 1974). This also applies to Circus cinereus, Asio flammeus and Bubo virginianus. In southern Chile (Region 3), Buteo ventralis has also benefited from forest clearance and Pandion haliaetus from dam building. Glaucidium brasilianum seems to be relatively indifferent to (or tolerant of) human-induced habitat perturbations (Johnson 1965, Solar 1975).

A decrease in food availability may be a possible threat in certain situations. Large carrion eaters (Cathartidae) may have suffered from the reduction of pinniped populations (due to heavy hunting) and from increased sanitary conditions in livestock ranching. Nevertheless, this may have been somewhat alleviated by the increase in garbage dumps (Solar 1975). Buteo polyosoma and Athene cucularia are said to have decreased in Magallanes owing to the disappearance of the fossorial rodent Ctenomys magellanicus from sheep-stocked ranges (Humphrey et al. 1970). However, quantitative information on the diet of these raptors is not available in that region. It is true, though, that in Magallanes trampling by sheep destroys the tunnels excavated by fossorial rodents, thus indirectly affecting other prey species that use those tunnels as refuges (e.g. the lizard Liolaemus magellanicus; see Jaksic and Schwenk 1983). Circus cinereus, a known predator of lizards in the region (Humphrey et al. 1970, Jimenez and Jaksic in prep.) may have thus been affected by a reduction in its food supply, but this has been amply compensated by the increase in favourable habitat through the clearing of Magallanes forests.

In contrast, food has been increased for some raptors owing to human activities. The large populations of rodents that build up in association with agricultural crops constitute an augmented food supply for raptors that tolerate human activities, such as Milvago chimango, Falco sparverius, Elanus leucurus, Tyto alba and Athene cucularia. Sheep ranching in southernmost Chile has increased the supply of carcasses for Milvago chimango and Polyborus plancus; if the latter species were not so heavily killed it should have increased in numbers. Introduction of the European rabbit (Oryctolagus cuniculus) and hare (Lepus capensis) in Magallanes (see Jaksic and Yanez 1983) seems to have increased the prey stock for Geranoaetus melanoleucus and perhaps also for Bubo virginianus

(Jaksic *et al.* in press, Jimenez, pers. obs.). Introduction of perch (Cyprinus sp.) in southern Chilean lakes, reservoirs, rivers and estuaries may have led to an increase in prey for Pandion haliaetus, but no data are available on its diet in Chile. Gardening has apparently increased the prey (passerines, including House Sparrows) for the human-tolerant Glaucidium brasilianum (Solar 1975).

Poisons/rodenticides, trapping, collision with motor vehicles, electrocution, nest destruction, egg collecting, taxidermy, falconry and wildlife photography seem to constitute only minor threats to Chilean raptors, but we have no quantitative information to support this claim.

PUBLIC ATTITUDES

There has been a favourable trend in the public attitude towards native raptors (as judged from informal polls conducted by the "El Mercurio" newspaper, R. Astorga, pers. comm.; and from TV ratings for programmes on Chilean wildlife, M. Gedda, pers. comm.) Apparently the constant exposure of the public to features on wildlife biology on television and in the press has had an important effect in terms of stressing the value of predators as necessary components of the natural world. Environmental awareness has also increased, and along with this a realization of the need to halt the processes of habitat deterioration, thus indirectly addressing one of the major problems faced by raptors. Among farmers and ranchers, however, some raptors still have bad reputations (e.g. Parabuteo unicinctus, Accipiter bicolor, Polyborus plancus), and in hunting them some harmless ones doubtless also get destroyed (see Greer and Bullock 1966; Jimenez, pers. obs.). Owls are reputedly birds of ill omen (particularly Glaucidium brasilianum and Tyto alba; see Housse 1945, Johnson 1965, Solar 1975), and are accordingly killed by country people.

CONCLUSIONS

From a conservation viewpoint, Chilean raptors that may be considered threatened are those that are declining most throughout the country: Coragyps atratus, Vultur gryphus, Accipiter bicolor, Buteo polyosoma and Strix rufipes (18% of the Chilean species). Also subjects of concern are those that are decreasing everywhere except in southernmost Chile (where they appear to be increasing): Circus cinereus, Geranoaetus melanoleucus and Asio flammeus (11% of the Chilean species). Of no conservation concern are those species whose numbers appear to be stable: Cathartes aura, Parabuteo unicinctus and Polyborus plancus (11% of the Chilean species). The most peculiar aspect of the Chilean raptor fauna is that 10 species (36% of the total) appear to be increasing in most of their ranges, owing to human activities associated with clearing of forests and subsequent farming: Pandion haliaetus, Elanus leucurus, Buteo ventralis, Falco femoralis, Falco sparverius, Milvago chimango, Tyto alba, Athene cunicularia, Bubo virginianus and Glaucidium brasilianum. If, due to errors in our assessment, this contention appears too rosy to be true, these latter populations should at least be considered as stable and no cause for concern. In contrast, it is disturbing that the population status of the remaining seven species (25% of the total!) is unknown: Buteo brachyurus, Buteo poecilochrous, Circus buffoni, Falco peregrinus, Phalcooenus alboquarlaris, Phalcooenus australis and Phalcooenus megalopterus, deserve more attention from a conservation viewpoint.

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