

Action Plan

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for the Conservation of

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the Brazilian Merganser

*Mergus octosetaceus*

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## for the Conservation of

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## the Brazilian Merganser

*Mergus octosetaceus*

Threatened Species Series – nº 3

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Brasília, 2006



## Production of Action Plan

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Final Version: January 2006

This Plan is based on the discussions that took place during the two workshops and on the information provided by experts of the three countries. The source of the information, when not specifically referenced, represents the compilers.

### Revisions

This action plan will be monitored annually by the compilers and should be reviewed and updated every five years (first review due 2011). However, an emergency review should be undertaken at any time if there are sudden major changes liable to affect the population.

### Geographical Scope

This action plan needs implementation in the following range states of the Brazilian Merganser: Argentina, Brazil, and Paraguay.

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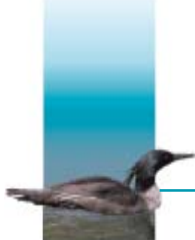




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## List of acronyms and abbreviations

CGFAU	–	Fauna General Co-ordination /Ibama
CEMAVE	–	National Research Center for the Wild Birds Conservation /Ibama
COFAU	–	Fauna Species Protection Co-ordination
DCBIO	–	Directorate for Biodiversity Conservation/MMA
FUNATURA	–	Pró-Nature Foundation
GEREX	–	Management Executive/Ibama
IBAMA	–	Brazilian Institute of Environment and Natural Renewable Resources
IUCN	–	International Conservation Union
MMA	–	Ministry of the Environment
NAWTAG	–	North American Waterfowl Taxon Advisory Group
OSU	–	Oregon State University
PBCPM	–	Brazilian Merganser's Biology and Conservation Project /UFF
PROAVES	–	Brazilian Association for the Birds' Conservation
RPPN	–	Private Reserves of Natural Heritage
SSC	–	Species Survival Commission/IUCN
UFF	–	Federal University of Rio de Janeiro State
UFRJ	–	Federal University of Rio de Janeiro
UEL	–	State University of Londrina
UnB	–	University of Brasília
USP	–	University of São Paulo
USGS/FRESC	–	United States Geological Survey/Forest and Rangeland Ecosystem Science Center
WWT	–	Wildfowl & Wetlands Trust
WITWSG	–	Wetlands International Threatened Waterfowl Specialist Group/IUCN

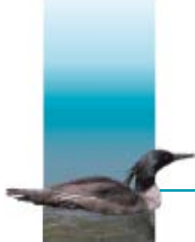
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# Presentation

Brazil is the country that has the world's greater biodiversity. At the same time, the increase of the human activities, such as the unordered expansion of the cities and the increase of the agricultural borders over the preserved areas resulted in a great pressure over several landscapes and biomes in Brazil. The main consequences of these actions are the loss, degradation and fragmentation of habitats, resulting on an increase of the number of species in the Official List of Threatened Species instituted by the Normative Instruction Nº 3 of the Ministry of the Environment, of May 27, 2003.

Every Brazilian citizen is responsible for watching over this national patrimony, but the initiatives and measures to be adopted in order to reverse this scenario must be undertaken in an organized and cooperative way for a common objective. Therefore, gathering of efforts from governments, society and research institutions, aiming the conservation of our biodiversity, represents an important step of this endeavor.

In order to change this threat scenario, the Brazilian Institute of Environment and Natural Renewable Resources and the Ministry of the Environment created the Threatened Species Series, composed by Action Plans and other relevant contributions to the protection and conservation of the Brazilian threatened fauna. The first two numbers of this Series referred, in order of publication, to the Red-billed Curassow *Crax blumenbachii* and the albatrosses and petrels (Order Procellariiformes).

The third number of this Series is the Action Plan for the Conservation of the Brazilian Merganser, a Critically Endangered species that originally occurred in Brazil, Argentina and Paraguay. Currently there are records only for Brazil and Argentina, although the populations in Argentina, if still existing, must be extremely reduced. This fact reinforces the need of conserve it on the Brazilian territory, developing joint efforts, aiming to assure that the Brazilian Merganser will not be extinct in the near future. The current population estimate is of only around 250 birds in nature and none in captivity.

The Plan presents information on the biology of the species, identifies their main threat factors and proposes measures that must be implemented, identifying potential actors and establishing time scales and priorities for long term conservation of the species. The Plan must be revised periodically, to monitor and evaluate the success of the actions undertaken and to update the conservation needs.

We thank all the participants and sponsors that collaborated for the elaboration of this Plan on all the phases of preparation, showing commitment with the conservation of the Brazilian biodiversity.

**MARCUS LUIZ BARROSO BARROS**

President - Brazilian Institute of Environment and Natural Renewable Resources

**JOÃO PAULO RIBEIRO CAPOBIANCO**

Secretary of Biodiversity and Forests  
Ministry of Environment







**PART 1**  
**GENERAL INFORMATION**





## Introduction

The Brazilian *Merganser Mergus octosetaceus* is a fish-eating duck occurring in low densities on streams and rivers flowing through remote sub-tropical forest and "cerrado" with gallery forest. It seems to favor upper tributaries interspersed with rapids and waterfalls from low elevations up to 1,300m (Figures 1 a,b,c,d,e,f). It is the only surviving species of Mergini (Order Anseriformes) in the Southern Hemisphere and very little is known about the species biology.

The species is one of the most threatened birds in Americas (Bartmann, 1994; Collar et al., 1992; Antas, 1996) categorized as critically endangered threatened, as in the List of the Threatened Species of the Brazilian Fauna (Port. N.º 003/2003 - MMA), as in the "Red List of the Threatened Animals" (IUCN 2000), because of its small and declining populations (BirdLife International, 2000). There are no reasonable estimates for the total population, less than 250 birds are thought to live in the wild (BirdLife International, 2000) and none in captivity. There are confirmed records from four watershed (São Francisco, Tocantins, Paraná and Doce) and three countries (Paraguay, Argentina and Brazil).

However, the last record in Paraguay was in 1984 (Lopez, 2000) and in Argentina, since 1993 only two sightings. All the records in these two countries have been about isolated birds, indicating strong reduction or even disappearance of the species in the investigated regions.

As with other territorial riverine ducks, the Brazilian Merganser is largely sedentary and monogamous - individuals are thought to remain paired for life on the same stretch of river. This makes the species extremely sensitive to habitat loss and degradation. Deforestation for agricultural expansion and cattle ranching, siltation of rivers caused by clear-felling, dam building

and forest fires pose the most critical threats to the species (Johnson & Chebez, 1985; Bartmann, 1988; Collar et al., 1992; Chebez, 1994). Currently the ecological tourism, especially aquatic sports as rafting (Bruno & Bartmann, personal comm., 2002), the "buoy-cross" and the canoeing can also represent a significant threat (Bruno & Carvalho, 2005).

If it wasn't by the pioneering studies of Gai (1950, 1951, 1976), Partridge (1956), Bartmann (1988), Silveira & Bartmann (1996, 2001), Bruno & Bartmann (2003), Lamas & Santos 2004, Lamas in press and Bruno (2004), almost nothing is known on the biology and ecology of the Brazilian Merganser. More information on population parameters and control factors of the populations of this species are urgently necessary.

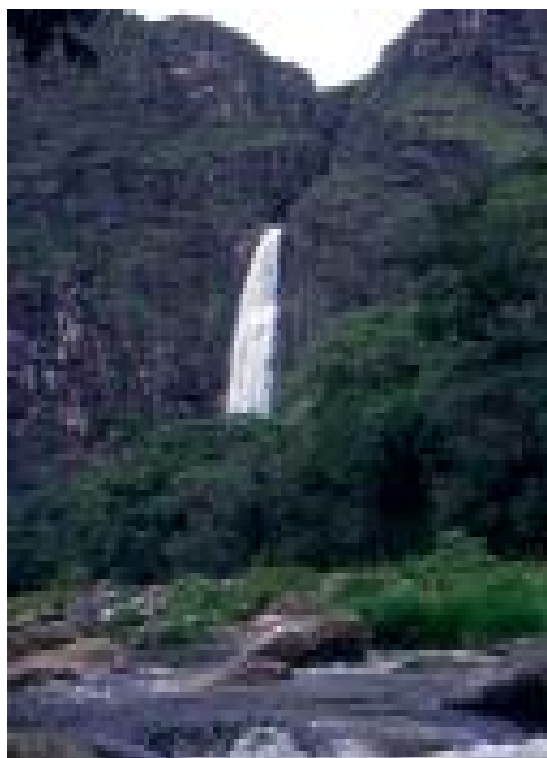


Fig. 1a



Sávio Bruno.



Fig. 1b

Sávio Bruno.



Fig.1c

Sávio Bruno.



Fig. 1d

Fig. 1 - *Mergus octosetaceus*' habitat. Serra da Canastra National Park and surroundings, MG. 1a Casca D'Anta waterfall 1b In the detail, a family of *Mergus* going up the river in the higher part of the São Francisco River 1c In the left edge, a pair floats in rich rapids waters 1d typical habitat of the species, next to the spring to the São Francisco River.



## Information on the species and natural history

### Morphology

*Mergus octosetaceus* has a total length that varies between 48 and 55 cm. Presenting blackish head and neck, darker in the auricular and lateral regions of the neck due to the metallized green reflections in this zone; from the posterior region of the head comes out a developed crest. Brownish back and gray tail with color gradation; wing of similar tonality with a sufficiently conspicuous white mirror. Chest and brownish gray womb, barred of white. Red feet. Black, fine, narrow serrated beak and with recurved extremity (Navas, 1977; Sick, 1984; Bruno, 2004) (Figure 2).

It does not present sexual dimorphism, but when sighted in pairs the males are distinguished by the bigger size, peak and plume (Partridge, 1956; Bartmann, 1988; Silveira & Bartmann, 2001) and more robust head (Bruno, 2004).

The youngs present the superior part of the body black, with three white spots: in the wing, side of the back and side of the tail. The inferior part is completely white. A white band extends from the beak to the back of the eye. There is a white spot in front of the eye. The iris is gray, the beak is black, legs and feet are light grayish (Partridge, 1956) (Figure 3).

For the layperson, the species can remember a Brazilian cormorant (*Phalacrocorax brasilianus*), which can occur in the same places, differing from it by the thinnest body, the narrow beak and especially by the plume in the nape of the neck. According to Bruno (2005b) other remarkable characteristics can

be enumerated: while the Brazilian Merganser possesses the red feet and black beak, the Brazilian cormorant presents dark feet and yellowish peak.

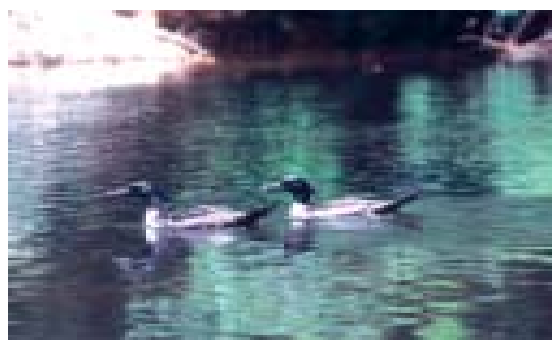


Fig. 2 - Pair of *Mergus octosetaceus*.

Sávio Bruno, August of 2005.



Fig. 3 - Young of Brazilian Merganser just fledging.

Sávio Bruno 2006.

### Behavior

They dive intensely in backwaters and around of rapids, fishing and use to rest settled in partially submerged or projected rocks, trunks and twigs fallen on the watercourse and marginal beaches (Sick, 1984; Partridge, 1956; Bartmann, 1988; Silveira & Bartmann, 2001). It is an alert species to the movements around, being



ready to reacting front to the eminent danger, even when resting. When they are without youngs or with sub-adult offspring, to the minor signal of danger they normally enter the water emitting alert vocalizations and flying over the water surface (Bruno, 2004) (Figure 4).

Sávio Bruno, August of 2005.



Fig. 4 - *Mergus octosetaceus* taking off over the water surface in the Serra da Canastra National.

When the adults are followed by its youngs, they do not raise flight immediately to any the danger, but move towards the edge of the river and in a certain instant swim vigorously, followed by the youngs, that are still unable to fly. The adults continuously vocalize in these circumstances (Bruno, 2004) (Figure 5).

Sávio Bruno, August of 2005.



Fig. 5 - *Mergus octosetaceus* pair followed by seven youngs, escaping from the eminent danger.

During the rainy season, strong rains can make the rivers very turbid by short periods. Bruno (pers. comm., 2005) mentions that while the water of the river remains

muddy the animals diminish their activity, spending most of the day resting, predominantly on rocks, being however, alert to the possible threats to its survival (Figure 6). They swim from time to time, observing the water surface, where they have the possibility to find small invertebrates.

Sávio Bruno, October of 2003.



Fig. 6 - In Brazilian Merganser swim with little frequency in muddy waters, remaining generally resting by the side of the river.

The youngs, when disturbed, run away for great distances or seek for shelter in the surrounding vegetation. When forced, they fly low, usually following the riverbed. They do not present the behavior to run away going deep inside the gallery forest, but they frequently search this vegetation that extends over the waters, camouflaging itself on the shades, lebirds and twigs (Bruno, pers. comm.) (Figure 7).

Photo: Sávio Bruno, August of 2005.



Fig. 7 - *Mergus octosetaceus* family with seven youngs camouflaged next to the twigs in the edge of the river.



Although extremely aquatic, they are more agile in land than the majority of the mergansers (Partridge, 1956). Its agility in scaling waterfalls, jumping from rock in rock, approaches them more to the torrential water ducks, as *Merganetta* sp., than to the mergansers. Very young birds, with less than two weeks of life, possess the capacity to dive and also making it a mechanism of escape from predators, as observed in the Serra da Canastra (Bruno & Bartmann, pers. comm., 2002).

They present a vocalization similar to a bark that can eventually be heard to the uprising flight and more frequently in the reproductive period: a male, in the Serra da Canastra National Park was observed swimming through its territory, continuously vocalizing for 10 minutes. Male and female answer playbacks and come close within 2,5m of the sonorous source (Silveira & Bartmann, 2001). Males present more strident and sonorous vocalization than female. Bruno et al. (2006 a and b) identified at least three distinct vocalizations for the species during the reproductive period (Figure 8).

Photo: Sávio Bruno, August of 2006.

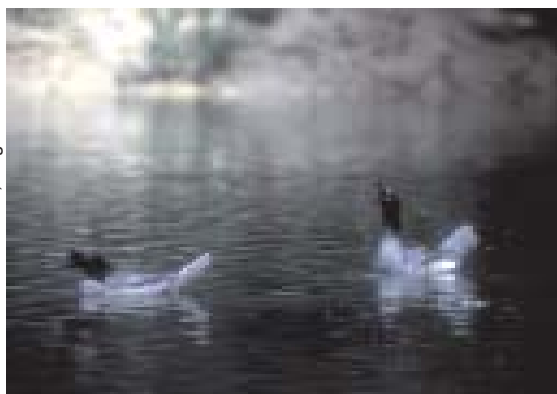


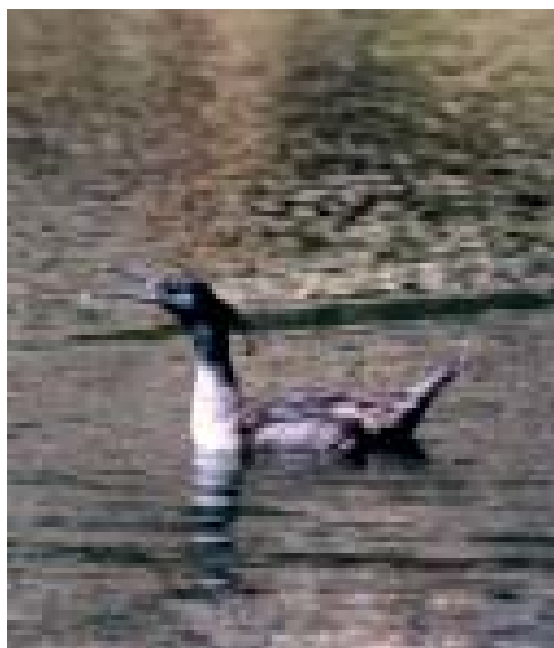
Fig. 8a *Mergus octosetaceus* pair loudly vocalizing due to sound of the photo shooting 8b male adult of *Mergus* vocalizing when returning to the neighborhoods of the nest where the female was incubating.

Determining the level of territoriality, dispersion and migration presented by the Brazilian Merganser will provide crucial information for the establishment of the most appropriate strategies for protection of the species and its habitats. Therefore, radio-telemetry studies and localization by satellites are urgent necessities.

## Distribution and habitat

The Brazilian Merganser requires rivers and streams of clear water, crossing subtropical and closed forests (Partridge, 1956; Johnson & Chebez, 1985; Bartmann, 1988). Apparently they prefer tributaries next to the springs, with at least 1m of depth, intercalated by rapids and waterfalls, in altitudes of up to 1300m.

Partridge (1956) speculates that the distribution of the species would be limited to the areas above waterfalls, so that the species would be protected from the predatory action of great fish (e.g. Dourado *Salminus maxillosus*) on the youngs. In the Serra da Canastra, the territory of a pair requires a minimum stretch of 5km of river (amplitude of 5 the 12 km, Silveira & Bartmann, 2001).



8b adult Male of *Mergus octosetaceus* vocalizing when returning to the neighborhoods of the nest where the female was incubating.

*M. octosetaceus* occurs, in low densities, in several separated areas within its historical distribution area. There are confirmed records from four watershed (São Francisco, Tocantins, Paraná and Doce) and three countries (Paraguay, Argentina and Brazil). The majority of the historical records are from the center-southern of Brazil and surrounding areas in Argentina and Paraguay (Figure 9).

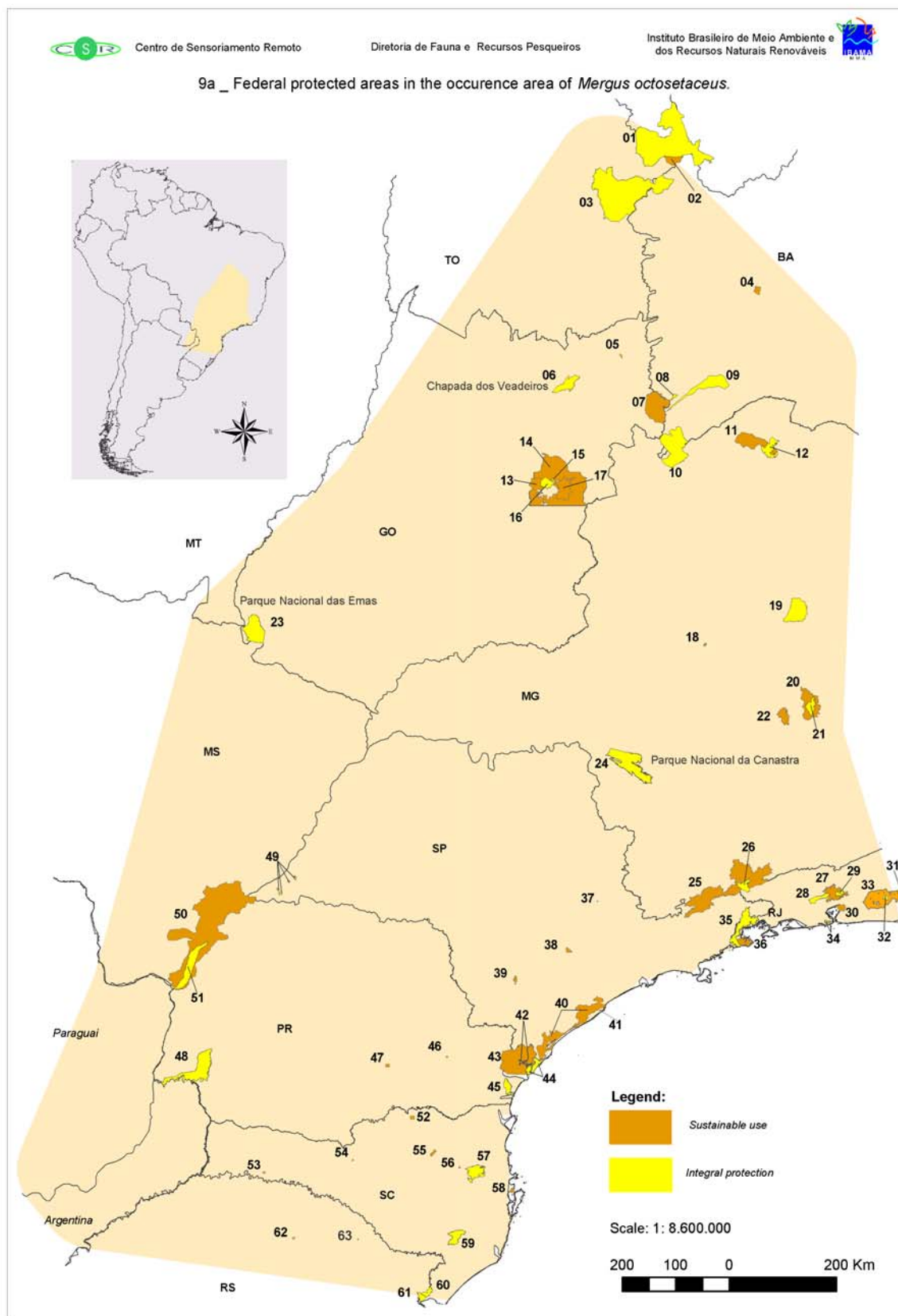
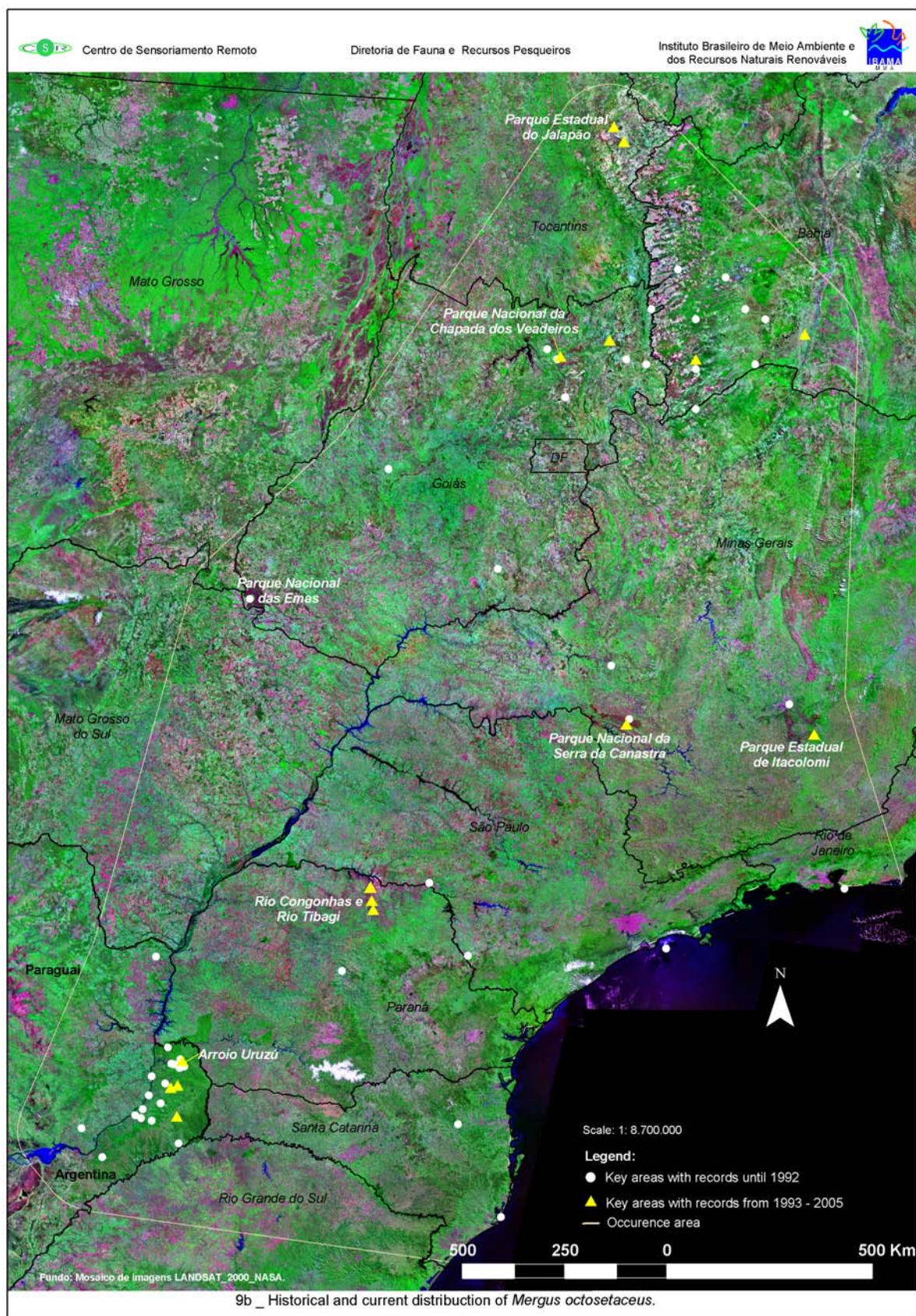


Fig. 9a Federal Conservation Units within the *Mergus octosetaceus*' area of occurrence: Key-area with records up to 1992 - circles; between 1993 and 2005 - triangles 9b *Mergus octosetaceus*' historical and current distribution.







## Numerical order for the Federal Conservation Units in the *Mergus octosetaceus* enclosing area.

- |   |   |
|---|---|
| 01 Nascentes do Rio Parnaíba National Park;                               | 35 Cairuçu Environmental Protection Area;                                 |
| 02 Serra de Tabatinga Environmental Preservation Area;                    | 36 Matão de Cosmópolis Area of Relevant Ecological Interest;              |
| 03 Serras Gerais dos Tocantins Ecological Station;                        | 37 Ipanema National Forest;   |
| 04 Cristópolis National Forest;   | 38 Capão Bonito National Forest;  |
| 05 Mata Grande National Forest;   | 39 Cananéia-Peruíbe-Iguape Environmental Protection Area;                 |
| 06 Chapada dos Veadeiros National Park;                                   | 40 Ilha do Ameixa Area of Relevant Ecological Interest;                   |
| 07 Nascentes do Rio Vermelho Environmental Preservation Area;             | 41 Guaraqueçaba Ecological Station;                                       |
| 08 Veredas do Oeste Bahiano Wildlife Reserve;                             | 42 Area of Ambient Protection of Guaraqueçaba;                            |
| 09 Grande Sertão Veredas National Park;                                   | 43 Superagui National Park;   |
| 10 Cavernas do Peruaçu Environmental Protection Area;                     | 44 Saint-Hilaire/Langue National Park;                                    |
| 11 Cavernas do Peruaçu National Park;                                     | 45 Açungui National Forest;   |
| 12 Rio Descoberto Basin Environmental Protection Area;                    | 46 Irati National Forest;   |
| 13 Central Plateaus Environmental Protection Area;                        | 47 Iguçu National Park;   |
| 14 Contagem Biological Reserve;   | 48 Mico-Leão-Preto Ecological Station;                                    |
| 15 Brasília National Park;  | 49 Ilhas and Vázeas do Rio Paraná Environmental Protection Area;          |
| 16 São Bartolomeu River Basin Environmental Protection Area;              | 50 Ilha Grande National Park;   |
| 17 Pirapitinga Ecological Station;  | 51 Três Barras National Forest;   |
| 18 Sempre-Vivas National Park;  | 52 Chapecó National Forest;   |
| 19 Morro da Pedreira Environmental Protection Area;                       | 53 Caçador National Forest;   |
| 20 Serra do Cipó National Park;   | 54 Serra das Abelhas - Rio da Prata Area of Relevant Ecological Interest; |
| 21 Carste de Lagoa Santa Environmental Protection Area;                   | 55 Ibirama National Forest;   |
| 22 National Park of the Emas;   | 56 Serra do Itajaí National Park;   |
| 23 Serra da Canastra National Park;                                       | 57 Anhatomirim Environmental Protection Area;                             |
| 24 Serra da Mantiqueira Environmental Protection Area;                    | 58 S. Joaquim National Park;  |
| 25 Itatiaia National Park;  | 59 Serra Geral National Park - Area 2;                                    |
| 26 Petrópolis Environmental Protection Area;                              | 60 Aparados da Serra National Park;                                       |
| 27 Tinguá Biological Reserve;   | 61 Passo Fundo National Forest;   |
| 28 Serra das Órgãos National Park;  | 62 Aracuri-Esmeralda Ecological Station.                                  |
| 29 Guapim-Mirim Environmental Protection Area;                            |   |
| 30 União Biological Reserve Union;  |   |
| 31 Poço das Antas Biological Reserve;                                     |   |
| 32 S. João River Basin / Mico-Leão-Dourado Environmental Protection Area; |   |
| 33 Tijuca National Park;  |   |
| 34 Serra da Bocaina National Park;  |   |

In Paraguay, the species seems to be restricted to small tributaries of the Paraná River, in Itapua and Alto Paraná states. The last confirmed sighting was in Itapua, in 1984 (López, pers. comm., 2000), but it is believed that the species is locally extinct (Brooks et al., 1993a, 1993b). Information on occurrence areas of the species in the Reserve of the Biosphere Mbaracayú (Clay 2003) requires confirmation.

In Argentina, the species is restricted to the province of Misiones, in the northeast of the country, where currently very little is known regarding its current status, and it is possible an extinction in a near future (Hearn, 1994; Bosso & Gil, 2000). In 1993, in a survey carried through in 376km of river, only one bird was found (Benstead et al., 1993) and wide surveys had recently found only isolated





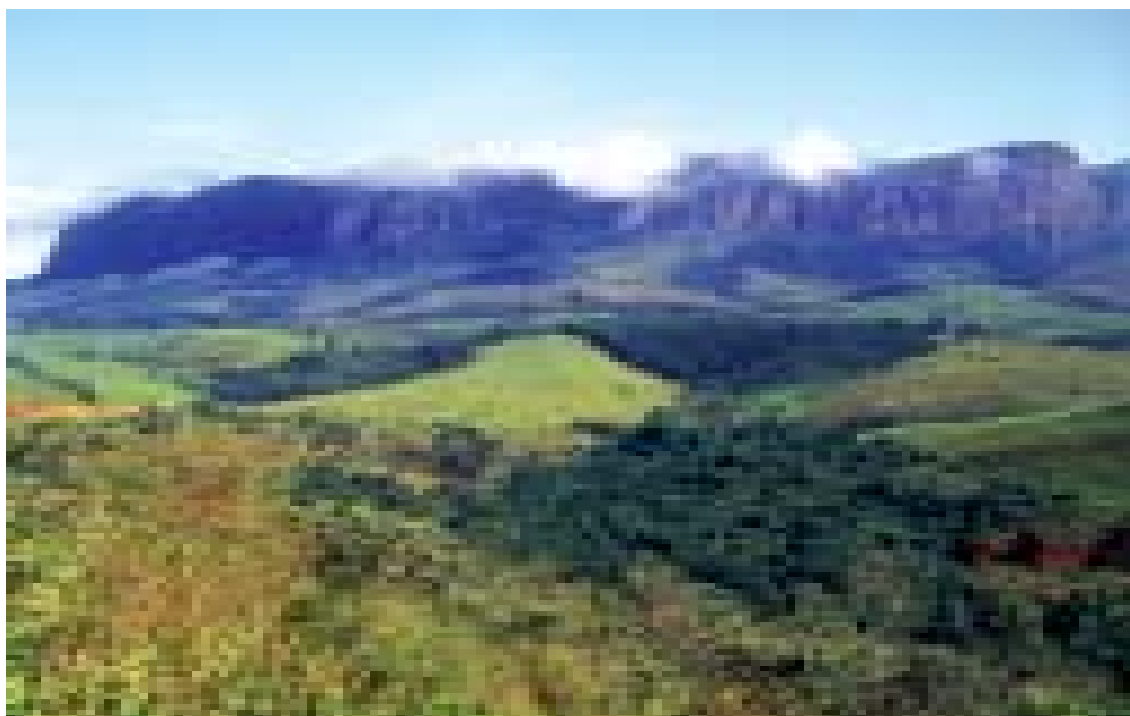
birds (Bosso & Gil, 2000). The most recent record of the species in the country was of an isolated bird in the Uruzú River, Urugua-í River basin, in May 2002 (Jorge Baldo, pers. comm.). There are records of the species in three protected areas: Iguazú National Park, Urugua-í Provincial Park and Urugua-í Private Reserve) however only few birds still survive in these places.

In Brazil the species occurred historically in eight states of the south center of the country (Bahia, Goiás, Minas Gerais, Tocantins, São Paulo, Rio De Janeiro - uncertain occurrence, Paraná and Santa Catarina) (del Hoyo et al., 1992; Collar et al., 1992; Sick, 1997; BirdLife International, 2000). Today it is believed that it has extinguished in three of these (São Paulo, Rio De Janeiro, and Santa Catarina) persisting in small numbers in localities extremely apart in Goiás, Minas Gerais, Tocantins and Paraná).

The localities with current occurrence of the Brazilian Merganser are: in Goiás, Chapada dos Veadeiros National Park and adjacent areas, as the Campo Alegre RPPN and Emas National Park (Yamashita & Valle, 1990; Leeuwenberg, pers. comm., 2001; Bianchi et

al., 2005; Antas, pers. comm., 2005), Serra da Canastra National Park and adjacent areas in Minas Gerais (Bartmann, 1988; Silveira, 1998; Silveira & Bartmann, 2001; Lamas, 2003; Bruno, 2004), Itacolomi State Park, in Minas Gerais in the Doce River basin (Cerqueira Junior et al., 2005), Tibagi and Congonhas Rivers in Paraná (Anjos et al., 1997; Anjos, 2003), and Novo River in the Jalapão State Park in Tocantins (Pacheco & Silva e Silva, 2002; Braz et al., 2003; Martuscelli, pers. comm., 2002). The last sighting of the species in the Emas National Park occurred in 1990.

Six of these areas are protected: Serra da Canastra National Park (Figure 10), Chapada dos Veadeiros National Park, Emas National Park, Jalapão State Park, Itacolomi State Park and Campo Alegre Privated Reserve of Natural Heritage (RPPN), but the populations in the Paraná and Bahia (if extant) are currently unprotected. The population that also occurs in the immediacy of the Campo Alegre RPPN is unprotected as well. The number and the localization of the key-areas for the species are inadequately known in the three countries of occurrence. Table 1 presents a list of all the records for the species.



Sávio Bruno, January 2005.

Fig. 10 – Serra da Canastra's general view.



Table 1: Inventory of the *M. octosetaceus* records (localities in each country are listed in the North-South direction). An erroneous records for Sucuriú River headboard, Mato Grosso do Sul, is not enclosed here. Note: Sightings in the Serra da Canastra National Park are not exhaustingly detailed.

Locality	Sublocality	Latitude Longitude	Nº birds	Protection Status	Last Record	Comments	Source			
<b>Argentina (Coering: Good)</b>										
Iguazú River	Garganta Del Diablo, PN Iguazú	25°39' S 54°23' W 25°39' S 54°23' W	2	Total	1942	Youngs, nº not specified	Collar et al. (1992) Johnson & Chebez (1985)			
	Pto. Canoas, PN Iguazú	25°39' S 54°23' W					Delacour (1959) (cit. Collar et al., 1992)			
	Salto	25°39' S 54°23' W					Partridge (1956), Johnson & Chebez (1985)			
	Destacamento Apepú, PN Iguazú	25°39' S 54°23' W					Johnson & Chebez (1985)			
Yacuy River	Not specified	25°58' S 54°11' W	1	Total	1947	Collected	Partridge (1956), Johnson & Chebez (1985) Johnson & Chebez (1985)			
		25°61' S 54°11' W	2		1949	Collected				
Urugua-í River	Not specified	25°58' S 54°06' W	6	Total	1948	Collected	Partridge (1956), Johnson & Chebez (1985) Partridge (1956), Johnson & Chebez (1985) Partridge (1956), Johnson & Chebez (1985) Partridge (1956), Johnson & Chebez (1985) Partridge (1956), Johnson & Chebez (1985) Partridge (1956), Johnson & Chebez (1985) Forcelli (1987) (cit. Collar et al., 1992) Luthin (1988) (cit. Collar et al., 1992)			
		25°58' S 54°06' W	1		1949	Collected				
		25°58' S 54°06' W	2		1950	Collected				
		25°58' S 54°06' W	5(3)		1954	Collected				
		25°58' S 54°06' W	1		1960	Collected				
		25°58' S 54°06' W	1		1985					
		25°58' S 54°06' W	1		1988					
		17km from bridge on route 19	25°56' S 54°16' W		3	Total		1984		Johnson & Chebez (1985)
		Palácio River, 37km from bridge on route 19	25°56' S 54°16' W		2	Total		1984		Johnson & Chebez (1985)
		Ilha Yacú	25°56' S 54°16' W		1	Total		1948	Collected	Partridge (1956), Johnson & Chebez (1985)
		Km 10	25°56' S 54°16' W 25°56' S 54°16' W		2	Total		1951	Collected	Partridge (1956), Johnson & Chebez (1985) Partridge (1956), Johnson & Chebez (1985)
					1			1952	Collected	
		Km 15	25°56' S 54°16' W		1	Total		1952	Collected	Partridge (1956), Johnson & Chebez (1985)
		Km 20	25°56' S 54°16' W		1	Total		1952	Collected	Partridge (1956), Johnson & Chebez (1985)
Uruzú River	unknown	25°55' S 54°19' W	nest	None	1970s	One nest recorded	D. Callaghan in litt. 1992 P. Canevari in litt., 1992 (cit. Collar et al., 1992) A. Johnson in litt., 1993 A. Johnson in litt., 1992 (cit. Collar et al., 1992) Sighted by Jorge Baldo in may			
		25°51' S 54°10' W	1		1986					
		25°51' S 54°10' W	1		1988					
		25°52' S 54°08' W	1		1989					
			1		2002					
Aguaray Guazú	26°08' S 54°39' W	1	None	1948	Collected	Partridge (1956), Johnson & Chebez (1985)				
Piray Mini River	Not specified	26°15' S 54°25' W	1	None	1970s		J.C. Chebez in litt. 1992 (cit. Collar et al., 1992) Hearn (1994)			
		26°19' S 54°20' W	1		1986					
		Next to Guairapo River mouth	26°17' S 54°13' W		1			None	1993	Survey data 1997
Piray Guazú River	Not specified	26°27' S 54°42' W	1	None	1951	Collected	Johnson & Chebez (1985)			
		26°50' S 54°50' W	1		Johnson & Chebez (1985), Collar et al. (1992) Johnson & Chebez (1985), Collar et al. (1992)					
		26°50' S 54°50' W	1							
		26°50' S 54°50' W	3							
2km down the Alegria River mouth	26°48' S 54°14' W	1	None	1996	Survey data	Bosso & Johnson (pers. comm.)				



Locality	Sublocality	Latitude Longitude	Nº birds	Protection Status	Last Record	Comments	Source
Tigre River	Next to route 14	26°35' S 54°03' W	1	None	1977	Piray Guazú River tributary	Johnson & Chebez (1985) (cit. Collar et al., 1992)
Paranay Guazú River		26°41' S 54°48' W	2	None	1984		M. Nores in litt. for W. Belton (cit. Collar et al., 1992)
Caruhapé River		26°47' S 54°56' W	1	None	1982	Collected	Partridge (1956), Johnson & Chebez (1985)
Mandarinas River		27°15' S 54°12' W	several	None	1953	Sobierbio River tributary Several birds observed	Johnson & Chebez (1985) (cit. Collar et al., 1992)
Victoria River		26°52' S 54°39' W				Rio Sobierbio River (only tributary of Uruguai River with sighting).	Johnson & Chebez (1985) (cit. Collar et al., 1992)
Yabibirí	RiverBonpland	27°29' S 55°29' W	1	None	1912	Collected	Partridge (1956), Johnson & Chebez (1985)
<b>Brasil (Cobertura: Modera)</b>							
Novo River, Tocantins	Upstream of Velha Waterfall	10°17' S 46°53' W	2	Total	2002		Paulo Martuscelli (pers. comm., 2002)
Novo River, Tocantins	Upstream of Velha Waterfall	10°17' S 46°53' W	4	Total	2001		V. Braz (pers. Comm., 2002)
Novo River, Tocantins	Upstream of Velha Waterfall	10°17' S 46°53' W	6	Total	2002	Pair with 4 youngs	Pacheco & Silva e Silva (2002)
Novo River, Tocantins	Upstream of Velha Waterfall	10°17' S 46°53' W	1	Total	2002		Braz et al. (2003)
Novo River, Tocantins	Upstream of Velha Waterfall	10°17' S 46°53' W	2	Total	2002		Braz et al. (2003)
Novo River, Tocantins	55 Km upstream of Velha Waterfall	10°17' S 46°53' W	6+	Total	2002		Rafting groups saw 3 groups, 2 with youngs (pers. comm. to Pacheco & Silva e Silva, 2002. No further information.
Novo River, Tocantins	55 Km upstream of Velha Waterfall	10°17' S 46°53' W	9	Total	2002	<b>Pair + 7 sub-adults</b>	Observed by a filming team in September 2002 (pers. comm. to Pacheco & Silva e Silva, 2002. No further information.
Novo River, Tocantins	<b>Next to Mateiros</b>	10°17' S 46°53' W	1	Total	2002		Braz et al. (2003)
Unknown, Tocantins							Yamashita & Pineschi (1999, pers. comm., 2002)
Formoso River, Bahia		14°20' S 45°30' W	?	Nome	1990s		Yamashita & Pineschi (1999, pers. comm., 2000)
Formoso River, Bahia	Jaborandi	13°45' S 43°40' W	?	Nome	1990s		Yamashita & Pineschi (1999, pers. comm., 2000)
Pratudão River, Bahia		14°10' S 45°30' W	?	Nome	1990s		Yamashita & Pineschi (1999)
Arrojado River, Bahia		13°30' S 45°30' W	?	Nome			Yamashita & Pineschi (1999)
Itaguari River, Bahia		15°00' S 45°30' W	?	Nome			Yamashita & Pineschi (1999)
Grande River, Bahia	Barreiras	12°05' S 45°00' W	?	Nome			Yamashita & Pineschi (1999)
Grande River, Bahia	Sítio Grande	12°40' S 45°05' W	?	Nome			Yamashita & Pineschi (1999)
Corrente River, Bahia	Correntina	13°20' S 44°40' W	?	Nome			Yamashita & Pineschi (1999)
Corrente River, Bahia	Cocos	14°15' S 44°30' W	?	Nome			Yamashita & Pineschi (1999)
Paraná River, Goiás	Posse	14°15' S 46°20' W	?	Nome			Yamashita & Pineschi (1999)
Paraná River, Goiás	Laciara	14°10' S 46°40' W	?	Nome			Yamashita & Pineschi (1999)
Paraná River, Goiás	São Domingos	13°20' S 46°15' W	?	Nome			Yamashita & Pineschi (1999)



Locality	Sublocality	Latitude Longitude	Nº birds	Protection Status	Last Record	Comments	Source
Quente River, Goiás	17°40' S 48°50' W		1	None			Yamashita & Pineschi (1999, pers. comm. 2002), C. Yamashita in litt. to D. Capper (2000)
das Pedras River, Goiás	Nova Roma	13°51' S 46°57' W	1	None	1950	Tocantins River's tributary	Sick (1958), (cit. Collar et al., 1992)
Tocantins River, Goiás		14°00' S 48°00' W	1 1 1	Total	1953 1960 1972		Sick (1985), (cit. Collar et al., 1992) Sick (1985), (cit. Collar et al., 1992) Sick (1985), (cit. Collar et al., 1992)
Chapada dos Veadeiros NP, Goiás		14°05' S 47°42' W	2	Total	1987		Wege & Long (1995)
Preto River, Chapada dos Veadeiros NP, Goiás		14°05' S 47°42' W	2	Total	1987		Yamashita & Valle (1990) (cit. Collar et al., 1992)
Preto River, Chapada dos Veadeiros NP, Goiás		14°07' S 47°47' W	2	Total	2000	4 youngs	Leeuwenberg (pers. comm. 2001)
das Pedras River, next to Chapada dos Veadeiros NP, Goiás			3 2	Nome	2003 2004	One pair and one individual One pair	Bianchi et al. (2005)
São Miguel River, Chapada dos Veadeiros NP, Goiás		14°10' S 47°50' W	?	Total	1940		
Lajeado River Campo Alegre RPPN, Goiás			1	Partial	2005		Antas, pers. comm.
dos Couros River, Campo Alegre RPPN, Goiás		14°17' 745" S 47° 48' 477" W	2	Partial	2004 and 2005		Flores, in litt
Guardamor, Goiás		16°00' S 50°40' W	5			Collected	von Pelzeln (1868-71) (cit. Collar et al., 1992)
PN Emas, Goiás		18°10' S 53°00' W	2	Total		Single record in the park area	A. Whittaker in litt. 1992 (cit. Collar et al., 1992), Wege & Long (1995)
Salitre Brook, Minas Gerais		19°17' S 46°55' W	2	Nome	1973	Quebra-Anzol River's tributary, Serra Negra	G.T. de Mattos in litt. (1992) (cit. Collar et al., 1992)
das Velhas River, Minas Gerais		19°55' S 43°56' W			1819	São Francisco River's tributary	Stresemann (1954) (cit. Collar et al., 1992)
São João River, Minas Gerais		20°10' S 46°37' W	1	Nome	1980	Serra da Canastra NP's North Limit	J.M. Dietz in litt. 1986 (cit. Collar et al., 1992)
São Francisco River, Minas Gerais	Fazenda Boqueirão	20°15' S 46°40' W	7 2 7	Nome	1987 1989 1989	Next to Serra da Canastra NP	Pearman in litt., (cit. Collar et al., 1992) Pearman in litt., (cit. Collar et al., 1992) Pearman in litt., (cit. Collar et al., 1992)
Serra da Canastra NP, Minas Gerais and surroundings. In several watercourses, including the São Francisco River and many tributaries (São Francisco Basin), Araguari River	Several	20°15' S 46°40' W	5 4 2 9 3 4 4 2 16 10 8 9 4 3	Partial	1981 1983 1983 1984 1985 1990 1991 1993 1996 1997 1998 1999 2000	2 pairs 2 pairs 1 pair 3 pairs, 10 youngs 2 pairs, 6 youngs 2 pairs, 4 youngs 2 pairs, 5 youngs 1 pair, 2 youngs 1 pair, 1 youngs 4 pairs, 13 youngs 3 pairs, 1 adult male, 8 youngs 14 pairs and	Bartmann (1988) Bartmann (1988) Bartmann (1988) Bartmann (1988) Silveira (1998) Forrester in litt. to M. Owen (1991) Bruno & Bartmann (2003) Tobias et al. (1993) Silveira & Bartmann (2001) Silveira & Bartmann (2001) Silveira & Bartmann (2001) Silveira & Bartmann (2001) Silveira & Bartmann (2001)



Locality	Sublocality	Latitude Longitude	Nº birds	Protection Status	Last Record	Comments	Source
and Grande River's tributaries (Paraná Basin)			21 15 47 15 23 32 28 52		2001 2001 2002 2002 2003 2004 2004 2005 2005	19 youngs 3 pairs, 9 youngs 4 pairs, 15 youngs 7 pairs, 1 adult and 1 young 4 pairs, 1 adult, 19 youngs 10 pairs, 2 adults, 30 youngs	Work Group for Brazilian Merganser's Recovery, pers. comm. Bruno & Bartmann (2003) Bruno & Bartmann (2003) Lamas (in press) Bruno (2004) Bruno, pers. comm. Lins & Andrade (2004) and Terra Brasilis (unpubl.data) Bruno, pers. comm. Terra Brasilis (unpubl.data)
Itacolomi SP, Minas Gerais	Rio Doce	20° 25' 8,5" S 43° 30' 54" O	1	Total	2005	Individual disappeared few months after sighting	Cerqueira Junior et al. (2005)
Rio de Janeiro	Not specified	23°0' S 43°0' W	?	None	1816	Collected. Doubts about those birds being from RJ	Partridge (1956); Pacheco & da Fonseca (1999)
Paranapanema River, Paraná	Fazenda Caiuá, Salto Grande	22°54' S 49°59' W	1	None	1903	Collected	Partridge (1956); Pacheco & da Fonseca (1999)
Tibagi River, Paraná	Sertaneja	22°58' S 50°58' W	#	None	1995		Partridge (1956); Pinto (1938) (cit. Collar et al., 1992)
Tibagi River, Paraná	Rio Congonhas	22°59' S 50°59' W	4	None	1997	"species record"	Anjos et al. (1997)
Tibagi River, Paraná	Rio Congonhas	23°01' S 50°57' W	12	None	1998	3 youngs	Anjos (2003)
Tibagi River, Paraná		23°01' S 50°57' W	2	None	2001	One pair probably	Anjos (2003)
Tibagi River, Paraná	Congonhas River	23°21' S 50°56' W	8	None	1995		Anjos et al. (1997)
Ivaí River, Paraná	Salto da Ariranha	24°22' S 51°27' W	1	None	1922	Collected	Sztolcman (1926) (cit. Collar et al., 1992), Partridge (1956)
São Paulo	Not specified	24°0' S 46°0' W	?	None	1819		Stresemann (1954), Burmeister (1856) (cit. Collar et al., 1992)
Itararé River, São Paulo	Itararé	24°07' S 49°20' W	2	None	1920	Collected	Von Pelzeln (1868-1971) (cit. Collar et al., 1992)
Santa Catarina	Not specified	-	1	None	Pre-1871	Collected	Burmeister (1856) (cit. Collar et al., 1992)
Santa Catarina	Not specified	-	1	None	Pre-1887	Collected	
Itajaí River, Santa Catarina	Blumenau	Desconhecida	1	None	1827		Von Berlepsch (1873-1874) (cit. Collar et al., 1992)
Itajaí River, Santa Catarina	Taió	26°56' S 49°03' W	1	None	1827		Stresmann (1948), Sick et al. (1981) (cit. Collar et al., 1992)
Santa Catarina	Laguna	28°29' S 48°47' W	1	None	Pre-1887	Uncertain locality	Mertens & Steinbacher (1955) (cit. Collar et al., 1992)
<b>Paraguai (Cobertura: Baixa)</b>							
Paraná River Basin	Alto Paraná	27°00' S 55°50' W			1891		Bertoni (1901) (cit. Collar et al., 1992)
Carapá River, departament of Canindeyú	Immediately to upstream of Catueté	24°08' S 54°35' W	1		1984		Nancy López, pers. comm.

<sup>1</sup> **Covering: Good** = 67?100% of the key-localities probably identified; **Moderate** = 34?66% of the key-localities probably identified; **Low** = 0?33% of the key-localities probably identified. **2 Protection Status: Total** - all birds in protected areas, **Partial** - some birds in protected areas; **None** - none of the birds in protected areas.



## Feeding

They feed diving in search of fish (6-19cm of length) and aquatic macroinvertebrates (Figure 11). The foraging can occur as in rapids, as in backwaters (Partridge, 1956; Bartmann, 1988; Silveira & Bartmann 2001). The diving last approximately 15-20 seconds, in depths until 0,5m.

The preys described in Brazil include: Lambari (*Astyanax* spp. - Bartmann,

Vieira, pers. comm., 2002). These are considered the main alimentary items in this place, but there are also mentions on the consumption of flying insects (Lamas, pers. comm., 2002).

Bruno et al. (2006a) evidenced that the parents capture lambaris and when emerging, are surrounded by the youngs, delivering the fish to one of them, which, when receiving it, runs away from its siblings swimming very fast, being many times pursued by them. This study proved that the feeding of the youngs is done mainly by the parents. (Figure 12).

In Argentina, the birds consume lambaris (Characidae), ciclids, catfishes (Pimelodidae), virolite (*Parodon affinis*), Neuroptera's larvae (Dobson fly; *Corydalis* sp.) and probably clams (Partridge, 1956). It is believed that, as other mergansers, the youngs feed on macroinvertebrates (Bartmann, 1988).

Sávio Bruno, 2001 and 2006.



Fig. 11a – Feeding (a) *Mergus octosetaceus* pair searching for food (b) lambari (*Astyanax* spp.): Brazilian Merganser' basic food; in the detail, a Brazilian Merganser male searching for these fish.

1988; Silveira & Bartmann, 2001; and *A. bimacullatus* - Pineschi & Yamashita, 1999). In the Serra da Canastra National Park the most common fish with appropriate size are lambari (*A. scabripinnis* and *A. rivularis*) and barrigudinho (*Phalloceros caudimaculatus*) (E.

## Reproduction

There is few information available on the mating system, dispersion and movements of the Brazilian Merganser. Studies marking these birds have never been carried out.

Sávio Bruno

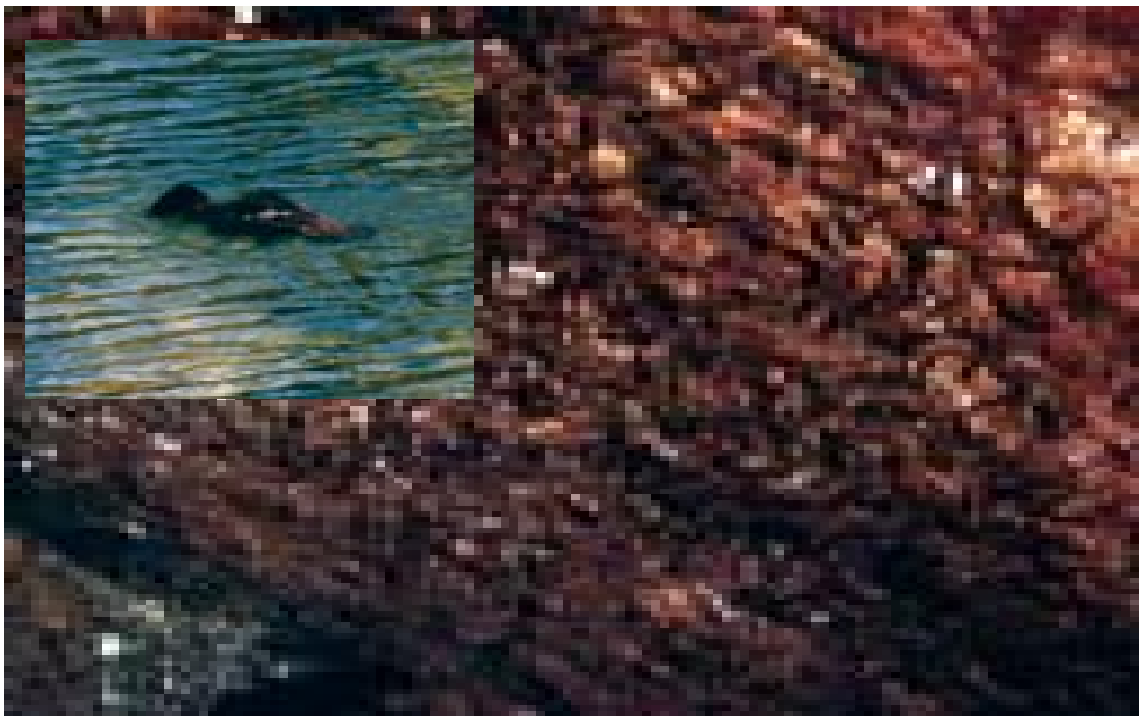


Fig. 11b





Initial comments suggest that the Brazilian Merganser forms pairs that last for their lifetime. The young can be in the same rivers that its parents, as the territorial "Blue Duck" similarly does (Williams, 1991), or can disperse to search for a new territory.

They are highly sedentary birds and although territorial disputes have been recorded, fights between pairs established in adjacent territories are rare (Silveira & Bartmann, 2001).

They nest in hollow of trees and holes in rocks. The nidification occurs mainly from June to October, the most common months for incubation are June/July as July/August are for the birth of the youngs (Partridge, 1956; Silveira & Bartmann, 2001; Bruno & Bartmann, 2003).

The copulation, during which the male mounts the female grasping its crest with the beak, can last for 15-25 seconds, notably longer than in other mergansers (Silveira & Bartmann, 2001). Only the female incubates, with one or two daily pauses in the incubation, that last from 60-90 min, spending most of the time foraging or smoothing the feathers (Partridge, 1956; Bruno et. al, 2006a, 2006b). While the female incubates, the male spend most of the time patrolling the river or resting in rocks adjacent to the nest (Figure 7, Appendix 4). In nests on the edge of calm waters, the male duck spend most of the time inside the river (Bruno et al., 2006b).

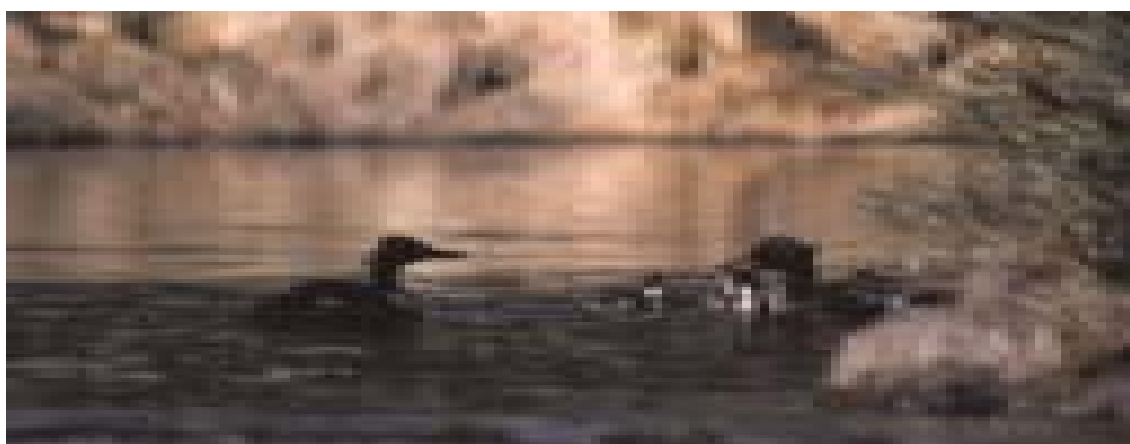
There is few information on the clutch size, however the average of youngs

in the Serra da Canastra between 1996 and 2000 was of 2.7 (varying from 2 to 4, n=10 hatches) (Silveira & Bartmann, 2001). Lamas (pers. comm.) observed from 1 - 6 young with its parents in the Serra da Canastra between 2001 and 2002, while Pacheco & Silva e Silva (2002) observed a pair of adults with four young in Tocantins. Adults have been observed with the maximum of eight youngs, carried in the back of the parents (Bartmann, 1988; Bruno & Bartmann, 2003).

The males provide extensive parental care, a unique behavior between the mergansers. Bruno et al. (2006c) researched the reproductive behavior in the Serra da Canastra between 2001 and 2005. Four pairs were monitored during this period, totalizing 64 youngs found, with average of 4 youngs per clutch, all from families who inhabit the São Francisco River.

There is no information regarding the age of the first reproduction, however is presumed that mature adults reproduce annually. The majority of the young is able to fly by the end of September, however they probably remain with the parents until December/January when the adults complete the molting (Figure 13).

In the Serra da Canastra, MG, on April 4th 2004, Bruno (pers. comm., 2006) recorded in the São Francisco River, a group of 5 Brazilian Megansers, which demonstrated narrow relation between its members. Considering the observation dates and the size of the animals, the author suggests that



Sávio Bruno.

Fig. 12 – *Mergus octosetaceus* female delivering a small fish directly into the beak of one young.



these individuals can be sub-adults separated from the parents. On February 8th 2005, in the same territory, a group composed by 9 individuals was registered by the author, which certainly was a pair and its seven youngs, from to the 2004 clutch. In the photo, the youngs, sub-adults, can be identified by the orange coloration in the beak commissure and adjacencies, while the adults present the face uniformly darkened. (Figures 13 and 14).

The registers of nests of the species are:

1. A nest in the hollow of *Peltophorum dubium*, in the state of Misiones, Argentina (Partridge, 1956), 25m from the ground. This locality is currently submerged by a dam (Chebez, pers.

comm., 2001). The cavity was 3m depth and with entrance measuring 15x35cm. The only material found in the nest was wooden chips.

2. A nest (with seven eggs) was found in a rock cavity, in the Serra da Canastra National Park, in 2002 (Lamas & Santos, 2004).
3. A nest in the Campo Alegre RPPN, the Dos Couros River (Antas, pers. comm.)
4. In 2005, two new nests were identified in the Serra da Canastra National Park. The first one in a tree hollow (Figure 13) next to the edge to the São Francisco River and the second one was in a crack on the scarps that border the same river (Bruno et al., 2006a) (Figure 15);

Sávio Bruno, 2005.

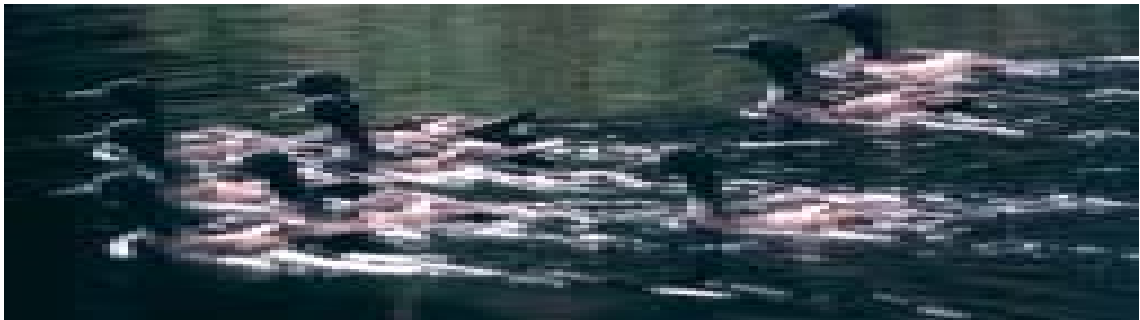


Fig. 13a

Sávio Bruno, 2005.

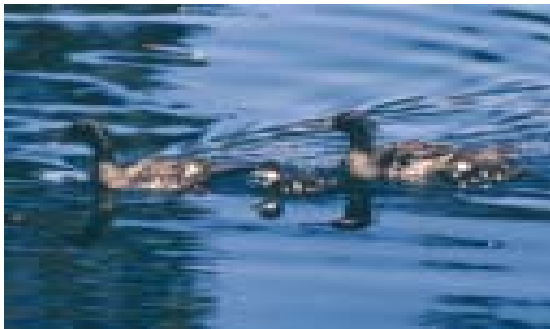


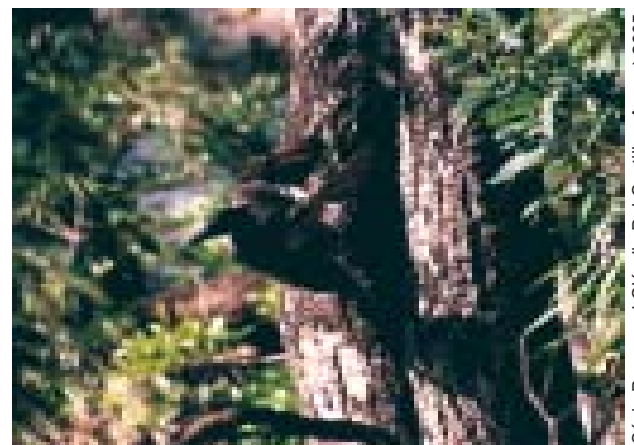
Fig. 13b

Fig. 13a – *Mergus octosetaceus* pairs in the Serra da Canastra National Park (a) pair followed by their offspring in February 2005. The subadults possess the beak commissure of clear tonality, while in the adults it is blackish. The adult female, of slightly smaller crest and less robust head, meets in the rear, with the male immediately in the front 13b pair followed by a young.

Sávio Bruno, 2004.



Fig. 14 – Five specimens, probably subadults separate from the parents, in April 2004.



Sávio Bruno and Cláudia Del Castilho, August 2005.

Fig.15 – *Mergus octosetaceus* female taking off when abandoning the nest in hollow tree.



these nests were monitored by the Sávio Bruno and the Instituto Terra Brasilis' teams, until the fledging of the youngs (Bruno et al. 2006b).

### Molting and development of the young

There is little information on the molting. In Argentina, Gai (1976) perceived that the adults presented molting in February, in Misiones. Benstead et al. (1993) observed only one male in molting in the Piray Miní River, in August 1993. As well in other mergansers, the molting is complete after the first reproduction, involving a period of 2 - 3 weeks, when the birds change the wings' plumage, making the flight harder. During this period few birds are observed, probably to its



Sávio Bruno, August 2005.

Fig. 16 – *Mergus octosetaceus* female about to leave the nest in a rock socket.

discrete behavior in this vulnerable situation (Silveira & Bartmann, 2001).

Figure 17 shows a young at the moment of fledging. The destination of the youngs when they abandon the parents is unknown (Silveira & Bartmann, 2001).



Sávio Bruno and Cláudia Del Castillo, August 2005.

Fig. 17 – Young of *Mergus octosetaceus* fledging.





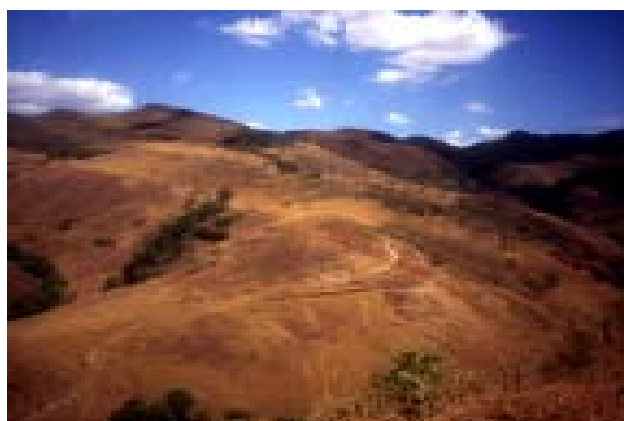
## Threats

A country-by-country compilation of the threats to the Brazilian Mergansers is given in Table 2. Each threat factor is assigned an importance rating on a five-point scale:

- Critical - a factor that could lead to the extinction of the species in 20 years or less;
- High - a factor that could lead to a decline of more than 20% of the population in 20 years or less;
- Medium - a factor that could lead to a decline of less than 20% of the population in 20 years or less;
- Low - a factor that only affects the species at a local level;
- Unknown - a factor that is likely to affect the species but it is not known to what extent.

### Habitat loss - importance: critical

Habitat loss, through deforestation of gallery forest alongside rivers, remains the key threat to the Brazilian Merganser (Figure 18). Clear felling has taken place for diamond mining (Serra da Canastra), agricultural expansion, human habitation, implementation of touristic facilities, cattle ranching, and for subsequent planting of *Pinus* spp. and eucalyptus (*Eucalyptus* spp.)



Sávio Bruno, April 2004

Fig. 18a and 18b Removal of a primary forest next to the São Francisco River (Serra da Canastra National Park) aiming at the pasture expansion.



Sávio Bruno, April 2004

Fig. 18b

Loss or reduction of the habitat quality is also critically related to the agro-pastoral models based in great monoactivist enterprises that destroy, transform and simplify food chains (Viana & Bruno, 2000); the lack or deficiency of basic sanitation especially in the marginal communities, destruction of the



draining net, areas of sand extraction, development of road system, mounts cutting, embankment, draining, deforestation for firewood, shore and vegetal coal attainment, increase of water and soil pollution with sewer and garbage (Figure 19), atmospheric and sonorous pollution by the vehicles traffic, also aerial, mainly of small size planes that fly over marginal areas (Bruno, 2004).

In Brazil, although Brazilian Mergansers have been recorded in six protected

By law, a certain width of forest has to be left bordering watercourses, but there is no enforcement of this. In recent years, a switch from cattle ranching to soy bean production has resulted in trees being cut to maximize the area under soy bean. Thus even the last remnants of gallery forest are now disappearing.

In Argentina, deforestation is continuing in Misiones state, Privately the cutting and burning of forest, specially by illegal immigrants from Brazil. Such habitat loss and accompanying reduction in water quality has been a major cause of the Brazilian Merganser's decline in Argentina (Johnson & Chebez, 1985; Chebez, 1994; Bosso & Gil, 2000).

Sávio Bruno, São Francisco River, October, 2003.



Fig. 19 – Presence of plastic garbage, signaling a slow but gradual process of environmental degradation.

areas (see Section 2.3), the numbers of birds counted are small and other populations may exist on unprotected rivers threatened by deforestation (Silveira & Bartmann, 2001; Pineschi & Yamashita, 1999, 2000; Lamas in press).

Habitat loss in Paraguay has been extensive. A recent study of land cover change in eastern Paraguay (Alstatt et al., 2003) showed that forest cover declined at an alarming rate during the 1990s. Analysis of satellite images from the beginning of the decade (1989-1991) found that around 32% of the region (45,018km<sup>2</sup> of a total study area of 140,235km<sup>2</sup>) was covered by forest. By the end of the decade (1999-2001), however, forest cover had declined to 31,463km<sup>2</sup> - a loss of 13,555km<sup>2</sup> (or around 30%) in ten years. The remaining forest continues to be cleared at a rate of 700-900km<sup>2</sup> per year (Guyra Paraguay unpub. data). Formerly in Paraguay, despite surrounding forest being cleared, gallery/riverine forest was often left standing, primarily to provide shade for cattle.

### Habitat degradation - importance: critical

The expansionist trend in Brazil aiming at the increase of the agricultural borders, based in low sustainability models, has been along the last decades, primordial concerning factor front to the generalized biodiversity loss, especially in the "cerrado" (Figure 24). This context opposes the social-environmental models adequate to the distinct realities (Bruno, 2004).

Habitat degradation through siltation of rivers may have been a major cause of the Brazilian Merganser's decline. Direct short-term effects of siltation include:

- fish kills, as sediment affects their respiration;
- reduction of the underwater visibility causing ducks to have to dive more to search for preys. The small number of birds' observations in muddy rivers in the Serra da Canastra suggests that these animals can look for smaller tributaries, where the clarity of the water allows foraging (Silveira & Bartmann, 2001). The waters turbidity is due, to a large extent, to erosive processes (Bruno, 2004).

Indirect longer term effects involve habitat changes, such as changes in stream



substrate reducing the availability of cavities for fish and the availability of macroinvertebrate food; degradation of fish spawning substrates and increased turbidity affecting the light available to aquatic plants. Poorer plant growth could affect food available to fish, but more importantly will reduce cover for them.

Siltation caused by diamond mining (Figure 20) has posed a significant threat to Brazilian Mergansers near Serra da Canastra National Park in Brazil (Silveira & Bartmann, 2001). Between 1970 and 1996, diamond mining, first by individual prospectors and then by organized commercial companies, led to massive habitat destruction and siltation (both directly from diamond washing and indirectly from subsequent run off from deforested areas). Commercial diamond extraction was banned in 1996 after the former Brazilian president, Fernando Henrique Cardoso, visited Serra da Canastra,

but there are on-going threats from new mining enterprises in the area. There are records of prospectors using "pipes", which are partial shunting lines of the river that makes the water pass through a metallic structure with steps that hold back the diamond (Figure 21).

In both the Serra da Canastra National Park and the Jalapão State Park, the increasing use of 4x4 vehicles is causing erosion (Figure 22) that is silting water courses and affecting riverine forest (Braz et al., 2003; Bruno, pers. comm., 2003; Lamas, in press).

Bruno (pers. comm., 2005) adds that the São Francisco River, when receiving its tributaries from areas where there are agropastoral activities and roads, loses its water quality, becoming more turbid (Figure 23).

The selective logging of wooden species for furniture production and civil construction results in the reduction of the habitat quality.

Sávio Bruno, 1994.

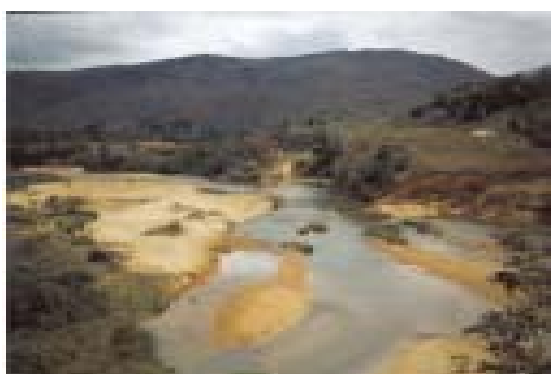


Fig. 20a

Fig. 20a and 20b – Mining impact in the São Francisco River: Until 1996, mining companies with pumps and other heavy machines caused severe hydrological and geological changes in riverbed.

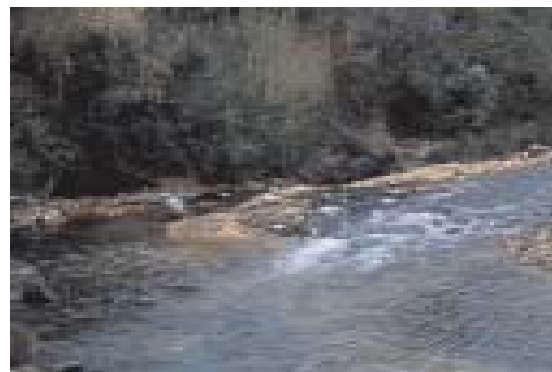


Fig. 21 – Illegal diamonds' mining claim, with the use of "pipes".

Photo Sávio Bruno. Surroundings of the Serra da Canastra National Park, October 2003.

Wolf Bartmann, sem data definida, antes de 1996.



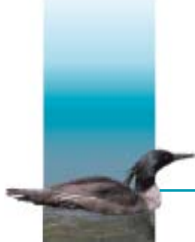
Fig. 20b



Fig. 22 – Erosive process caused by vehicles used in sport activities.

Sávio Bruno, 2006.





The soil's misuse by inadequate agro-pastoral techniques causes its sediments to be carried and consequent turbidity of waters. The main techniques are deforestation, extreme plowing and harrowing, as well as the high rates of pastures' capacity (Bruno et al., 2005; Lamas, in press). The presence of roads or its construction also contributes for the aggravation of the soil loss and siltation of rivers, as well as deficiencies in the urban planning and consequent disordered growth of villages and cities added with vigorous population growth (Bruno, 2004).

was flooded by the Itaipú Dam were as high as 2m or more. Now, the transparency is often as low as 0.5m (Hermosa, 1999). In the Itaipú Dam, shore erosion rates are as high as 13m<sup>3</sup>/m per year (Acha Navarro, 1999). Sediment loads within the watershed of the Monday River, on which the Brazilian Merganser probably occurred in the past, have been estimated at 24.14 tonnes/month in the Ybuí stream (AlterVida, 2000a) and 209.19 tonnes/month in the Alegre stream (AlterVida, 2000b). The result is that both watersheds, and in particular the Alegre, are increasingly silting-up (Facetti, 2002).

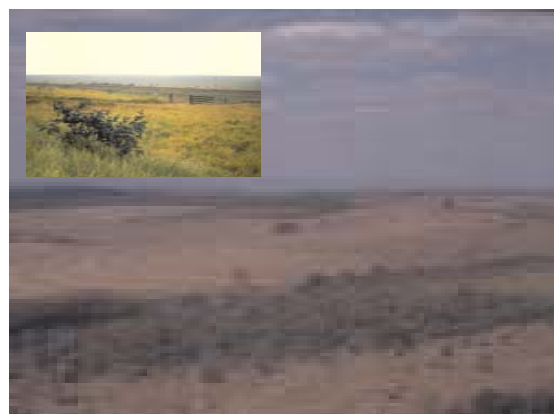
Sávio Bruno, January 2006.



Fig. 23 – In the Serra da Canastra National Park, the São Francisco River, when receiving the waters from the streams Luciano and Cachoeirinha suffers to significant impact due to the soil sediments dragged.

Siltation of rivers is also thought to have been a major cause of the Brazilian Merganser's decline in Argentina (Hearn, 1994). Most rivers in Misiones had very high sediment loadings during the 1970s. This was especially apparent during the rainy season when rivers changed to a reddish coloration due to increased silt levels. The Iguazú River in Argentina, a previous site for Brazilian Merganser, was noticeably affected during the clearance of forest from its upper reaches in Brazil. Nevertheless, water quality in many Misiones Rivers and tributaries is comparable to that in rivers used by the species in Brazil (Bosso & Gil, 2000).

In Paraguay, all rivers within the Paraná drainage carry heavy sediment loads resulting from extensive soil erosion as a result of deforestation. Historically, transparency in tributaries of the Paraná River in the area that



Sávio Bruno, Minas Gerais' "cerrado", August 2001; in detail, 1993.

Fig 24 – The advance of areas destined to agriculture and extensive cattle (detail) in the "cerrado", compromising many times, even areas next to the rivers, in detriment of the native vegetation.

### Hydrological changes - importance: critical

Dam building poses a significant and irreversible threat to Brazilian Mergansers through direct destruction of habitat and through the ecological and hydrological change of remaining watersheds (Lamas, in press). Dam construction has resulted in significant habitat loss in all three merganser range countries. The Itaipú, Acaray and Yacyreta dams in Paraguay flooded areas of around 1,350km<sup>2</sup> (split between Paraguay and Brazil), around 300km<sup>2</sup> (in Paraguay) and about 1,600km<sup>2</sup> (between Paraguay and Argentina). The planned Corpus Dam on the Paraná River would flood between 16,500 and 57,500Ha of potential Merganser habitat in





Argentina and Paraguay. In Argentina, one third of the Urugua-í River, a site with records of Brazilian Mergansers, was flooded by the Urugua-í Dam in 1990 which could have devastated the remaining merganser population (Johnson & Chebez, 1985). There are also plans to try to maintain the water level in the Urugua-í at the highest possible level. In Brazil, there are plans for large scale dam projects on the Tibagi River, Paraná state, the only extant site in the Brazilian Atlantic Forest where the Brazilian Merganser has been recorded recently (Anjos et al., 1997). Dams, both large and small, are proposed throughout the Brazilian Mergansers' known and suspected range throughout Brazil.

The change of lotic environment into lentic is considered a great and important threat in all the places of occurrence (Rigueira, pers. comm. 2006).

In the cycle of "Debates on the São Francisco River's Revitalization and Transposition" promoted by the Legislative Body of Minas Gerais in October 2003. Alencar<sup>1</sup>, 2003 (apud Bruno, 2004) when dealing with the recovery of that river, affirms to be necessary to go up to its springs to evidence the real, global and serious situation, effectively verifying the degradation of its watershed. The author calls the attention on water tables situation upstream of all the tributaries of its basin, alerting that this outflow has diminished.

### Environmental disturbances importance: high

The Brazilian Merganser's sedentary habits combined with its habitat specificity make it specially susceptible to environmental disturbances. Development of touristy activities like rafting, canoeing and buoy-cross and other forms of river transport presents potential threats, considering that these activities are known to cause increased duckling mortality in other mergansers, such

as the globally threatened Scaly-sided Merganser *Mergus merganser* (Surmach & Zaykin, 1994).



Sávio Bruno.

Fig. 25 – Proven territory areas of the Brazilian Merganser in the Serra da Canastra National Park suffer the impact from tourist activities. Photo: Sávio Bruno.

Disturbance from other touristy activities may also have a negative impact. For example, at Serra da Canastra some pairs of Brazilian Merganser use areas visited by a large and increasing number of tourists (Silveira & Bartmann, 2001; Lamas, in press) (Figure 25). It is important to stand out that rappel's practice can be very impacting, considering that the species, in its reproductive period, uses cracks in rocks close to the river (Bruno, pers. comm., 2005).

Disturbance from anglers has been recorded in Argentina, but at current levels is thought to only pose a local threat (Bosso & Gil 2000). Incorporating measures to mitigate disturbance into the management plan for the Urugua-í Provincial Park could prevent the Brazilian Merganser's extinction there (Chebez, pers. comm., 2001).

In the Jalapão State Park, the mergansers may be at risk from intensive ecotourism, including rafting and large numbers of people bathing in waterfalls and rapids used by the species. Rafting along the Novo River is quickly becoming one of the hottest ecotourism activities in Brazil and may negatively affect the mergansers. The buoy-cross' practice also deserves some attention (Bruno, pers. comm., 2005)

<sup>1</sup>Alencar, J. 2003. Velho Chico. Jornal do Brasil, Rio de Janeiro, 8 nov. Supl. JB Ecológico, p. 28.



Next to the Campo Alegre RPPN, Goiás state, periodically occurs parties in the neighborhoods of the Couros River, that concentrate up to five thousand people, what can represent an extremely relevant disturbance for the species.

### Fire - importance: high/ unknown

Fire is considered to be an important natural ecological factor in "cerrado" ecosystems (Coutinho, 1982). It has been estimated that each area of "cerrado" in long-settled regions is burned once every two years. This usually occurs naturally during the colder and drier months from May to September. Fires can be widespread during these months throughout the "cerrado". However, frequent and prolonged fires can destroy and degrade environments (Figure 26).

In 1991, for example, a prolonged drought contributed to the reported burning of one percent of the state of Mato Grosso. In 1994, it were burned 70% of Brasilia National Park, all of Emas National Park and all of the Araguaia National Park.

In recent years, however, it has become increasingly common for fires to be started deliberately by local farmers to permanently deforest areas and convert them to agricultural land, particularly on the range of *M. octosetaceus* in the three countries. In recent years, forest fires have seriously affected the main Brazilian Merganser sites in Brazil.

Sávio Bruno, setembro de 2003.



Fig. 26a – Fire in the region of the Serra da Canastra National Park.



Sávio Bruno, Setembro 2004.

26b – teams trained to fight fire.

In 2002, fires burnt 38,000ha of Serra da Canastra National Park, including areas used by mergansers. Following surveys in Tocantins state, Brazil, in August 2002, which located one pair of Brazilian Mergansers, a forest fire devastated the area (Goerck, pers. comm., 2002).

In 2003, forest fires affected the three most important Brazilian Merganser sites in Brazil. In the Chapada dos Veadeiros National Park, Goiás state, fires affected about half of the 66,000ha park (Global Fire Monitoring Center Website, 2003). In many cases local ranchers seeking to clear pasture near the parks' borders started the fires, and the fire spread out because of strong winds. In neighboring Tocantins state, fires claimed 70% of the Jalapão State Park.

In Minas Gerais state, fires spread over 15,000ha of Serra da Canastra National Park, including areas notoriously used by mergansers (Goerck, pers. comm., 2003; Riguera & Lins, pers. comm., 2003; Bruno, pers. comm., 2003). The impacts caused in these areas affected the ciliar forest of the São Francisco River in the upper part of the Park. Soon after the fire, a local evaluation with photographic registers of those 14km to the Casca D'Anta waterfall was carried out. It was observed that fire has the capacity to also affect the other edge of the river, when in high flares. Considering that the species incubate the eggs in near trees or scarps of the river, the fire action is justified and reaffirmed, especially when reaching ciliar forests, as a high importance factor (Bruno, pers. comm., 2005) (Figure 27).



### Inbreeding - importance: low/unknown

Remaining potentially suitable habitat in Brazil, Paraguay and Argentina is now so isolated that little or no interchange probably takes place between populations. According to Yamashita (pers. comm., 2006),

since this is an old species, of an old group, related to the geomorphological and not to phytogeographical environment, the occupation of the occurrence areas would probably been by metapopulations since the Pliocene/Pleistocene, and usually by isolated populations, therefore, there was always low variability. If inbreeding was a limiting factor, the species would probably not exist today.



Sávio Bruno, October 2003.

Fig. 27 – Impact caused by the fire in the edges of the São Francisco River in the Serra da Canastra National Park.

### Hunting - importance: medium/unknown

The Brazilian Merganser's extremely small population and sedentary habits suggest that the effects of hunting could be catastrophic. However, hunting is not thought to be a major threat to Brazilian Mergansers in Brazil, considering that due its small size and secretive habits, this species is not under hunting pressure. (Silveira & Bartmann, 2001).

Local people at Serra da Canastra suggest that hunting for this species was common decades ago, but it has now ceased (Lamas, in press). The hunting of *M. octosetaceus* in Brazil was described by Ihering<sup>2</sup>, 1968 (apud Bruno, 2004): "... in such

a way that it feeds almost exclusively on fish, giving to its meat the characteristic fish-eating flavor". In detriment of the legal questions, in 2005, during field research in the Serra da Canastra, an inhabitant of the São Francisco margins reported a capture of one Brazilian Merganser by children. According to the inhabitant, the duck would be eaten, however, it was released after traded for a domestic bird. Hunting traps with maize or sweet potato have been observed along the São Francisco River, indicating that, even with the Brazilian Merganser not being the biggest object of hunters' desire, the hunting practice is however a reality to be fought (Bruno, pers. comm., 2005) (Figure 28).

In the Jalapão State Park, there is a very limited control and it is not certain if mergansers are hunted there (Braz et al., 2003). In Argentina, subsistence hunting

<sup>2</sup>Ihering, R. von. 1968. *Dicionário dos Animais do Brasil*. São Paulo: University of Brasília. 790 p.



probably poses an ongoing low-level threat, Privately considering the growing number of immigrants entering the state (Johnson & Chebez, 1985; Chebez, 1994; Hearn, 1994; Bosso & Gil, 2000).

Sávio Bruno, 2001 and 2006.



Fig. 28a – Examples of hunting in the edges of the São Francisco River in the Serra da Canastra National Park:

Sávio Bruno, 2001 and 2006.



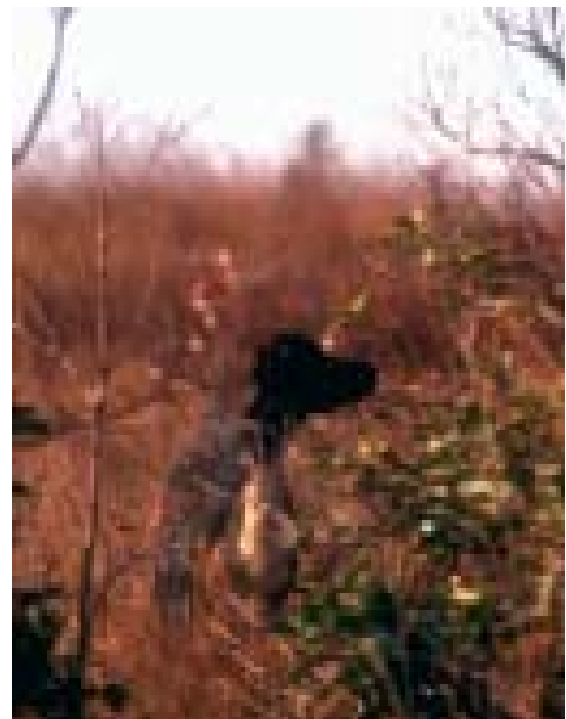
Fig. 28b – traps with maize and other cereals fattening.

### Predation - importance: medium/unknown

Giai (1951) and Partridge (1956) have suggested that the Black & White Crested Eagle (*Spizastur melanoleucus*) and Ornate Hawk-eagle (*Spizaetus ornatus*) may prey on Brazilian Mergansers, while Bruno & Carvalho (2006) indicate Harris' Hawk (*Parabuteo unicinctus*) and Black chested Buzzard- Eagle (*Geranoaetus melanoleucus*) as potential predators of adult animals and Buteo sp. and Acciper sp. as threats to the youngs.

Domestic dogs are potential predators of young mergansers in Serra da Canastra National Park (Lamas, in press). These dogs can eventually live in the wild, increasing the predation risks (Bruno, pers. comm., 2005). There are other dogs that can also be Brazilian meganser's predator, like crab-eating Zorro (*Cerdocyon thous*) and the Manned Wolf (*Chrysocyon brachyurus*), that include birds in its diet (Bruno, 2004).

Bartmann (1988), noticed the presence of Otters *Lontra longicaudis* within Brazilian Merganser territories, suggesting that they may be predators of ducklings. According to Bruno & Carvalho (2006), other mustelids like Tayra (*Eira barbara*), the little grison (*Galictis cuja*) and procyonids like coati (*Nasua nasua*) and the racoon (*Procyon cancrivorus*) are also capable to predate. Bruno (2004) points out that the felines in the Serra da Canastra National Park include birds and eggs in its diet, to name them, little spotted cat (*Leopardus tigrinus*) and margay (*Leopardus wiedii*), besides other mammals as white-eared opossum (*Didelphis albiventris*) and collared anteater (*Tamandua tetradactyla*).



Sávio Bruno, September 2004.

Fig. 29 – Domestic dog freely living in the Serra da Canastra National Park.



Regarding the reptiles, the author includes tegu lizard (*Tupinambis merianae*) not discarding serpents as rattlesnakes (*Crotalus durissus*), boas (*Boa constrictor*) and Tropical rat snake (*Spilotes pullatus*) in the list of eggs or young's potential predators.

The impact of such predation is unlikely to have significant impacts in healthy populations, but in the case of the Brazilian Merganser, with such a small population, even low levels of predation may cause population decline.

### Introduction of exotic fishes - importance: medium/unknown

Most artificial reservoirs in Brazil formed by hydroelectric dams have been stocked with exotic predatory fish, including North American Blackbass (*Micropterus salmoides*), Tucunaré (*Cichla* spp.), and herbivorous fishes like Tilapia. The number of private properties building small reservoirs or tanks and stocking them with exotic fish has boomed in Brazil, including Minas Gerais state. Most such species have spread their ranges and may colonize mergansers' habitat, disrupting the small fish and arthropod communities that the mergansers rely on (Lamas, in press). Exotic predatory fish are thought to have caused the local extinction of small fish elsewhere, and were one of the factors in the extinction of the Atitlan Grebe (*Podiceps giganteus*) and the decline of other grebes and ducks.

### Competition - importance: low/unknown

It is possible that competition with other species can reduce the reproductive success of the Brazilian Merganser.

The competition for food would be with the Darter (*Anhinga anhinga*), or Brazilian Cormorant (*P. brasiliensis*), and the competition for nest sites would be with other

hole-nesting species, such as Muscovy Duck (*Cairina moschata*), toucans (*Ramphastos dicolorus* and *R. toco*), parrots (e.g. *Pionus maximiliani*) or mammals like white-eared opossum (*Didelphis albiventris*), Tayra and racoons (Benstead et al., 1993; Silveira & Bartmann, 2001; Bruno & Carvalho, 2006). The magnitude of such effects is unknown.

Bruno recorded in 2003, 2004 and 2006 the presence of Neotropic cormorant (*Phalacrocorax olivaceus*) in the São Francisco River, diving and resting on rocks, in territory pertaining to a Brazilian Mergansers family, next São José do Barrreiro, MG. (Figure 30).

This researcher also observed, in the same river, Muscovy Duck in the lower parts of the river, as well as pilled-billed grebe (*Podilymbus podiceps*) and least grebe (*Podiceps dominicus*) in the higher part of the Serra da Canastra National Park. All, according Sick to(1997), include fish in its diet. Bruno & Carvalho (2006) also add great kiskadees, kingfishers and almost all components of the Ardeidae and Anatidae families as interespecific competitors of *M. octosetaceus*, because they also include small fish in its diet.



Fig. 30 – Neotropic cormorant (*Phalacrocorax olivaceus*) in the territory of a Brazilian Merganser family in the Serra da Canastra National Park.





### Pollution - importance: low/unknown

Expanding of the human occupation and subsequent pollution (e.g. from domestic and industrial waste) may pose an increasing threat to Brazilian Mergansers. For example, on the Rio São Francisco downstream of Serra da Canastra National Park, the absence of Brazilian Mergansers below the village of Vargem Bonita is thought to be partly due to pollution from the village (Silveira, 1998), however there are records of the species in this place in 2005 (Rigueira, pers. comm., 2006). Considering that Vargem Bonita is the first city bathed by the São Francisco River, further studies about this issue are required. Figure 31 presents an example of contamination of waters in the São Francisco River.

### Direct exploitation - importance: low/unknown

Between 1947 and 1960, Partridge and colleagues collected 21 Brazilian Mergansers from the Arroyo Urugua-í in northeast Argentina (Partridge 1956). Although

collection of museum specimens is not thought to be an ongoing threat to the species, such levels of exploitation may have played a major part in the Brazilian Mergansers decline (Bosso & Gil, 2000). In the last twenty years, it is possible that Brazilian Mergansers have been trapped in Argentina for export to bird collections.

### Egg-collecting/ capture of young - importance: low/unknown

Egg collecting and the trapping of young, either for food for local people or for bird traffic is a potential threat to the Brazilian Merganser, although such activities are thought to be extremely rare or currently even non-existent.

### Pesticides (indirect effect) - importance: low/unknown

Increased pesticide use associated with expanding agriculture may pose a threat to Brazilian Mergansers. Low levels of pesticides have been found in the Iguazú River (Bosso & Gil, 2000), although the impact of this factor on the species remains unknown. Construction of the Itaipú and Yacyretá Dams in Paraguay have led to huge fish kills due to the release of phenol from the decomposition of the flooded biomass (specifically, lignin) and/or from herbicides present in the areas flooded (Enaprena, 1995). Very high levels of toxic substances, such as certain chlorides, insecticides in general and heavy metals (lead, chromium, mercury) have been documented in a number of tributaries ever since 1984 (Enaprena, 1995).

The levels of agrochemicals within the watershed of the Monday River are also high. For example, AlterVida (2000a) reported a total of 30 agrochemicals being used within the Ybuí micro-watershed (of 5461ha) within any one year, with a total application of 2,357 litres. An analysis of

Sávio Bruno, October 2003.



Fig. 31 – Water contamination by the decomposition of carcasses of domestic animals (bovine) at open sky - São Francisco River, surroundings of the Serra da Canastra National Park.



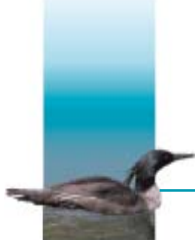
pesticides in water and bottom sediments of the Itaipú dam, conducted during 1990-1998 and reported in Facetti (2002), found Aldrin in 53% of the samples, with 26% of the samples exceeding recommended levels; 27% of the samples contained DDT, with 18% exceeding recommended levels. The most common pesticide was Heptachlor, found in 69% of the samples, and exceeding recommended levels in 12% of the samples. According to Facetti (2002), the departments of Itapúa and Alto Paraná account for 52% of all the pesticides used in Paraguay.

Analyses conducted by the national water authority in the lower Monday watershed have detected the presence of prohibited organochloride pesticides (Facetti, 2002).

In the region of the Serra da Canastra the use of agrochemicals in the phytosanitary control and treatment of coffee plantations has been a constant, there are recent occurrences of serious cases of human poisoning in São Roque de Minas. Therefore, these products are incorporated as into the hydrological environment as into the river that drains the hydrographical watershed (Bruno, pers. comm., 2005).

**Table 2.** Threats to the Brazilian Merganser in the country of occurrence.

THREAT	ARGENTINA	BRAZIL	PARAGUAY
<b>HABITAT LOSS</b>		<b>OVERALL - CRITICAL</b>	
Clear-felling			
- Agricultural Expansion	Critical	Critical	Critical
- Cattle Ranching	High	Critical	-
- Pine Plantations	Critical	Low	High
- Human Habitation	High	High	Critical
- Hotel Construction	-	High	-
- Tourism Facilities	-	Low	-
Selective Logging			
- Furniture	Medium	Low	-
- Fences and Buildings	Medium	High	High
- Honey Collection	Low	Unknown	Medium
- Firewood	-	High	-
- Coal Production	-	High	-
<b>HABITAT DEGRADATION</b>		<b>OVERALL - CRITICAL</b>	
Siltation			
- Diamond Mining	N/A	Critical	-
- Human Habitation	Critical	High	Critical
<b>HYDROLOGICAL CHANGE</b>		<b>OVERALL - CRITICAL</b>	
Dam Building	Critical	Critical	Critical
<b>DISTURBANCE</b>		<b>OVERALL - HIGH</b>	
- Ecotourism	Medium	High	-
- Rafting	Medium	High	-
- Angling	Low	Low	-



THREAT	ARGENTINA	BRAZIL	PARAGUAY
<b>HABITAT LOSS</b>	<b>OVERALL - CRITICAL</b>		
<b>FOREST FIRES</b>	<b>OVERALL - HIGH/UNKNOWN</b>		
	Critical/Unknown	Critical/Unknown	Critical/Unknown
<b>INBREEDING</b>	<b>OVERALL - HIGH/UNKNOWN</b>		
	Low/unknown	Low/unknown	Low/unknown
<b>HUNTING</b>	<b>OVERALL - MEDIUM/UNKNOWN</b>		
	Medium	Low/unknown	Low/unknown
<b>PREDATION</b>	<b>OVERALL - MEDIUM/UNKNOWN</b>		
	Low/unknown	Medium/unknown	Low/unknown
<b>INTRODUCTION OF EXOTIC FISHES</b>	<b>OVERALL - MEDIUM/UNKNOWN</b>		
	N/A	Medium/unknown	N/A
<b>COMPETITION</b>	<b>OVERALL - LOW/UNKNOWN</b>		
	For Food	Low/unknown	Low/unknown
	For Nest Sites	High/unknown	Low/unknown
		Low/unknown	Low/unknown
<b>POLLUTION</b>	<b>OVERALL - LOW/UNKNOWN</b>		
Domestic and Industrial Waste	Low	Low/unknown	-
<b>DIRECT EXPLOITATION</b>	<b>OVERALL - LOW/UNKNOWN</b>		
Specimen Collection for Museums	Low/unknown	Low/unknown	Low/unknown
<b>EGG-COLLECTING/TAKING OF YOUNG</b>	<b>OVERALL - LOW/UNKNOWN</b>		
Collection by Aviculturists	Low/unknown	Low/unknown	Low/unknown
<b>PESTICIDES (INDIRECT EFFECT)</b>	<b>OVERALL - LOW/UNKNOWN</b>		
	Low/unknown	Low/unknown	High





## Status

The Brazilian Merganser is legally protected throughout its range. In Brazil, the species is known to occur in six Conservation Units: Serra da Canastra National Park, Chapada dos Veadeiros National Park, Emas National Park, Jalapão State Park, Itacolomi State Park and Camplo Alegre RPPN, but the populations from Paraná and Bahia (if extant) occur on as yet unprotected sites.

In Argentina, there have been records of Brazilian Merganser from three protected areas: the Iguazú National Park, Parque Provincial Urugua-í and Private Reserve Urugua-í (Antas, 1996; Chebez, 1994; Chebez et al., 1998). Further surveys throughout the species range are necessary to determine the current status of Brazilian Merganser.

Despite the extreme threat situation of this species, there has been relatively little conservation action towards its protection. Status reviews have been conducted at a global level (Collar et al., 1992; Antas, 1996; BirdLife International, 2000) and at a national level in Argentina (Johnson & Chebez, 1985; Chebez, 1994; Bosso & Gil, 2000), and Brazil (Pineschi & Yamashita, 1999, 2000). Surveys have been conducted in all three range states (e.g. Benstead et al., 1993; Anjos et al., 1997; Silveira, 1998; Pacheco & Silva e Silva, 2002; Olmos & Silva e Silva, 2003; Hayes & Granizo, 1990; Braz et al., 2003). Basic studies of ecology, behaviour and distribution have been conducted in Argentina (Partridge, 1956), and around Serra da Canastra National Park in Brazil (Bartmann, 1988; Silveira & Bartmann, 1996; Silveira & Bartmann, 2001; Lamas, in

press; Lamas & Santos, 2004; Bruno & Bartmann, 2003; Bruno 2004).

The first International Workshop for the Conservation of the Brazilian Merganser was convened in Brazil in September 2000, hosted by Ibama a workshop at the Serra da Canastra National Park, Minas Gerais state. Ten experts from all three Brazilian Merganser range countries (Argentina, Brazil, and Paraguay), Europe and the United States attended the workshop (Brazilian Merganser Recovery Team, 2001). On 29 October 2002, the second meeting of the Brazilian Merganser Recovery Team was convened by Ibama in Brasilia. The meeting aimed to review the current status and conservation of the species, finalize the text the action plan and discuss its publication details, agree on the 2003-2005 work programme and identify priority projects for subsequent fund-raising action, agree on membership and means of operation of the Brazilian Merganser Recovery Team. The meeting was attended by 19 people, including representatives from three NGOs (BirdLife International - Brazil Program, Conservation International, and Terra Brasilis), five Brazilian universities (University of Brasilia, University of São Paulo, Federal Rural University of Rio de Janeiro, Federal University of the Rio de Janeiro State, Federal Fluminense University, State University of Londrina), and a multi-disciplinary team from Ibama.

In order to facilitate information exchange between Brazilian Merganser conservationists, a Brazilian Merganser e-mail list server has been established by the IUCN-SSC/Wetlands International Threatened Waterfowl



Specialist Group (mergus@wwt.org.uk). The list server currently has 41 members, four from Argentina, 25 from Brazil, three from Paraguay, six from the UK and three from the USA.

## Argentina

### Current status

The Brazilian Merganser (Pato Serrucho or Mbigua-í, in Guarani) is a species considered as Critically Endangered at national level (Fucema et al., 1997) and one of the most threatened birds of Argentina.

Mainly distributed along the tributaries of the Paraná River in the gallery forest of Misiones province, the records from the Uruguay River Basin have not been confirmed and are considered doubtful. Towards the middle of the 20th century, the rivers of the northern half of Misiones probably held the most important and best conserved Brazilian Merganser populations, specially the Urugua-í River. Today, only the headwaters of the Paraná River and the "Green Corridor Conservation Area" (ca. 1,200,000ha) may hold small relict populations.

Despite the species occurring in three protected areas in the country (Iguazú National Park, Urugua-í Provincial Park and Urugua-í Private Reserve) there are few recent registers records. The species was recently observed in the Urugua-í Provincial Park, in the Uruzú and La Playita Rivers (Baldo and Arzamendia, pers. comm. 2002). Such record confirms the presence of this species in Argentina's Atlantic Forest.

Some researchers still believe that a population of considerable size can exist in the extensive hydrographic system of Misiones (Giraudo and Povedano, 2004)

### Population trend

The Brazilian Merganser population in Argentina has declined markedly. The species was first recorded in the early 20th Century although it undoubtedly occurred in Argentina prior to this. Around the 1950s, it was regularly encountered on clear water

rivers when numerous specimens were collected for museum collections, and a number of internationally important studies conducted (Giai, 1951, 1976; Partridge, 1956). In the 1960s and 1970s, a lack of interest in the species resulted in an absence of records. Attempts were made to locate the merganser in 1980, 1983 and 1985. In the latter year, Johnson & Chebez (1985) observed Brazilian Mergansers in the Urugua-í River Basin. Following the construction of the Urugua-í Dam, a number of searches failed to locate any mergansers (Benstead et al., 1993; Bosso & Gil, 2000) despite much of the river basin now being protected in a Provincial Park and a Private Reserve. The same thing has happened on the Iguazú River and its tributaries. Despite the creation of a National Park, and regular visits by park guards and naturalists, no mergansers have been found during the 1990s (Johnson & Chebez, op. cit.; Saibene et al., 1996; Chebez et al., 1998). Searches of sites with historical merganser records and of possibly suitable habitat failed to locate any birds. The last two confirmed sightings of the Brazilian Merganser in Argentina were of single birds on the Arroyo Piray Miní in 1993 (Benstead et al., 1993; Bosso & Gil, 2000) and on the Uruzú River in the Urugua-í basin in May 2002 (Jorge Baldo, pers. comm.).

### Species protection

The species is protected by National Law Nº 22421, National Decree Nº 666/97 and Resolution SAGyP Nº 144/83. It is officially recognized as "In Danger" and was declared a "Provincial Natural Monument" (i.e. a flagship threatened species) in Misiones.

### Habitat protection

Although the Brazilian Merganser has occurred in three protected areas in Argentina (Iguazú National Park, Urugua-í Provincial Park and Urugua-í Private Reserve), there have been no recent records and the species may no longer occur here.



## Conservation programs

At the present time, there are no ongoing conservation activities for Brazilian Merganser in Argentina. Most recent conservation activities have been conducted either by independent naturalists or by staff of Fundación Vida Silvestre Argentina and Aves Argentinas/Asociación Ornitológica del Plata. Surveys for Brazilian Mergansers have been conducted in 1991 (Arroyo Yabotí Miní, Río Iguazú), 1993 (Arroyos Uruzú, Urugua-í, Piray Miní, Piray Guazú, Yacuy and Río Iguazú - the Pato Serrucho '93 expedition), 1994 and 1995 (Arroyos Yabotí Miní, Piray Guazú, Uruzú, Alegría, Paranay Guazú, Yasy, Antas and Tigre - the Mbigua-í Project).

The "Pato Serrucho '93" expedition, which surveyed 376km of rivers in Misiones for Brazilian Mergansers, was supported by The Wildfowl & Wetlands Trust and The International Waterfowl & Wetlands Research Bureau (now Wetlands International). It was conducted with the support of Fundación Vida Silvestre Argentina and the Administración de Parques Nacionales. The Mbigua-í Project won the 1994 Beca Claes Olrog from Aves Argentinas/AOP Birds.

Conservation strategies have not been implemented in Argentina.

## Brazil

### Current status

#### Paraná

The Brazilian Merganser was first recorded in Paraná state in 1922 at Salto da Ariranha on the Ivaí River. Recent sightings in Paraná include eight individuals recorded on the Congonhas River, a tributary of the Tibagi River (Anjos et al., 1997) in 1995. In 1997, the species was recorded in the Congonhas River and in 1998, 12 individuals, including three juveniles, were recorded on the lower part of this river, near the Tibagi River. In 2001, two birds (probably a pair) were recorded on the Tibagi River near the Congonhas River (Orsi, pers. comm.).

In 2005 Márcio Rodrigo Gimenez carried out, as part of a project lead by Luíz dos Anjos and supported by the CNPq and for the UEL, three expeditions to survey the species in the Congonhas River, for a six month period, but the species was not found (Anjos, pers. comm. 2006).

#### Bahia

Pineschi & Yamashita (1999, 2000) reported the presence of over 30 Brazilian Mergansers on the Pratudão, Corrente (Éguas) and Formoso Rivers between the towns of Jaborandi and Vila dos Gatos. However, recent surveys of a total of 70km of the same areas in July 2003 failed to find any birds (Olmos & Silva e Silva, 2003).

The gallery of most of the riverbanks was removed, both for agriculture or pasture and there is little natural vegetation left. Local people for watering their crops are now abstracting river water, and many areas had been burned and drained to plant soy beans. This area is also threatened by plans to build two hydro electrical plants (reportedly by the Caraíba Metais).

#### Tocantins

Brazilian Mergansers have also recently been found during three expeditions to Tocantins (Pacheco & R. Silva e Silva, 2002; Martuscelli, pers. comm.; Braz et al., 2003). The most recent records include a single bird on the Novo River, near Mateiros, in May 2002 (Braz et al., 2003), two birds near to the Cachoeira da Velha (Velha Waterfall) in the Jalapão State Park in May 2002 (Braz et al., 2003), and a pair with four young seen in the same area on 27 August 2002 (Pacheco & Silva e Silva, 2002).

#### Goiás

Surveys carried out between 1992 and 1999 reported the presence of Brazilian Mergansers in eastern Goiás in the regions of Posse, Laciara, and São Domingos in the headwaters of the Paranã River (Pineschi & Yamashita, 1999, 2000).



Since 1987, Brazilian Mergansers have been observed in Chapada dos Veadeiros National Park, Goiás state, on at least four occasions. In September 2000, a pair of Brazilian Mergansers (with four young) was observed on the Rio Preto by an Ibama consultant (Leeuwenberg, pers. comm. 2001). On 31 August and 1 September 2003, three Brazilian Mergansers were found on the Rio das Pedras, municipality of Nova Roma, the first sighting there since 1950 (Bianchi et al., 2005).

There are also records in 2004 and 2005 for Goiás state, in the City of Alto Paraíso, near to the Chapada dos Veadeiros, in the Campo Alegre RPPN and its limits, in the Couros and Lageado Rivers. One individual was observed in the Lageado River in May/April 2005 and a pair in the Couros River in May and June 2005, that was observed after the breeding season with three young in August 2005. (Antas, in litt. 2006).

There are historical records and notice of the use of the middle part of the São Miguel River in the beginning of the decade of 1990. This river is affluent to the Tocantinzinho River, deserving a prominence due to the records done there and for being one potential connecting way between the populations of Chapada dos Veadeiros National Park and Tocantinzinho River, if those are spatially separate (Antas, in litt. 2006).

### Minas Gerais

In Minas Gerais, the first records of the species are of two birds in the Salitre Brook, in 1973 (G.T. de Mattos, 1992, cit. by Collar et al., 1992), a bird in the São João River in 1980 (J.M. Dietz, 1986, cit. by Collar et al., 1992) and five birds in the Serra da Canastra National Park in 1981 (Bartmann, 1988). In this region, the species is being continuously recorded since 1981 (Bartmann, 1988; Pearman cit. by Collar et al., 1992; Silveira & Bartmann, 2001; Lamas, in press; Bruno & Bartmann, 2003; Lins & Andrade, 2004; Terra Brasilis, unpubl. data). There are recent records of 47 birds in the region in 2002 (Lamas, in

press), 15 in 2003, 28 in 2004 (Bruno, pers. comm.), 32 in 2004 and 52 in 2005 (Terra Brasilis, unpubl. data).

In April 2004 an individual was visualized in an Itacolomi State Park's artificial lake (Curva Lagoon), Ouro Preto, Minas Gerais (Cerqueira Junior et al., 2005). However, after few months, the individual disappeared and the existence of a population established in this region was not still confirmed.

Estimated population sizes at the above sites are: Serra da Canastra National Park region - 40-50 pairs; Emas National Park - 1-5 pairs (if extant); Chapada dos Veadeiros National Park- 1-5 pairs; Jalapão State Park - 1-5 pairs; Tibagi / Congonhas Rivers- 1-5 pairs; Bahia - 1-5 pairs (if extant).

### Population trend

Only the population of the Serra da Canastra National Park is being regularly monitored. Productivity numbers between 1996 and 2000 (Silveira & Bartmann, 2001) found a total of 39 individuals (six pairs produced 27 young in 10 clutches). Further, more extensive surveys in 2001/2002 found that there are at least 80 individuals in the Serra da Canastra region (Lamas, in press). Studies carried out by Instituto Terra Brasilis' staff concluded that the population of Serra da Canastra's region could be even bigger (Renata Andrade and Lívia Lins, pers. comm.). Bruno et al. (2006b) has observed 72 individuals (4 pairs, producing a total of 64 young) between 2001 and 2005.

Further analysis of the exact locations of birds is required before population trends in and around Serra da Canastra National Park can be determined. Successful breeding has been recorded at the Canastra region in most recent years, although there is no information about the fate of the young. Surveys in other areas have been conducted on an opportunistic and infrequent basis so no information is available on population trends in Brazil. However, it is expected that new studies in southwest SW Bahia and Tocantins provide more information.



## Species protection

The species and its habitat are protected under Brazilian National Law (Law Nº 5,197 of January 1967, Law Nº 9,605 of February 1998). The Normative Instruction Nº 3, of 26 May 2003, of the Ministry of the Environment, classifies the species as critically endangered. The Law Nº 9,605 forbids the pollution of humid habitats, the explosive use, fishing with toxic substances, as well as intentional fires. Further protection for the Brazilian Merganser is also provided by the New Brazilian Forestry Code which requires the preservation of gallery forest along river courses, especially for the protection of threatened species. The Brazilian Merganser is also protected under state law, for example under Minas Gerais Provincial Law (Conselho de Política Ambiental, COPAM, Deliberação 41/95). The Resolution No. 279 (27 June 2001) of the Conselho Nacional do Meio Ambiente (CONAMA) introduced rigorous Environmental Impact Assessments for future hydroelectric and thermoelectric power plants.

## Habitat protection

### Serra da Canastra National Park

Created in 1972, with an area of 198.380,78ha, presents the typical vegetation formation (high fields or as locally know "campos de altitude") as the tropical Atlantic. "Campos rupestres", small parcels of gallery forest and "campo cerrado" spots are also present. A movement of the land proprietors of the region currently jeopardizes the park, since two thirds of its area are still not indemnified, and today there is the risk of losing about 130.00ha of its area (Rigueira, pers. comm. 2006). At least 20 pairs live in the area of the park and 21 pairs in adjacent areas (Lamas, in press; Lins & Andrade, 2004; Instituto Terra Brasilis, unpubl. data).

### Emas National Park

Created in 2002, with an area of 133.064,42ha. This area possesses some "cerrado" biome's physionomies, as: gallery forest, "vereda", "campo rupestre", mesophytic

forest, humid field, "cerrado", "cerradão", "campo cerrado", "campo sujo" and "campo limpo". There are no recent records, and few details about the record from 1990. If the species does exist there, most of the population should occur on the park's boundaries.

### Chapada dos Veadeiros National Park

Created in 2001, with an area of 65.038,16ha. It presents "cerrado" vegetation, as "campos rupestres", gallery forest, semideciduous dry forests, many "cerrado" sensu strictu and "veredas" slithering the "campos limpos" formations. Last sighting of the species in the area occurred in September 2003. Most pairs should occur on the park's boundaries. There are plans to extend the national park area to around 210,000ha, to include the species' habitat, as well as the Pedra River's watershed.

### Itacolomi State Park

Created in 1967, with an area of 7.543ha. The region is located in the transition between Atlantic Forest and the "Cerrado", here, represented by "campo rupestres". An individual was observed in 2004.

### Jalapão State Park

Created in 2001, with an area of 160.000ha, presents a combined vegetation of "cerrado ralo" with sand, dunes, mountain ranges, valleys and "veredas". At least three birds observed within the park boundaries by Braz et al. (2003) in May 2002 and a pair with four young seen by Pacheco & Silva e Silva (2002) on 27 August 2002.

### Congonhas and Tibagi Rivers

Last register done in 2001. Despite being rare, the species occurs in area without legal protection. Threatened by the construction of hydroelectric enterprises, there is the intention of creation of an Environmental Protection Area- APA along the Congonhas River (Anjos, 2003). This proposal includes reforestation of the edges of the river, conservation of the forest remainders,





environmental education focusing the effect of the pesticide use, sustainable fishing, and environmental monitoring. All these initiatives, if implemented, must benefit the species.

### **Bahia**

Pratudo and Pratudão Rivers' watersheds have been recently (December 2000) decreed as Veredas do Oeste Bahiano Wildlife Shelter (128.521ha), with the explicit objective to protect the Brazilian Merganser, among others species (Olmos & Silva e Silva, 2003). The Carinhanha River, in the Bahia/Minas verge is partially protected inside Grande Sertão Veredas National Park.

### **Conservation programmes**

Bartmann (1988, 1994), Silveira & Bartmann (1996, 2001), Bruno & Bartmann (2003) and Bruno (2004), Lamas (2004), Lamas (in press), Lins & Andrade (2004), Andrade/Terra Brasilis (pers. Comm.) conducted basic monitoring and ecological research on Brazilian Mergansers in Serra da Canastra National Park.

Between 1992 and 1999, Yamashita & Pineschi (1999) conducted field surveys for Brazilian Mergansers in 14 areas of central Brazil in four different states (Goiás, Bahia, Minas Gerais and Tocantins).

In July 2001, a project began in Serra da Canastra National Park and its surroundings aiming to locate all suitable merganser habitats in order to revise the management plan of the Park. This initiative of Ibama was conducted by the Instituto Terra Brasilis, and originated the Brazilian Merganser Programme, that has four main areas of work (based on the priorities set out in this action plan): studies on Brazilian Merganser breeding biology and habitat characteristics, an inventory of distribution within the Canastra range; environmental education in both urban and rural areas (schoolchildren, teachers, farmers and other local people); and a campaign to market the species presence

with the aim of ultimately making it a flagship species for the region. Some institutions, especially the Minas Gerais State's Institute of Forests, support this work.

In 2005, S.F. Bruno (UFF) made official the project "Brazilian Merganser's Biology and Conservation in Serra da Canastra National Park and Surroundings, MG, Brazil". The project aims the continuity of the ecological studies of the species, including behavioral component, by monitoring already known pairs that inhabit the São Francisco River, from its spring to the city of Vargem Bonita. The study emphasized aspects related to the reproductive behavior of the species, including parental care, foraging habits and major biotic and abiotic threats. The results have been used in the environmental education of the surrounding area of the Serra da Canastra National Park.

In May of 2005, a project in the Ivaí River watershed and Fortaleza River began (Tibagi River watershed), aiming at the search of records of new populations of the species and the accomplishment of an evaluation of the conditions of the environment, searching to identify places with suitable habitat for the Brazilian Merganser. This is an ongoing project, conducted by Instituto de Pesquisa e Conservação da Natureza - Idéia Ambiental, and is moving on to a second step - surveys stretches selected in two rivers in the Ivaí watershed (Patos and Ariranha Rivers) and in Fortaleza River (Tibagi watershed) (Klemann Junior, pers. comm. 2006).

After recent observation of the species in the Preto River and Pedra River in the Chapada dos Veadeiros (Leeuwenberg, pers. comm., 2001, Bianchi et al., 2005), there are plans to expand the park area to about 210.000ha aiming to include the species habitat.

The Brazilian Merganser Recovery Team meeting in Brasília in October 2002, agreed a total of eight priority conservation projects. These are listed below along with an appraisal of their current level of implementation.



## Priority 1

### Inventory of key sites

A GIS enabled inventory of key sites is under compilation, including all the points from Table 1.

### Surveys of key sites

Recent surveys have been conducted in Tocantins in 2002 (by BirdLife International - Programa do Brasil and Conservation International), in Bahia in 2003 (BirdLife International - Programa do Brasil), and at Serra da Canastra since 1996 (Silveira & Bartmann, 1996, 2001; Terra Brasilis, unpubl. data; Bartmann & Bruno, unpubl. Data; Lamas, in press; Bruno and Bartmann, 2003; Bruno, 2004; Bruno et al., 2006b in prep.).

Further surveys by Conservation International are planned in Tocantins (Jalapão) and Minas Gerais (Serra do Cipó National Park) in order to estimate the numbers of mergansers using these areas.

Terra Brasilis plan to expand their surveys in the Canastra region and include an appraisal of the environmental impacts affecting the Brazilian Merganser, including diamond mining, dam construction, erosion, agrochemicals and forest fires. Aiming at to contribute for the evaluations of environmental impacts in the region, the UFF, represented by S.F. Bruno has been developing educational projects and monitoring of the *M. octoetaceus*'s biology.

### Biological research, habitat characteristics

The UFF, through the project "Brazilian Merganser's Biology and Conservation in Serra da Canastra National Park and Surroundings, MG, Brazil", has advanced in the studies, with special attention to reproductive biology.

Proposals for biological research are being elaborated, focusing on: reproductive ecology of the species and habitat

characteristics in the region of the Serra da Canastra (Instituto Terra Brasilis), and habitat use and behavior in Congonhas River (UEL). There is an ongoing study on the effect of the fire on the species in the Serra da Canastra (Bruno, unpubl. data).

In the Chapada of the Veadeiros, Paulo Antas is conducting surveys, through the Funatura and Hélio Jorge Cunha will perform his master thesis on the species ecology.

### Environmental education

The Instituto Terra Brasilis produced and is propagating educative material for divulgation, awareness and involvement of the communities in the adjacencies of the Serra da Canastra National Park. This action includes the propagation of an itinerant environmental educative exposition to the entire school community pertaining to the region, which is opened by a scenic presentation where the personage, the Brazilian Merganser, dialogues in a playful form with the local community on the conservation of the natural resources. It also includes a folder and calendar with information on the species; this material aims the participation of the community and visitors in the protection of the Brazilian Merganser.

Sávio F. Bruno is also conducting other works of public education and awareness in the area.

## Priority 2

### Species management

A project to evaluate the relevance of the artificial nests placement, aiming at assisting the reproduction of the species was defined as priority 2, but it is still ongoing.

### Studies on the feasibility of the establishment of a population in captivity and translocation of birds and eggs

During the 2002 Workshop, a study on the feasibility of establishing a captive



population, or translocation birds and eggs (e.g. from areas predicted to be flooded by the construction of hydroelectric dams) was determined to be Priority 2. The priority of such studies must be reviewed by the Working Group for the Recovery of the Merganser, as recent survey work has located few mergansers and it was observed that key sites are being severely affected by forest fires and the establishment of hydroelectric enterprises.

### Priority 3

#### Studies to identify potential habitat with the use of GIS

Currently not being developed; potential conduction by the project Brazilian Merganser's Biology and Conservation/UFF.

#### Establishment of management agreements with landowners to protect the species within their properties

Included on the proposal of the Instituto Terra Brasilis.

## PARAGUAY

### Current status

With only two historical records it is clear that the Brazilian Merganser has always been rare in Paraguay. The first record was reported by Bertoni (1901) from the "Alto Parana" region in 1891. This latitude (27°S) suggests that the record relates to the Paraná River in Itapúa Department. The second sighting in Paraguay was by Nancy López on the Río Carapá, just upstream (west) of Catueté, Canindeyú Department, in February 1984. Both records are within the Rio Paraná basin, although there is at least one unsubstantiated citation of the species occurring within the Paraguay River basin (Collar et al., 1992).

The lack of recent sightings of Brazilian Mergansers in Paraguay suggests that

the species may now be extinct in this country (Hayes & Granizo, 1990; Brooks et al., 1993a, 1993b). Most rivers in Paraguay are severely degraded with only short sections of two rivers - the Pozuelo and the Carapá - believed to remain relatively pristine. Even these are periodically inundated with sediment, and presumably agrochemicals. Most rivers, which may once have been suitable for the species, have suffered major deforestation, particularly in the Paraná River drainage. All must now carry huge year-round sediment loads as a result of widespread soil erosion. In addition, the completion of the Itaipu dam flooded the lower reaches of the tributaries of the Río Paraná in Canindeyú and northern of Alto Paraná Department.

In 2002, Guyra Paraguay conducted interviews with local people in the vicinity of the Mbaracayú Biosphere Reserve, Canindeyú Department. All interviews were conducted in Guarani - one of the indigenous languages of Paraguay - and subsequently translated to Spanish. Although the interviews focused on other taxa, six reports of Brazilian Merganser were received (Clay et al., 2003). The headwaters of the Carapá River (the river where Nancy López reported Brazilian Merganser in 1984) lie just a few kilometers to the east of the reserve. Surveys for Brazilian Merganser are urgently required in the Mbaracayú Biosphere Reserve and in the few relatively pristine areas lying to the east and south-east (for instance the Carapá, Pozuelo and Acaray-mi Rivers) to investigate whether the species survives there.

### Population trend

If the Brazilian Merganser still exists in Paraguay, the remaining population must be very reduced.

### Protection of the Species

The Brazilian Merganser is protected under the Environmental Crimes Law, number 716/1995, commonly known as the Ecological Crimes law. This law protects all endangered species, prohibiting their destruction and trade





(in the species or their parts and/or derivatives). The penalty is a 1 to 5 year jail sentence, or a fine of 500 to 1,500 times the minimum wage.

The experience of management of reserves in Paraguay illustrated that the establishment of interested local groups is an excellent form to obtain the commitment regarding environmental conservation (López, pers. comm.).

### Habitat protection

There are a few protected areas in Paraguay where Brazilian Merganser could potentially occur. However, the degraded states of the rivers within these protected areas, the lack of effective protection and their location near to the confluence with the

Paraná River, suggest few chances of the species occurrence on these areas.

### Conservation programmes

Few conservation actions specifically for Brazilian Mergansers have been conducted in Paraguay. No mergansers were sighted during surveys along 105km of the Carapá River, 22km of the Ytambey River and 71km of the Ñacunday River during July-September 1989 (Granizo & Hayes, 1989; Hayes and Granizo, 1990). However, local people in the vicinity of the Mbaracayú Biosphere Reserve reported the presence of Brazilian Mergansers in 2002. Short stretches of the Pozuelo, Piratí and Jejui-mi Rivers were surveyed (without success) during August-September 1992 (Brooks et al., 1993a, 1993b).



**PART 2**  
**CONSERVATION PLAN**





## Objectives

The objective of this action plan is to assure the permanent maintenance of the current populations and range of the Brazilian Merganser in the medium-to long term; to promote increases on the numbers of birds and populations as well as promote the expansion of the geographic distribution of the species within its original occurrence area.

### Specific objectives

Each item is assigned a level of priority and timescale. The priority for each objective is estimated on a four-point scale:

- **Essential** - an objective that is needed to prevent a large decline in the population that could lead to the species' extinction in nature and/or captivity;
- **High** - an objective that is needed to prevent a decline of more than 0% of the population in 20 years or less;
- **Medium** - an objective that is needed to prevent a decline of less than 20% of the population in 20 years or less;
- **Low** - an objective that is needed to prevent local population declines or which is likely to have only a small impact on the population across the range;

The timescale for each objective is estimated on a six-point scale:

- **Immediate** - needs to be completed within the next year;
- **Short** - needs to be completed within the next 1-3 years;
- **Medium** - needs to be completed within the next 1-5 years;
- **Long** - needs to be completed within the next 1-10 years;
- **Ongoing** - an objective that is currently being implemented and should continue;

- **Completed** - an objective that was completed during the preparation of the action plan (such actions may nevertheless need reviewing or carrying out again as circumstances develop in the future).

The objectives are divided in the following areas:

1. Fiscalization and legislation
2. Species and habitat protection
3. Monitoring and research
4. Awareness and capacity building
5. International collaboration and communication

#### 1. Fiscalization and legislation

A strong legislative basis is essential to the species conservation. The legislation that applies for the Brazilian Merganser appears adequate, although enforcement needs improving.

- 1.1. Promote the protection of the Brazilian Merganser and its habitats through national and regional legislation.  
**Priority:** essential  
**Time scale:** short  
**Actors:** Legislative with suggestions from Ibama and MMA.
- 1.2. Enforce existing legislation, in the sense of the preservation of the Brazilian Merganser and its habitat, including regulations relating to riparian forest, hunting and collection of eggs or adults from the wild.  
**Priority:** essential  
**Time scale:** short  
**Actors:** Legislative with suggestion from Ibama and MMA.
- 1.3. Promote the development and implementation of international and national action plans for the Brazilian Merganser.  
**Priority:** high  
**Time scale:** medium  
**Actors:** Environmental agencies of the occurrence countries.



- 1.4. Establish bilateral or trilateral agreements among the range countries for the conservation of the Brazilian Merganser.

**Priority:** high

**Time scale:** medium

**Actors:** Environmental agencies of the occurrence countries.

- 1.5. Incorporate the conservation needs of the Brazilian Merganser into the management plans for the main river systems where the species occurs (Paraná, São Francisco and Tocantins).

**Priority:** high

**Time scale:** medium

**Actors:** Ibama, basins' committees.

- 1.6. Ensure that broad policies, such as forestry and tourism, do not negatively impact on the Brazilian Merganser and its habitat.

**Priority:** high

**Time scale:** medium

**Actors:** Ibama, MMA, Environmental agencies of the occurrence countries.

- 1.7. To control the hunting pressure wherever necessary, through reinforcement of the fiscalization.

**Priority:** high

**Time scale:** short

**Actors:** Ibama, federal and state environmental agencies of the occurrence countries.

## 2. Species and habitat protection

All sites with occurrence of the Brazilian Merganser must to be adequately protected and managed under a management plan that prioritizes the conservation needs of the species.

- 2.1. Involve international conventions on the protection of the Brazilian Merganser and its habitat, specifically the Ramsar and Biodiversity Conventions.

**Priority:** high

**Time scale:** short

**Actors:** Ibama, MMA, Environmental agencies of the occurrence countries.

- 2.2. Seek protected-area designation for sites regularly holding Brazilian Mergansers.

**Priority:** essential

**Time scale:** medium

**Actors:** Ibama, MMA, federal and state environmental agencies of the occurrence countries.

- 2.3. Legally forbid activities that promote destruction or degradation of sites regularly holding Brazilian Mergansers.

**Priority:** essential

**Time scale:** medium

**Actors:** Ibama, MMA, federal and state environmental agencies of the occurrence countries.

- 2.4. Enhance breeding success where appropriate through the installation of artificial nest boxes.

**Priority:** medium

**Time scale:** medium

**Actors:** Research projects.

- 2.5. Reduce recreational disturbance from pedestrians, through the development of oriented trails on the occurrence areas where there is public visitation.

**Priority:** high

**Time scale:** medium

**Actors:** Federal and state environmental agencies of the occurrence countries.

- 2.6. Implement or reinforce restrictions for domestic animals on the occurrence area of the species, especially dogs, which could kill chicks and cause disturbance.

**Priority:** high

**Time scale:** medium

**Actors:** Ibama, MMA, federal and state environmental agencies of the occurrence countries, protected areas' managing agencies.



- 2.7. Enforce the legislation that forbids the introduction of exotic fish in reservoirs and impoundments connected to basins used by mergansers.  
**Priority:** high  
**Time scale:** short/medium  
**Actors:** Ibama, federal and state environmental agencies of the occurrence countries.
- 2.8. Restore previously degraded habitats for Brazilian Mergansers, for example through reforestation of gallery forest along river corridors at key sites.  
**Priority:** high  
**Time scale:** medium  
**Actors:** Ibama, research institutions, federal and state environmental agencies of the occurrence countries.
- 2.9. Produce management plans for key sites, and establish management agreements with landowners to protect the species within their properties.  
**Priority:** high  
**Time scale:** short  
**Actors:** Ibama, research institutions
- 2.10. Limit the negative impact from disturbance by regulating the extent of activities, such as rafting, camping, "buoy-crossing", fishing and ecotourism.  
**Priority:** high  
**Time scale:** short  
**Actors:** Ibama, MMA, federal and state environmental agencies of the occurrence countries.
- 2.11. Reduce siltation in rivers by prohibiting activities such as diamond and limestone mining, and deforestation on the occurrence areas.  
**Priority:** essential  
**Time scale:** short  
**Actors:** Ibama, MMA, federal and state environmental agencies of the occurrence countries.
- 2.12. Ensure that negative impacts of dam construction on Brazilian Merganser populations are minimized and compensated for.  
**Priority:** essential  
**Time scale:** short  
**Actors:** Ibama, MMA, federal and state environmental agencies of the occurrence countries.
- 2.13. Ensure that the Tocantinho River basin's protection and of its mid and low reaches tributaries, besides the protection of the entire course of Couros River and São Miguel River basin.  
**Priority:** high  
**Time scale:** medium  
**Actors:** Ibama, federal and state environmental agencies.
- 2.14. Extend the Chapada dos Veadeiros National Park area in order to include in this conservation unit the areas where recent registers of the Brazilian Merganser and of suitable habitat for the species.  
**Priority:** high  
**Time scale:** short  
**Actors:** Ibama.
- 2.15. Regularize the agrarian situation of the Serra da Canastra National Park by paying the overdue indemnities, preventing that the indemnified lands are not lost as park area.  
**Priority:** high  
**Time scale:** short  
**Actors:** Ibama.

### 3. Monitoring and research

Coordinated monitoring is the cornerstone of any action plan. Monitoring provides data for identifying and protecting key sites and provides the means to measure



the effectiveness of the plan implementation. Regular surveys can also help prevent illegal activities affecting the Brazilian Merganser, such as hunting. A co-ordinated survey of Brazilian Mergansers throughout their range would be logistically impossible. Nevertheless, ongoing surveys of suitable sites are needed to locate new populations, identify key sites and assess their conservation status, and to provide more robust estimates of global population and trend.

3.1. Continue surveys to locate new populations of Brazilian Mergansers, and periodically re-survey sites where mergansers currently occur or historically were known to occur.

**Priority:** essential  
**Time scale:** short  
**Actors:** Research institutions, NGO's.

3.2. Compile a key site inventory for Brazilian Merganser.

**Priority:** essential  
**Time scale:** short  
**Actors:** Research institutions, NGO's.

3.3. Monitor key sites on an annual basis, including details of numbers of birds, breeding success, water quality and habitat characteristics.

**Priority:** essential  
**Time scale:** short  
**Actors:** Research institutions, NGO's.

3.4. Encourage birdwatchers and local people to submit records of Brazilian Mergansers to relevant national contact points, and establish a centralized mechanism for collecting birdwatchers' observations.

**Priority:** low  
**Time scale:** short  
**Actors:** Ibama, environmental agencies of the occurrence countries, research institutions, NGO's.

3.5. Undertake research on Brazilian Mergansers at key sites, including studies of ecology, breeding behaviour, biology, habitat requirements, population dynamics, dispersal, and genetic variability.

**Priority:** essential  
**Time scale:** short  
**Actors:** Research institutions, NGO's.

3.6. Evaluate the habitat and physical characteristics of sites with historical and recent records of Brazilian Merganser in order to characterize suitable habitats for the species.

**Priority:** high  
**Time scale:** medium  
**Actors:** Research institutions, NGO's.

3.7. Verify the feasibility of establishing a population of the Brazilian Merganser in captivity

**Priority:** high  
**Time scale:** medium  
**Actors:** Ibama, federal and state environmental agencies of the occurrence countries, research institutions.

#### 4. Public awareness and capacity building

With the exception of local people living in and around a small number of key sites for Brazilian Merganser, the species is largely unknown to people in its range, including governmental agencies. Public awareness plays a key role in obtaining participation of local communities and visitors. Education and training programmes for local people, conservationists, park managers, policy makers and others are urgently required linking Brazilian Merganser conservation to the sustainable use of natural resources and habitats.

4.1. Conduct education programmes on the conservation of natural habitats amongst local people near key sites using the Brazilian Merganser as a flagship species.

**Priority:** essential  
**Time scale:** medium  
**Actors:** Research institutions, NGO's.

4.2. Create Brazilian Merganser "Conservation Bases" close to key sites, providing general information about the





species, its habitat, major threats and visitor behaviour rules, to tourists and local community.

**Priority:** high

**Time scale:** medium

**Actors:** Research institutions, NGO's.

4.3. Form local groups interested to promote the conservation of the Brazilian Merganser.

**Priority:** medium

**Time scale:** medium

**Actors:** Research institutions, NGO's.

4.4. Conduct training programmes on the conservation of natural habitats for relevant professionals, such as park wardens at key sites, using the Brazilian Merganser as a flagship species.

**Priority:** essential

**Time scale:** medium

**Actors:** Ibama, environmental agencies of the occurrence countries, research institutions, NGOs.

4.5. Increase public awareness of the need to conserve the Brazilian Merganser through local, regional, national and international media campaigns.

**Priority:** high

**Time scale:** medium

**Actors:** Ibama, environmental agencies of the occurrence countries, research institutions, NGOs.

## 5. International collaboration and communication

Reviews of the implementation of successful IUCN action plans for threatened species (for example, the Pheasant Action Plan - McGowan & Garson, 1995) have highlighted the importance of effective collaboration and communication between local people, decision-makers, special interest groups and international agencies (Garson, 2000). International working groups, encompassing expertise from national and international interests, have been established to implement

action plans for threatened species, such as the Lesser White-fronted Goose (*Anser erythropus*) and Ferruginous Duck (*Aythya fuligula*). Such collaboration maximizes the chance of securing funds for conservation projects.

Concern for the Brazilian Merganser is now growing and several individuals and organizations both inside and outside range states have expressed an interest in undertaking efforts to conserve the species.

5.1. Form international and national working groups to implement conservation plans for the Brazilian Merganser.

**Priority:** essential

**Time scale:** immediate

**Actors:** Ibama, environmental agencies of the occurrence countries, research institutions, NGOs.

5.2. Establish a communications network for relevant interest groups.

**Priority:** medium

**Time scale:** continuous

**Actors:** Ibama, environmental agencies of the occurrence countries, research institutions, NGOs.

5.3. Provide regular feedback on the implementation of the Brazilian Merganser action plan to relevant governmental and non-governmental contacts in range countries and abroad.

**Priority:** essential

**Time scale:** continuous

**Actors:** Ibama, environmental agencies of the occurrence countries, research institutions, NGOs.

5.4. Review annually the progress achieved and revise the efforts undertaken on the implementation of the action plan.

**Priority:** essential

**Time scale:** continuous

**Actors:** Ibama, environmental agencies of the occurrence countries, research institutions, NGOs.





## References

- Acha Navarro, J.A. Erosión costera en el embalse de Itaipú (margen derecha). **Biota**, v. 10, p. 1-28, 1999.
- ALENCAR, J. Velho Chico. Jornal do Brasil, Rio de Janeiro, 8 nov. **Supl. JB Ecológico**, p. 28. 2003.
- Altervida. **Plan de manejo de la micro cuenca Ybuí**. Proyecto de Administración de Recursos Naturales. 2000(a).
- \_\_\_\_\_. **Plan de manejo de la micro cuenca Alegre**. Proyecto de Administración de Recursos Naturales. 2000(b).
- Altstatt, A.; Kim, S.; Rodas, O.; Townshend, J.; Tucker, C.; Musinsky, J.; Clay, R.; Yanosky, A. Subtropical **deforestation**: Paraguay in the 1990s. Poster: Global Land Cover Facility, University of Maryland Institute for Advanced Computer Studies, USA June 2003.
- ANJOS, L. **Status e distribution of the Brazilian Merganser (*Mergus octosetaceus*) on the Congonhas River, Tibagi River basin, Paraná State, Southern Brazil**. Project proposal to the American Bird Conservancy. 2003.
- ANJOS, L.; SCHUCHMANN, K.-L.; Berndt, R. Avifaunal composition, species richness, e status in the Tibagi river basin, Paraná state, Southern Brazil. **Ornitologia Neotropical**, v. 8, p. 145-173, 1997.
- ANTAS, P.T.Z. The Brazilian Merganser (*Mergus octosetaceus*), the most threatened duck in South America. **Gibier Faune Sauvage**, Game Wildl, v. 13, Juin 1996, p. 799-800.
- BARTMANN, W. New observations on the Brazilian Merganser. **Wildfowl**, v. 39, p. 7-14, 1988.
- \_\_\_\_\_. The Brazilian Merganser (*Mergus octosetaceus*) - nearly extinct. **CBSG News**, v. 5, p. 7, 1994.
- BENSTEAD, P.J.; HEARN, R.D.; JEFFS, C.J.S.; CALLAGHAN, D.A.; CALO, J.; GIL, G.; JOHNSON, A.E.; STAGI NEDELCOFF, A.R. **An expedition to assess the current status of the Brazilian Merganser *Mergus octosetaceus* in Argentina**: final report. Unpublished Report. WWT, Slimbridge, UK. 1993.
- BERTONI, A.W. Aves nuevas del Paraguay. **Anal. Cient. Paraguayos, Ser.**, v. 2, n. 1, p. 1-216, 1901.
-



BIRDLIFE INTERNATIONAL. **Threatened Birds of the World**. Barcelona e Cambridge, UK.: Lynx Edicions, BirdLife International, 2000.

BIANCHI, C.A.; BRANT, S.; BRANDÃO, R.A.; BRITO, B.F. New records of Brazilian Merganser *Mergus octosetaceus* in the rio das Pedras, Chapada dos Veadeiros, Brazil. **Cotinga**, v. 24, p. 72-74, 2005.

BOSSO, A.; GIL, G. **Sobre la situación del Pato Serrucho (*Mergus octosetaceus*) en la Argentina**. Apunte preparado para el Taller sobre Pato Serrucho, São Roque de Minas, Brasil, 18 a 22 de Septiembre 2000. 8 p.

BRAZ, V.S.; ABREU, T.L.S.; LOPES, L.E.; LEITE, L.O.; FRANÇA, F.G.R.; VASCONCELLOS, M.M.; BALBINO, S.F. Brazilian Merganser *Mergus octosetaceus* discovered in Jalapão State Park, Tocantins, Brazil. **Cotinga**, v. 20, p. 68-71, 2003.

BRAZILIAN MERGANSER RECOVERY TEAM. **Brazilian Merganser Conservation Workshop**. Final report to USFWS Office of International Affairs. 2001. 19 p.

BROOKS, T.; BARNES, R.; BARTRINA, L.; BUTCHART, S.H.M.; CLAY, R.P.; ESQUIVEL, E.Z.; ETCHEVERRY, N.I.; LOWEN, J.C.; VINCENT, J. **Project Canopy' 92: final report**. Cambridge, UK: ICBP Study Report, 1993(a).

BROOKS, T.M.; BARNES, R.B.; BUTCHART, S.H.M.; CLAY, R.P.; ESQUIVEL, E.Z.; ETCHEVERRY, N.I.; LOWEN, J.C.; VINCENT, J.P. Bird surveys e conservation in the Paraguayan Atlantic Forest. **BirdLife International Study Report**, n. 57. Cambridge: BirdLife International, 1993(b).

BRUNO, S.F. **Biologia e conservação do pato-mergulhão (*Mergus octosetaceus* Vieillot, 1817) no Parque Nacional da Serra da Canastra e Entorno, Minas Gerais, Brasil**. Lavras, 2004. 43 p. Monografia (Pós-Graduação em Biologia) - Instituto de Biologia, Universidade Federal de Lavras, MG.

\_\_\_\_\_. **Biodiversidade ameaçada do Rio São Francisco: o pato-mergulhão (*Mergus octosetaceus*) como sentinela ambiental**. Primeira Jornada de Palestras em Comemoração à Semana de Meio Ambiente na Faculdade de veterinária/UFF, promovida pelo Departamento de Zootecnia e Desenvolvimento Agro-sócio-ambiental Sustentável. Universidade Federal Fluminense, Faculdade de Veterinária, 3 de jun. de 2005, Niterói, RJ.

BRUNO, S.F.; BARTMANN, W. **Conservation Strategies at the Serra da Canastra Natur Park, MG, Brazil, with Enfasis in the Brazilian Merganser (*Mergus octosetaceus*)**. Palestra realizada na Reunião para Conservação do Pato-mergulhão promovida pelo Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. Hotel Kubitscheck, 19 de outubro, Brasília. 2002.

\_\_\_\_\_. Brazilian Mergansers in Serra da Canastra National Park, Minas Gerais State, Brazil. **TWSG News**, v. 14, p. 53-54, 2003.

BRUNO, S.F.; CARVALHO, R.B.A. **Espécies predadoras e competidoras do pato-mergulhão (*Mergus octosetaceus* Vieillot, 1817)**. 2005(a) No prelo.

\_\_\_\_\_. Tanto esforço para salvar um pato feio? Projeto Biologia e Conservação do Pato-mergulhão (*Mergus octosetaceus* Vieillot, 1817) no Parque Nacional da Serra da Canastra e Entorno, MG, Brasil. In: SIMPÓSIO EM CIÊNCIA AMBIENTAL, 1., 2005. **Anais...** Niterói, UFF. 15 a 16 set. 2005. p. 7.



BRUNO S.F.; LOUZADA, N.C. Biologia e Conservação do Pato-mergulhão (*Mergus octosetaceus* Vieillot, 1817) no Parque Nacional da Serra da Canastra e Entorno, MG, Brasil. CONGRESSO DA SOCIEDADE DE ZOOLOGICOS DO BRASIL BALNEÁRIO DE CAMBORIÚ, 29 de mai. a 03 de jun. 2005. In: CONGRESSO DA SOCIEDADE DE ZOOLOGICOS DO BRASIL, 29., 2005. **Anais...**

BRUNO, S.F.; MASSENA, V.R.S.; SILVA, A.L.S. Conseqüências da Alta Taxa de Lotação em Ecossistemas Transformados. **Revista Mundo & Vida - Alternativas em Estudos Ambientais**, Niterói: UFF-CEG, v. 6, f. 1. 2005.

BRUNO S.F.; CARVALHO, R.B.A.; BARTMANN, W. Reproductive datas of Brazilian merganser between 2000 and 2005 in Serra da Canastra National Park, MG, Brazil. **TSWG News**, 2006(b). No prelo.

BRUNO, S.F. et al. **Comportamento reprodutivo do pato-mergulhão (*Mergus octocetaceus* Vieillot, 1817) com ninho em cavidade rochosa no Parque Nacional da Serra da Canastra, MG, Brasil.** 2006(a). No prelo.

\_\_\_\_\_. **Comportamento reprodutivo do pato-mergulhão (*Mergus octocetaceus* Vieillot, 1817) com ninho em cavidade arbórea no Parque Nacional da Serra da Canastra, MG, Brasil.** 2006(a). No prelo.

BURMEISTER, H. **Systematische Uebersicht der Thiere Brasiliens, 2: Vögel (Aves).** Georg Reimer, Berlin. 1856.

CERQUEIRA JUNIOR, M.C.; DE PAULA, G.A.; RIBON, R. Ocorrência do pato-mergulhão (*Mergus octosetaceus*) na porção Meridional da Cadeia do Espinhaço, Minas Gerais, Brasil. In: **Resumos do XII Congresso Brasileiro de Ornitologia.** Blumenau, SC. 2005.

CHEBEZ, J.C. **Los que se van. Especies argentinas en peligro.** Buenos Aires: Ed. Albatros, 1994. 604 p.

CHEBEZ, J.C.; REY, N.; BABARSKAS, M.; GIÁCOMO, A.D. **Las aves de los Parques Nacionales de la Argentina.** Buenos Aires: Ed. L.O.L.A., 1998. 126 p. (Monogr., 12)

CLAY, R.P.; VILLANUEVA, S.; FERNÁNDEZ, D.; FERNÁNDEZ, E.; FERNÁNDEZ, E. Brazilian Merganser may survive in Paraguay. **TWSG News**, v. 14, p. 52, 2003.

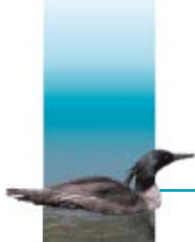
COLLAR, N.J.; GONZAGA, L.P.; KRABBE, N.; MADROÑO NIETO, A.; NARANJO, L.G.; PARKER III, T.A.; WEGE, D.C. **Threatened birds of the Americas: the ICBP/IUCN Red Data Book.** Cambridge, UK: ICBP, 1992.

COUTINHO, L.M. Ecological effects of fire in Brazilian cerrado. **Ecological Studies**, v. 42, p. 273-291, 1982. In: HUNTLEY, B.J.; WALKER, B.H.; Springer-Verlag. (Ed). **Ecology of Tropical Savanna.**

DELACOUR, J. **The waterfowl of the world.** London: Country Life, III v. 1959.

DIETZ, J.M. **Ecological studies of the Maned Wolf in Serra da Canastra National Park, Minas Gerais state, Brazil, South America.** IUCN/WWF Project 1584. 1980.

ENAPRENA. **Documento base sobre el sector agrícola y su impacto ambiental.** Asunción, Paraguay: SSERNMA/MAG-GTZ, 1995.



FACETTI, J.F. **Estado ambiental del Paraguay:** presente y futuro. Asunción, Paraguai: SEAM/GTZ, 2002.

FORCELLI, D.O. El Pato Esquivo Sobrevivira? **En Peligro de Extinción**, v. 1, n. 1, p. 2-3, 1987.

FUCEMA; SAREM; AOP; APN. **Libro rojo:** mamíferos y aves amenazados de la Argentina. Buenos Aires, 1997. 221p.

GARSON, P. Pheasant Specialist Group (WPA/BirdLife/SSC). **Species**, v. 34, p. 77-78, 2000.

GIAI, A.G. Notas de viajes por el norte de Misiones. **Hornero**, v. 9, p. 121-164, 1950.

\_\_\_\_\_. Notas sobre la avifauna de Salta y Misiones. **Hornero**, v. 9, p. 139-164, 1951.

\_\_\_\_\_. **Vida de un naturalista en Misiones.** Buenos Aires: Ed. Albatros, 1976. 171p.

GLOBAL FIRE MONITORING CENTER WEBSITE. **Fires in Brazil, 26 September 2003.** 2003. Disponível em: [http://www.fire.uni-freiburg.de/GFMCnew/2003/0926/20030926\\_brazil.htm](http://www.fire.uni-freiburg.de/GFMCnew/2003/0926/20030926_brazil.htm).

GRANIZO, T.; HAYES, F.E. El Pato Serrucho y su posible extinción en el Paraguay. **Hornero**, p. 18. 1989.

GREEN, A.J. Analysis of globally threatened Anatidae in relation to threats, distribution, migration patterns, e habitat use. **Conservation Biology**, v. 10, p. 1435-1445, 1996.

HAYES, F.E. Status, distribution e biogeography of the birds of Paraguay. **American Birding Association, Monographs in Field Ornithology.** American Birding Association. v. 1, 1995. 230 p.

HAYES, F.; GRANIZO, T. A tippy canoe e waterfalls too - in search of the Brazilian Merganser. **La Kuatia Ne'é**, March-April 1990, p. 25-28.

HEARN, R. The current status of the Brazilian Merganser (*Mergus octosetaceus*) in Argentina. **Threatened Waterfowl Research Group Newsletter**, WWT, Slimbridge, UK, v. 5, p. 14-15, 1994.

HERMOSA, A.J.L. Calidad de agua del embalse de Itaipú. **Biota**, v. 9, p. 1-36, 1999.

JOHNSON, A.; CHEBEZ, J.C. Sobre la situacion de *Mergus octosetaceus* Veillot (Anseriformes: Anatidae) en la Argentina. **Historia Natural Supl.**, Ctes., v. 1, p. 1-16, 1985.

LAMAS, I.R. Census of Brazilian Merganser *Mergus octosetaceus* in the region of Serra da Canastra National Park, Brazil, with discussion of its threats and conservation. **Bird Conservation International.** No prelo.

\_\_\_\_\_. *Mergus octosetaceus*: nova estimativa do tamanho da população na região do Parque Nacional da Serra da Canastra. BRAZILIAN ORNITHOLOGY CONGRESS, 11., 2003. **Proceedings...** Feira de Santana, Bahia, November 2003.

LAMAS, I.R.; SANTOS, J.P. A Brazilian Merganser *Mergus ocotsetaceus* nest in a rock crevice, with reproductive notes. **Cotinga**, v. 22, p. 38-41, 2004.



LINS, L.V.; ANDRADE, R.D. Novos registros do pato-mergulhão (*Mergus octosetaceus*) na região da Serra da Canastra, Minas Gerais. CONGRESSO BRASILEIRO DE ORNITOLOGIA, 12., 2004. Blumenau, SC. 2004. **Resumos...**

LIVEZEY, B.C. Phylogeny e evolutionary ecology of modern seaducks (Anatidae: Mergini). **Condor**, v. 97, p. 233-255, 1995.

LUTHIN, C. Argentina: La Reserva "Selva Misionera". **Bolétin Panamericano**, v. 3, n. 2, p. 1, 1988.

MCGOWAN, P.J.K.; GARSON, P. **Status survey e conservation action plan 1995-1999 Pheasants**. Gland, Switzerland: IUCN, 1995.

MERTENS, R.; STEINBACHER, J. Die im Senckenburg-Museum vorhandenen Arten ausgestorbener, aussterbender oder seltener Vögel. **Senckenb. Biol.**, v. 36, p. 241-265, 1955.

OLMOS, F.; SILVA E SILVA, R. **Survey of the Brazilian Merganser *Mergus octosetaceus* along the rivers Formoso, Corrente e Pratudão, Bahia, Brazil**: results of a preliminary survey. São Paulo: BirdLife International - Programa do Brasil, 2003. 5 p. Unpublished Report.

PACHECO, J.F.; DA FONSECA, P.S.M. Evidência de ocorrência histórico do Pato-mergulhão (*Mergus octosetaceus*) no estado do Rio de Janeiro. **Atualidades Ornitológicas**, v. 88, p. 10, 1999.

PACHECO, J.F.; SILVA E SILVA, R. **The Brazilian Merganser *Mergus octosetaceus* in Jalapão, Tocantins, Brasil**: results of a preliminary survey. BirdLife International - Programa do Brasil, São Paulo. 2002. 9 p. Unpublished Report.

PARTRIDGE, W.H. Notes on the Brazilian Merganser in Argentina. **Auk**, v. 73, p. 473-488, 1956.

PINESCHI, R.B.; YAMASHITA, C. Occurrence, census e conservation of the Brazilian Merganser (*Mergus octosetaceus*) in Brazil with notes about feeding behaviour e habitat preferences. NEOTROPICAL WATERFOWL SYMPOSIUM, 6., 1999. Neotropical Ornithology Congress, 7 October 1999. Monterrey, Mexico. 1999. **Proceedings...**

\_\_\_\_\_. Ocorrência e notas sobre o comportamento do Pato Mergulhão *Mergus octosetaceus* no Estado da Bahia. CONGRESSO BRASILEIRO DE ORNITOLOGIA, 8., 2000. **Proceedings...** p. 179-180. 2000.

PINTO, O.M. de O. Catálogo das aves do Brasil e lista dos exemplares que as representam no Museu Paulista. **Revta. Mus. Paulista**, v. 22. 1938.

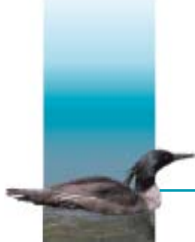
SICK, H. Resultados de uma excursão ornitológica do Museu Nacional à Brasília, novo Distrito Federal, Goiás, com a descrição do um novo representante de *Scytalopus* (Rhinocryptidae, Aves). **Bol. Mus. Nac., N.S. Zool.**, Rio de Janeiro, n. 185, 1958.

\_\_\_\_\_. **Ornitologia brasileira, uma introdução**. Brasília: Universidade de Brasília, 1985.

SICK, H.; DO RÓSARIO, L.A.; DE AZEVEDO, T.R. Aves do estado de Santa Catarina. **Sellóvia Ser. Zool.**, n. 1, 1981.

SILVEIRA, L.F. The birds of Serra da Canastra National Park e adjacent areas, Minas Gerais, Brasil. **Cotinga**, v. 10, p. 55-63, 1998.





SILVEIRA, L.F.; BARTMANN, W. **Observações sobre a biologia de *Mergus octosetaceus* na Serra da Canastra, Minas Gerais, Brasil.** Frankfurt Zoological Society, Frankfurt. 1996. Unpublished Report.

\_\_\_\_\_. Natural history e conservation of the Brazilian Merganser *Mergus octosetaceus* at Serra da Canastra National Park, Minas Gerais, Brazil. **Bird Conservation International**, v. 11, p. 287-300, 2001.

STRESEMANN, E. Ausgestorbene und Aussterbende Vogelarten, Vertreten im Zoologischen Museum zu Berlin. **Mitt. Zool. Mus.**, Berlin, v. 30, p. 38-53, 1954.

SURMACH, S.G.; ZAYKIN, D.V. The Scaly-sided Merganser *Mergus squamatus* (Gould) in the Iman Basin, Far-East Russia. In: HUGHES, B.; HUNTER, J. (Ed.). The Scaly-sided Merganser *Mergus squamatus* in Russia e China. **TWRG Special Publ.**, WWT, Slimbridge, n. 1, p. 11-17, 1994.

SZTOLCZMAN, J. Étude de collections ornithologiques de Paraná. Prace Zool. Pol. Państw. Muz. Przyr. **Ann. Zool. Mus. Pol. Hist. Nat.**, v. 5, n. 3, p. 107-196, 1926.

TOBIAS, J.A.; CATSIS, M.S.; WILLIAMS, R.S.R. **Notes on scarce birds observed in southern e eastern Brazil: 24/7/93 - 7/9/93.** BirdLife International, Cambridge. 1993. Unpublished.

VIANA, C.M.; BRUNO, S.F. Proposta para Desenvolvimento da Agropecuária Ecológica. In: SIMPÓSIO BRASILEIRO DE AGROPECUÁRIA ECOLÓGICA E SAÚDE HUMANA, 1., 2000. Rio de Janeiro, **Anais...** Disquete 3<sup>1/2</sup>. Winzip. 2000.

VON BERLEPSCH, H. Zur Ornithologie der Provinz Santa Catharina, Süd-Brasilien. **J. Orn.**, v. 21, p. 225-293; v. 22, p. 241-284. 1873-74.

VON PELZELN, A. **Zur Ornithologie Brasiliens:** Resultate von Johann Natterers Reisen in den Jahren 1817 bis 1835. A. Pichler's Witwe und Sohn, Wien. 1868-71.

WEGE, D.C.; LONG, A.J. **Key areas for threatened birds in the Neotropics.** BirdLife International, 1995. 311 p.

WILLIAMS, M. Social e demographic characteristics of Blue Duck *Hymenolaimus malacorhynchos*. **Wildfowl**, v. 42, p. 65-86, 1991.

YAMASHITA, C.; VALLE, M.C. Ocorrência de duas aves raras no Brasil Central: *Mergus octosetaceus* e *Tigrisoma fasciatum fasciatum*. **Ararajuba**, v. 1, p. 107-109, 1990.





# Appendixes

## Appendix I. Conservation actions recommended for Argentina

### 1. Fiscalization and legislation

- Promote national and international policies that favor the protection of the Brazilian Merganser and its habitat.
- Enforce existing legislation, in the sense of the preservation of the Brazilian Merganser and its habitat, including regulations relating to riparian forest, hunting and collection of eggs or adults from the wild.
- Promote the development and implementation of international and national action plans for the Brazilian Merganser.
- Establish bilateral or trilateral agreements among the range countries for the conservation of the Brazilian Merganser.
- Incorporate the conservation needs of the Brazilian Merganser into the management plans for the main rivers where the species occurs (Paraná, San Francisco and Tocantins).
- Ensure that broad policies, such as forestry and tourism, do not negatively impact on the Brazilian Merganser and its habitat.

### 2. Species and habitat protection

- Involve international conventions on the protection of the Brazilian Merganser and its habitat, specifically the Ramsar and Biodiversity Conventions.
- Seek protected-area designation for sites regularly holding Brazilian Mergansers.

- Legally forbid activities that promote destruction or degradation of the occurrence sites regularly holding the Brazilian Merganser.
- Increase the availability of nest building sites where appropriate through the installation of artificial nests.
- Reduce recreational disturbance from pedestrians, through the development of oriented trails in areas of occurrence where there is public visitation.
- Implement or to reinforce for domestic animals on the occurrence area of the species, especially dogs, that can kill young or cause disturbance.
- Enforce the legislation that forbids the introduction of exotic fish in reservoirs and lakes connected to the basins used by the Brazilian Merganser.
- Restore previously degraded habitats for the Brazilian Merganser, for example, through reforestation of the gallery forest along the rivers corridors at key sites.
- Regulate the extension of impacting activities as "rafting", "buoy-crossing", encampment, fishing and ecotourism.
- Ensure that negative impacts of dam construction on Brazilian Merganser populations is minimized and compensated for.

### 3. Monitoring and research

- Continue surveys to locate new populations of Brazilian Mergansers,



and periodically re-survey sites where mergansers currently occur or historically were known to occur.

- Compile a key site inventory for Brazilian Merganser.
- Monitor key sites on an annual basis, including details as number of birds, reproductive success, water quality and habitat characteristics.
- Encourage birdwatchers and local people to submit records of Brazilian Mergansers to relevant national contact points, and establish a centralized mechanism for collating birdwatchers' observations.
- Undertake research on Brazilian Mergansers at key sites, including studies of ecology, breeding behaviour, biology, habitat requirements, population dynamics, dispersal, and genetic variability.
- Evaluate the habitat and physical characteristics of sites with historical and recent records of Brazilian Merganser in order to characterize suitable habitats for the species.
- Verify the feasibility of establishing a population of the Brazilian Merganser in captivity.

#### 4. Public awareness and training

- Conduct education programmes on the conservation of natural habitats amongst local people in and around key sites using the Brazilian Merganser as a flagship species.
- Create Brazilian Merganser "Conservation Bases" close to key

sites, providing general information about the species, its habitat, major threats and visitor behaviour rules, to tourists and local community.

- Form local groups interested to promote the conservation of the Brazilian Merganser.
- Conduct training programmes on the conservation of natural habitats for relevant professionals, such as park wardens at key sites, using the Brazilian Merganser as a flagship species.
- Increase public awareness of the need to conserve the Brazilian Merganser through concerted local, regional, national and international media campaigns.

#### 5. International collaboration and communication

- Form international and national working groups to implement conservation plans for the Brazilian Merganser.
- Establish a communications network for relevant interest groups.
- Provide regular feedback on the implementation of the Brazilian Merganser action plan to relevant governmental and non-governmental contacts in range countries and abroad.
- Review annually the progress achieved and revise the efforts undertaken on the implementation of the action plan.



## Appendix 2

### Summary of the recommended conservation actions for Brazil

#### 1. Fiscalization and legislation

- Promote the protection of the Brazilian Merganser and its habitats through national and regional legislation.
- Enforce existing legislation, in the sense of the preservation of the Brazilian Merganser and its habitat, including regulations relating to riparian forest, hunting and collection of eggs or adults from the wild.
- Promote the development and implementation of international and national action plans for the Brazilian Merganser.
- Establish bilateral or trilateral agreements among range states for the conservation of the Brazilian Merganser.
- Incorporate the conservation needs of the Brazilian Merganser into the management plans for the main river systems where Brazilian Merganser occurs (Paraná, São Francisco and Tocantins).
- Ensure that broad policies, such as forestry and tourism, do not negatively impact on the Brazilian Merganser and its habitat.
- To control the hunting pressure, where appropriate, through reinforcement of the control.

#### 2. Species and habitat protection

- Involve international conventions in protecting the Brazilian Merganser

and its habitat, specifically the Ramsar and Biodiversity Conventions.

- Seek protected-area designation for sites regularly holding Brazilian Mergansers.
- Legally forbid activities that promote the destruction or degradation of sites regularly holding Brazilian Mergansers.
- Enhance breeding success where appropriate through the installation of artificial nest boxes.
- Reduce recreational disturbance from pedestrians, through the development of oriented trails on the occurrence areas where there is public visitation.
- Implement or reinforce restrictions for domestic animals on the occurrence area of the species, especially dogs, which could kill chicks and cause disturbance.
- Enforce the legislation that forbids the introduction of exotic fish in reservoirs and impoundments connected to basins used by mergansers.
- Forbid the introduction of exotic fish in reservoirs and lakes connected to the basins used by the Brazilian Merganser.
- Restore previously degraded habitats for Brazilian Mergansers, for example through reforestation of gallery forest along river corridors at key sites.
- Produce management plans for key sites, and establish management



agreements with landowners to protect the species within their properties.

- Limit the negative impact from disturbance by regulating the extent of activities, such as rafting, "buoy-crossing", camping, fishing and ecotourism.
- Reduce siltation in rivers by prohibiting activities, such as diamond and limestone mining and deforestation on the occurrence areas
- Ensure that negative impacts of dam construction on Brazilian Merganser populations are minimized and compensated for.
- Ensure the Tocantinzinho River basin's protection and of its mid and low reaches tributaries, besides the protection of the entire course of Couros River and São Miguel River basin.
- Extend the Chapada dos Veadeiros National Park area in order to include in this unit the areas where recent registers of the Brazilian Merganser and of suitable habitat for the species.
- Regularize the agrarian situation of the Serra da Canastra National Park by paying the overdue indemnities, preventing that the indemnified lands are not lost as park area.

### 3. Monitoring and research

- Continue surveys to locate new populations of Brazilian Mergansers, and periodically re-survey sites where mergansers currently occur or historically were known to occur.
- Compile a key site inventory for Brazilian Merganser.
- Monitor key sites on an annual basis, including details of numbers of birds, breeding success, water quality and habitat characteristics.
- Encourage birdwatchers and local people to submit records of Brazilian

Mergansers to relevant national contact points, and establish a centralized mechanism for collating birdwatchers' observations.

- Undertake research on Brazilian Mergansers at key sites, including studies of ecology, breeding behaviour, biology, habitat requirements, population dynamics, dispersal, and genetic variability.
- Evaluate the habitat and physical characteristics of sites with historical and recent records of Brazilian Merganser in order to characterize suitable habitats for the species.
- Verify the feasibility of establishing a population of the Brazilian Merganser in captivity.

### 4. Public awareness and training

- Conduct education programmes on the conservation of natural habitats for local people in and around key sites using the Brazilian Merganser as a flagship species.
- Create Brazilian Merganser "Conservation Bases" close to key sites, providing general information about the species, its habitat, major threats and visitor behaviour rules, to tourists and local community.
- Form local interest groups to promote the conservation of the Brazilian Merganser.
- Conduct training programmes on the conservation of natural habitats for relevant professionals, such as park wardens at key sites, using the Brazilian Merganser as a flagship species.
- Increase public awareness of the need to conserve the Brazilian Merganser through local, regional, national and international media campaigns.



### 5. International collaboration and communication

- Form international and national working groups to implement conservation plans for the Brazilian Merganser.
- Establish a communications network for relevant interest groups.
- Provide regular feedback on the implementation of the Brazilian Merganser action plan to relevant governmental and non-governmental contacts in range states and abroad.
- Review annually the progress achieved and revise the efforts undertaken on the implementation of the action plan.





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## Appendix 3

### Summary of the conservation actions recommended for Paraguay

#### I. Fiscalization and legislation

- Enforce existing legislation, in the sense of the preservation of the Brazilian Merganser and its habitat, including regulations relating to riparian forest.

#### Monitoring and research

- Develop and implement international and national programmes to monitor the status and distribution of the Brazilian Merganser and its habitat.
- Continue surveys to locate new populations of Brazilian Mergansers, and periodically re-survey sites where mergansers currently occur or historically were known to occur. In order of priority, these are:

- Surveys of the Piratíy, Carapá and Pozuelo Rivers.
- Interviews with local people, especially fishermen, throughout the Paraná River drainage in Paraguay.
- Surveys of other tributaries of the Paraná watershed in Paraguay, especially the rivers Monday and Ñacunday.
- Surveys of rivers within the Paraguay River watershed, including the upper stretches of the Apa and Arroyo Estrella, the Aquidaban, the Ypané, the Aguaray Guazú, the Jejui and the Tebicuary.

Other actions pending discovery of remnant populations.

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## Appendix 4

### Photos of the Brazilian Merganser in the Serra da Canastra National Park, Minas Gerais.

Figure 1 - Brazilian Merganser pair with youngs. Photo: Sávio Bruno, 2001.

Figure 2 - Brazilian Mergansers pair flying over the river. Photo: Sávio Bruno, August 2005.

Figure 3 - Brazilian Mergansers pair. Photo: Sávio Bruno.

Figure 4 - Brazilian Mergansers pair. Photo: Sávio Bruno.

Figure 5 - Brazilian Mergansers pair. Photo: Sávio Bruno.

Figure 6 - Brazilian Mergansers pair. Photo: Sávio Bruno.

Figure 7 - While the female incubates, the Brazilian Merganser male rests in front of the nest, floating in calm waters. Photo: Sávio Bruno, August 2005.

Figure 8 - Brazilian Mergansers pair with eight youngs. Photo: Sávio Bruno, August 2001.

Figure 9 - Brazilian Mergansers family in the São Francisco River; the youngs are about 4 days old. Photo: Sávio Bruno, August 2005.

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Sávio Bruno, 2001.

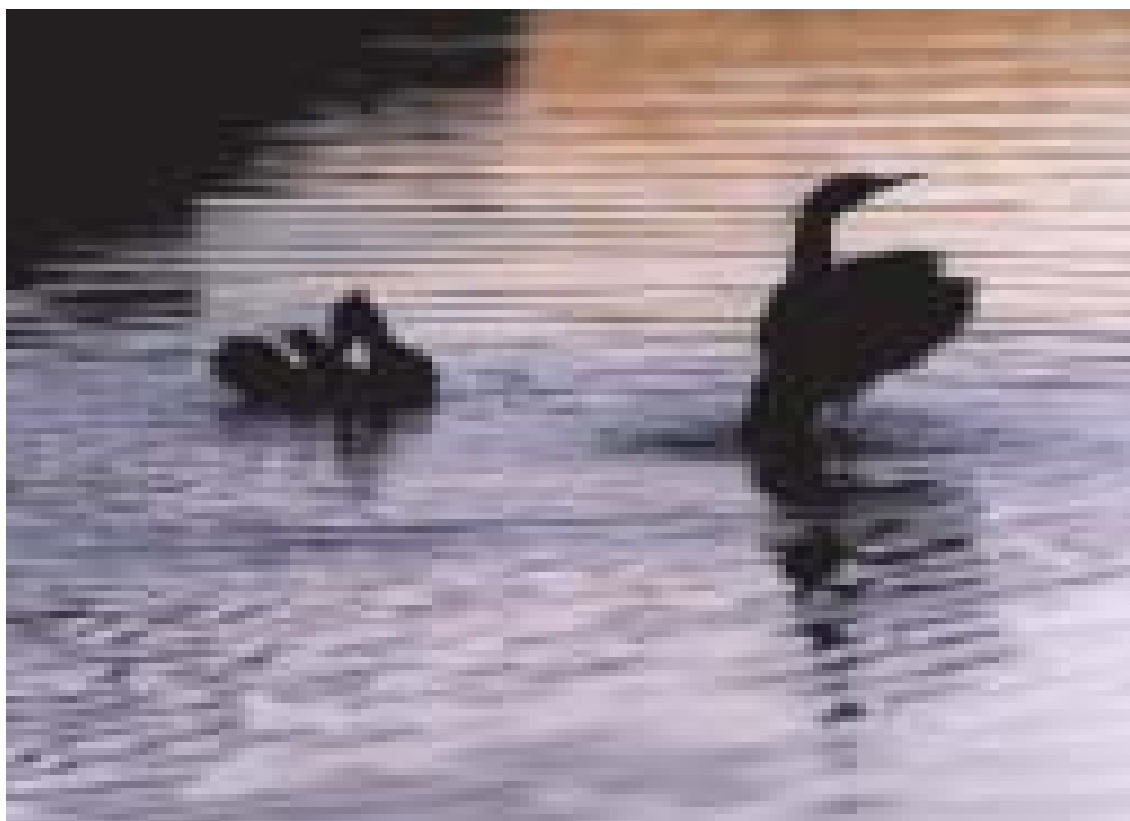


Fig. 1 – Brazilian Merganser pair with youngs.

Sávio Bruno, agosto de 2005.



Fig. 2 – Brazilian Mergansers pair flying over the river.



Sávio Bruno.

Fig. 3 – Brazilian Mergansers pair.



Sávio Bruno.

Fig. 4 – Brazilian Mergansers pair.



Sávio Bruno.

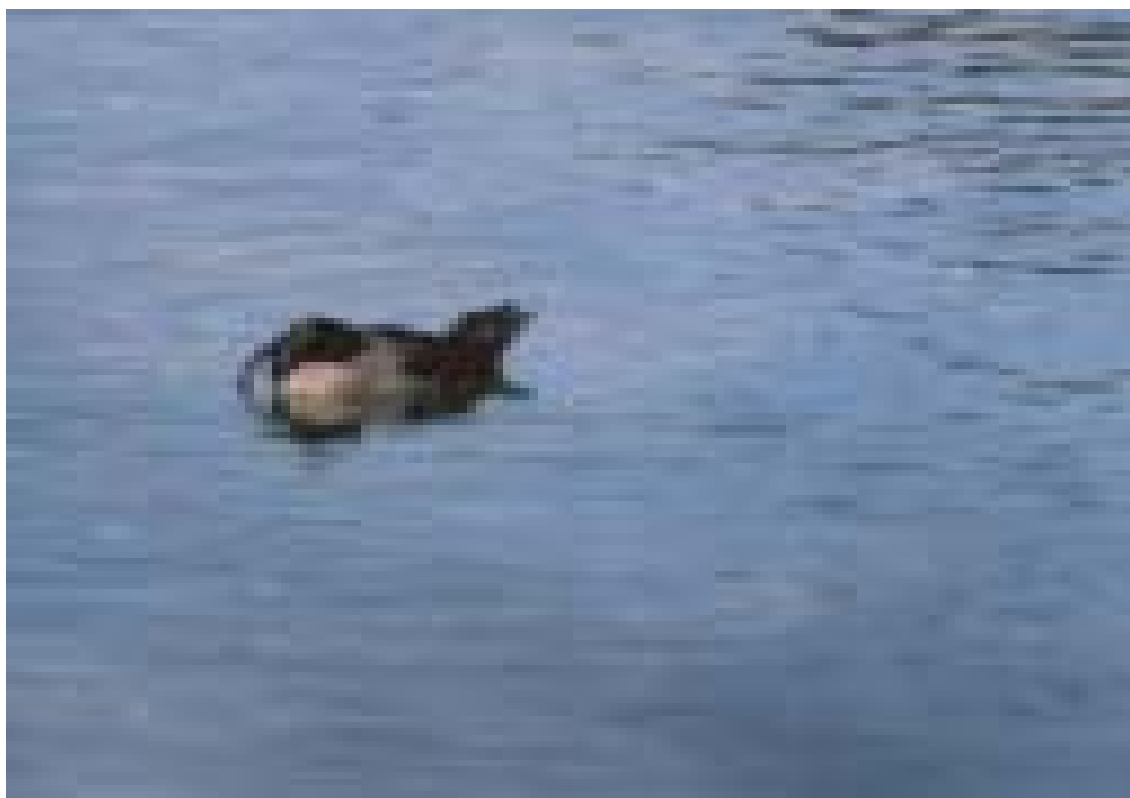


Fig. 5 – Brazilian Mergansers pair.

Sávio Bruno.



Fig. 6 – Brazilian Mergansers pair. Photo: Sávio Bruno.



Sávio Bruno, agosto de 2005.

Fig. 7 – While the female incubates, the Brazilian Merganser male rests in front of the nest, floating in calm waters.



Sávio Bruno, agosto de 2001.

Fig. 8 – Brazilian Mergansers pair with eight youngs.



Sávio Bruno.

Fig. 9 – Brazilian Mergansers family in the São Francisco River; the youngs are about 4 days old.