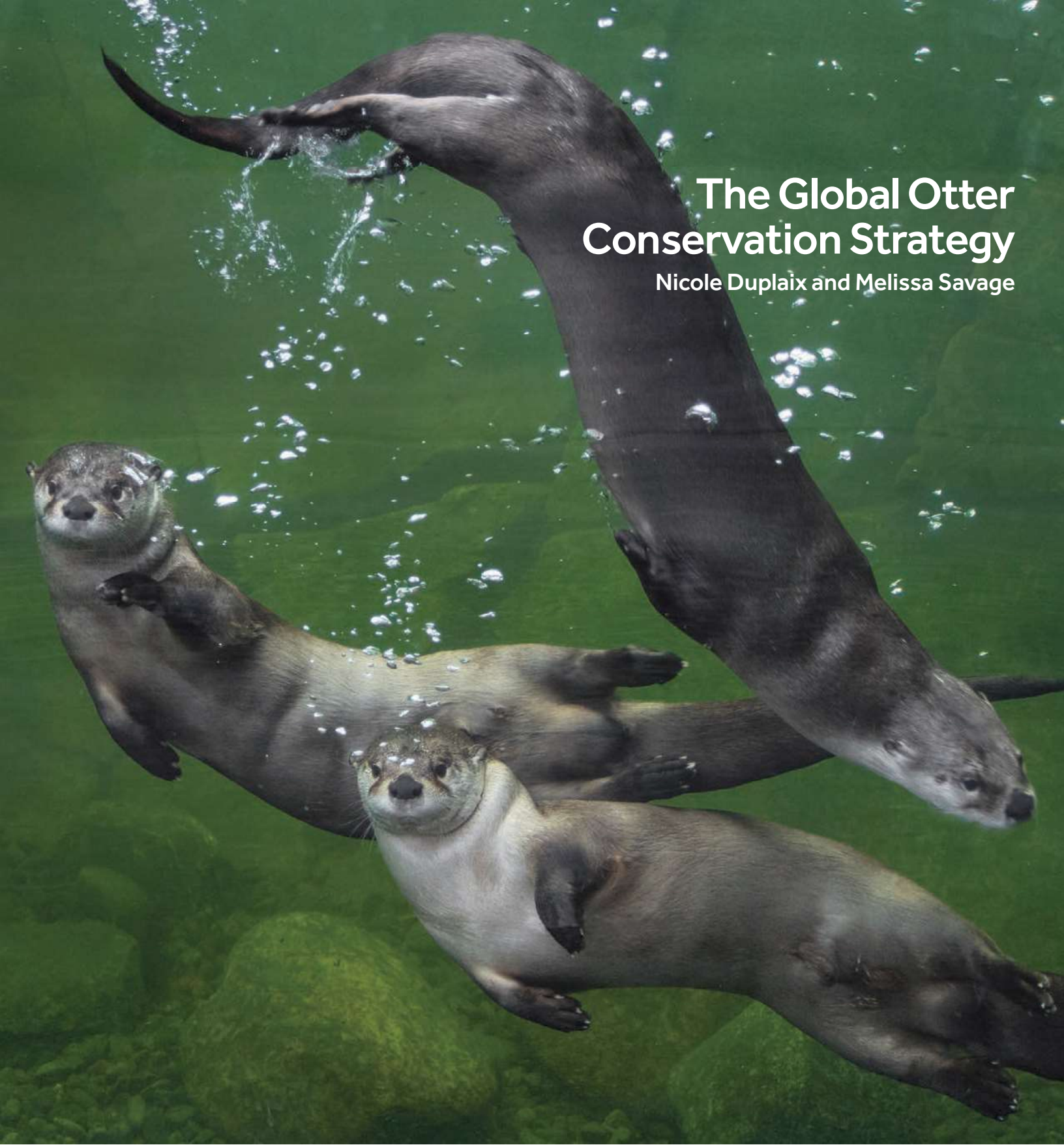

The Global Otter Conservation Strategy

Nicole Duplaix and Melissa Savage

IUCN SSC Species Survival Commission

RED LIST THE IUCN RED LIST OF THREATENED SPECIES™

Otter Specialist Group

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The Global Otter Conservation Strategy
Nicole Duplaix and Melissa Savage

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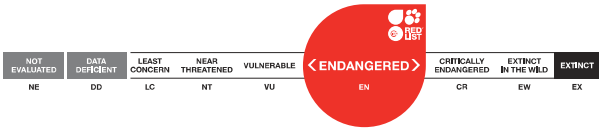
List of the thirteen extant otter species

1. **Giant otter**
   Pteronura brasiliensis
   South America
   ***Endangered**
2. **North American River otter**
   Lontra canadensis
   North America
   ***Least concern**
3. **Neotropical otter**
   Lontra longicaudis
   South America
   ***Near threatened**
4. **Marine otter**
   Lontra felina
   South America
   ***Endangered**
5. **Southern river otter**
   Lontra provocax
   South America
   ***Endangered**
6. **Sea otter**
   Enhydra lutris
   North America
   ***Endangered**
7. **Spotted-necked otter**
   Hydrictis maculicollis
   Africa
   ***Near threatened**
8. **Hairy-nosed otter**
   Lutra sumatrana
   Asia
   ***Endangered**
9. **Eurasian otter**
   Lutra lutra
   Eurasia
   ***Near threatened**
10. **African clawless otter**
    Aonyx capensis
    Africa
    ***Near threatened**
11. **Congo clawless otter**
    Aonyx ongicus
    Africa
    ***Near threatened**
12. **Short-clawed otter**
    Aonyx cinereus
    Asia
    ***Vulnerable**
13. **Smooth-coated otter**
    Lutrogale perspicillata
    Asia
    ***Vulnerable**

South America
Giant Otter
Pteronura brasiliensis



The largest otter was once the most endangered in the mid-1970s when the fur trade decimated its numbers over most of its South American range. The implementation of CITES, strong national protection legislation, and ongoing conservation programs in the range countries allowed the Giant otter to make a comeback.

IUCN Red List Status
The Giant otter is classified as Endangered. A future reduction in population size of 50% or more is projected over the next 25 years, or three generation lengths (Pacifici *et al*. 2013). CITES: Appendix I.

Distribution
The Giant otter is endemic to South America and its historical broad distribution ranged from east of the Andes in the Orinoco and Amazon Basins to northern Venezuela and the river networks of the Guianas and to its southern limit in Argentina, occurring in lowland environments no more than 600 m elevation. But local extinctions caused fragmentation of the Giant otter's range, due to commercial hunting for most of the 20th century and to habitat destruction. The populations from the Paraná Basin in southern Brazil and from Argentina and Uruguay are considered extinct or nearly so. In the Brazilian Cerrado a population persists in the face of intense habitat modification. Important populations are still found in parts of the Amazon, in the Pantanal region and possibly in the Guianas.

Hunting for the pelt trade was the greatest threat to the Giant otter in the past and the species came close to extinction in the early 1970s in Ecuador, Colombia, Venezuela, Bolivia, and Brazilian Pantanal (Duplaix 1980). From 1960 to 1969, records indicated a regional harvest of 12,390 giant otter skins. In 1973, Giant otters were placed on CITES Appendix I, and the enforcement of international trade restrictions on Giant otter skins in 1975 finally ended Giant otter hunting (Recharte and Bodmer 2010). Stable populations are now known in some parts of the Pantanal (Leuchtenberger and Mourão 2008, Ribas *et al*. 2012, Tomás *et al*. 2015) and the Amazon (Rosas *et al*. 2007, Groenendijk *et al*. 2015). Recently some populations have been recovering and or returning to their original range, for example, the Yavarí-Mirín River in Peru (Recharte and Bodmer 2010), the Madidi and Itenéz and Guaporé Rivers in Bolivia (Ayala *et al*. 2015, Zambrana Rojas *et al*. 2012), the Lagarto-Cocha and Cuyabeno Rivers in Ecuador (V. Utreras pers. comm. 2018), and the Amanã Reserve in Brazil (Marmontel *et al*. 2015) and in the middle Içana River, Northwest Amazonia in Brazil (Pimenta *et al*. 2018).

Habitat and Ecology
The Giant otter inhabits large rivers, streams, lakes and swamps (Duplaix 1980, Carter and Rosas 1997). In Suriname, the species seems to prefer black water creeks and rivers with sandy or rocky bottoms (Duplaix 1980). In Peru, large lowland rivers with gentle flow and oxbow lakes with high fish densities are preferred (Schenck 1999). In Bolivia, both clear and whitewater floodplains are used (Zambrana Rojas *et al*. 2012). Since Giant otters build dens and use campsites along the banks of water bodies, some habitat traits are important determinants of presence, such as gentle slopes, vegetation cover and proximity to the water's edge (Lima *et al*. 2012). In seasonally flooded habitats, the availability of banks and other habitat features may change and induce changes in habitat selection by the otter (Leuchtenberger *et al*. 2013).

During the peak inundation in the southern Pantanal, when the banks are flooded,

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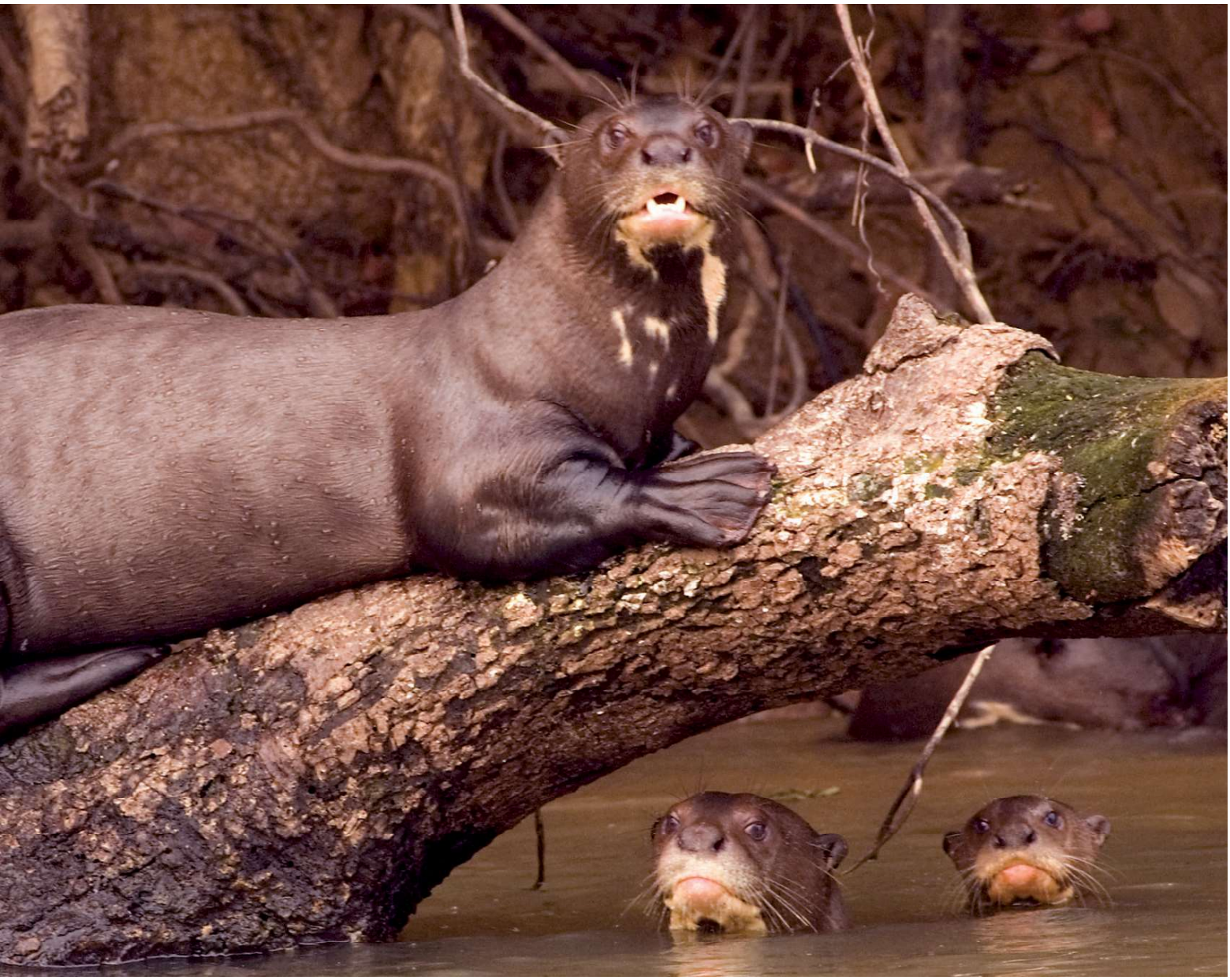

Giant otter groups use emerged shrubs as refuges and latrines (Leuchtenberger *et al*. 2015). At such times, when prey is more dispersed, Giant otters were observed in flooded forest, swamps and grasslands adjacent to the river (Leuchtenberger *et al*. 2013). Territoriality and population density may lead some groups to use unusual sites, such as artificial lakes along roads in the southern Pantanal (Leuchtenberg *et al*. 2013). Giant otters also use agricultural channels (Laidler 1984) and the reservoirs of dams (Palmeirim *et al*. 2014). The preferred habitat for Giant otters seem to be undisturbed water bodies, with high quality vegetation cover and abundant prey density.

Giant otters are one of the most social members of the otter family. A Giant otter group consists of a dominant breeding pair, non-breeding subadults and offspring. Group size can range from two to sixteen individuals that may or may not be related (Ribas *et al*. 2016).

Reproduction is related to the capacity of the group to defend high quality territories, usually a function of group size (Groenendijk *et al*. 2014, Leuchtenberger *et al*. 2015), possibly explaining the advantage of having non-related individuals in the group (Leuchtenberger and Mourão 2008, Ribas *et al*. 2016). Giant otters attain sexual maturity at around 2 1/2 years old (Oliveira *et al*. 2011), and the earliest breeding may occur at age 3 (Groenendijk *et al*. 2014). A group usually produces one litter a year, ranging from one to six young but averaging two (Duplaix 1980, Staib 2005, Groenendijk and Hajek 2006, Leuchtenberger and Mourão 2008).

Groups live in well-established territories that are constantly defended by scent-markings at latrines, campsites and dens along the banks of lakes and rivers (Leuchtenberger and Mourão 2009), and warning vocalizations (Leuchtenberger *et al*. 2014, Mumm and Knörnschild 2017).

Conflict encounters are common when an intruder is detected and may lead to serious injuries or even death (Schweizer 1992, Rosas and Mattos 2003, Ribas and Mourão 2004). Territories vary in size from 0.5 km to 18 km of riverbank in the dry season, and 8 to 24 km in the wet season (Utreras *et al*. 2005, Leuchtenberger *et al*. 2015) and appears to be related to group size (Groenendijk *et al*. 2014, Leuchtenberger *et al*. 2015). The size of neighboring groups may limit the expansion of territory (Leuchtenberger *et al*. 2015).

The diet of Giant otters consists almost exclusively of fish but may also include caiman and other vertebrates (Ribas *et al*. 2012, Rosas-Ribeiro *et al*. 2012). The species is opportunistic in its diet and adapts its diet according to prey availability.

Threats

The species is threatened by multiple human activities throughout the species range, destruction of riparian habitat, overfishing, contamination of water bodies -- especially by gold mining, fossil fuel exploration, and the use of pesticides and fertilizers, domestic animal diseases, and mismanaged tourism (Duplaix 1980, Schenck 1999, Utreras and Tirira 2001). Human populations are increasing and expanding in the region. In the last census, the Amazon region registered the highest population growth in Brazil. Illegal settlements, road opening and deforestation threaten pristine habitats. Colonization of new areas are expected, followed by intensive exploitation of natural resources. Furthermore, proposed mega-projects in the 2007 Brazilian Growth Acceleration Plan represent a significant threat to Brazilian Amazonian and Pantanal habitat.

The Giant otter remains endangered because of the low recuperation rate of relict populations now also under pressure from human activities (Groenendijk *et al*. 2014). Direct conflict between humans and otters is an increasing problem. Otters may

Even a decade after gold mining stopped, areas affected still had depleted fish populations and had not been recolonized by otters.

be killed for fun or out of fear, or, more often, because they are seen as competitors for fish by loggers, miners, and fishermen, who often blame them for depleting fish resources used for local consumption and in commercial trading in markets (Gómez and Jorgensen 1999, Recharte *et al*. 2008, Rosas-Ribeiro *et al*. 2012, Utreras and Tirira 2001). Giant otters can drown, get stuck in fishing nets and traps, and are then blamed for damaging them (Rosas-Ribeiro *et al*. 2012, Utreras *et al*. 2013). Fish farming is rapidly increasing in the species' range, for example in parts of the Ecuadorian Amazon, and expose otters to retaliation killing (V. Utreras pers. obs.). Cubs are sometimes captured illegally to be kept as pets (M. Marmontel pers. obs).

Giant otters are highly susceptible to persecution: they are large, conspicuous, social, and very vocal. They are active in daytime and occupy open habitats and stable territories. Their signs – latrines and dens – are easily recognizable, making it possible to identify areas of recent activity by a group (Groenendijk *et al*. 2005). Individuals and groups often react to people by approaching to investigate. Moreover, only the dominant pair produces young, and usually only once a year. During the years of the pelt trade, these life history attributes of the species combined to make it an easy target for fishermen. In 2017 a Giant otter group was killed by fishermen in the Pantanal and according to locals, kills occur frequently during the fishing season (C. Leuchtenberger, pers. comm.). In 2011-2012, the Kanamari indigenous people promoted a massive Giant otter killing in their territory (Território Indígena Kanamari), based on their perception that the species was overfishing the river turtle population. The community leader bought 300 cartridges for the hunters, who shot 64 giant otters (Endo pers. comm. 2012). Such incidents of targeted killing can lead to extinction of small populations in a watershed.

Gold mining, both artisanal and industrial, is a significant threat to the species, particularly in the Guiana Shield region, in southeastern Peru, and the western region of the Ecuadorian Amazon. The main impacts are habitat destruction, sedimentation of rivers, and pollution (Kimbrough 2014). Gold miners cut swathes into the floodplain forest and blast river banks with pressure hoses, using mercury to amalgamate gold particles. Gold prices are at a record high, whereas mercury is inexpensive. Forest conversion to mining increased six-fold from the periods 2003-2006 to 2006-2009 (Swenson *et al*. 2011).

Even a decade after mining stopped, areas affected still had depleted fish populations and had not been recolonized by otters. In areas of gold mining, fish are contaminated with mercury. Gutleb *et al*. (1997) found that mercury concentrations in most fish near Manu National Park were higher than considered tolerable for the Eurasian otter.

Migration of contaminated fish and long-range atmospheric transport of mercury probably increase the area of influence of such contaminants. Contamination of otters by other heavy metals through pesticides and other agrochemicals is still poorly understood. Over the last two decades, the Guianas and Peru regions are facing significant expansions in areas subject to gold mining, and consequently in French Guiana populations are still considered as decreasing, due to habitat threats (Allard *et al*. 2017).

The many planned hydroelectric dams in the species' range are a major threat to giant otters. These will alter hydrological regimes of rivers and affect fish populations and habitat (Latrubesse *et al*. 2017). Dams disrupt the annual cycles of inundations, vital for the maintenance of populations of flood dependent species such as the giant otter (Mourão *et al*. 2010, Alho and Sabino 2011). One hundred and eighty-four new dams are planned or under construction, greater than two MW capacity over the next 20 years in the Amazon. These dams would include five of the six major Andean tributaries of the Amazon. Sixty per cent of the dams would cause the first major break in connectivity between protected Andean headwaters and the lowland Amazon.

Giant otters can live in some artificial lakes, such as the shallow Balbina Reservoir in Brazil (Rosas *et al*. 2007). In other areas, hydroelectric dams have depleted Giant otter populations, as did the Curuá-Una Hydroelectric in the Brazilian Amazonia (Rosas *et al*. 2007). Around the Pantanal, there are over 115 projects of small hydroelectric plants. Other major infrastructure projects include the Inter-oceanic highway in southeastern Peru, and the Initiative for the Integration of the Regional Infrastructure of South America (V. Utreras pers. comm.).

One hundred and eighty-four new dams greater than two MW capacity are planned or under construction over the next 20 years in the Amazon.

Giant otters are vulnerable to disturbance from poorly managed tourism, including sport fishing. It is important to control increasing levels of tourism on lakes and rivers both in and outside protected areas (Groenendijk and Hajek 2006). Research has shown that Giant otter reproductive success and sighting success by tourists is considerably lower on unmanaged lakes than on managed lakes (Groenendijk and Hajek 2006).

Giant otter cubs held in captivity have died of canine parvovirus, so domestic animal diseases may pose a serious threat to wild giant otter populations. Infection can also occur in remote areas, since transient otters and people hunting with dogs travel large distances with potential for contact and infection of vulnerable otter populations (Schenck 1999).

Climatic changes are predicted to increase suitable areas for Giant otters (Cianfrani *et al*. 2018). However, long-term habitat and climatic modifications may increase the exposure of some core otter areas to the negative effects of the surrounding unsuitable areas (Cianfrani *et al*. 2018). The species also has a high specialized niche, making it more vulnerable to climate change.

Captive Populations

There are currently 116 Giant otters in captivity in 27 zoos, and more than half of these individuals are in European zoos. The comparison of the gene diversity index among captive subpopulation is the result of different strategies in Europe and the US. In Europe breeding has been kept low, which results in a lower inbreeding factor and a higher gene diversity, although the number of animals is decreasing. In US breeding the program is strong which results in high inbreeding, low gene diversity and stable demographics. Currently, Giant otters are not breeding in the Latin American captive population. Their collective genetic profile is the best (wild born, confiscated animals or first or second-generation captive born) but the total number of individuals is very low. For a globally sustainable captive population, exchange programs between zoos in Latin America are needed and collaborative breeding programs must be launched.

Site-specific Conservation Locations

The population of Giant otters living in the Cerrado biome in Brazil has a high conservation value. Recent surveys conducted from the Araguaia basin to the eastern limit of the species' distribution

Threat Mitigation Measures
Some priority actions include:

1. Establish protected areas in all range countries, including fish corridors, to connect fragmented populations and protect stable populations
2. Strengthen national, departmental and municipal protected area administrations, as well as other key actors, especially with indigenous grassroots organizations
3. Implement reintroduction programs to recover historical populations in Argentina (Corrientes) and Brazil (Paraná Basin)
4. Establish national conservation plans throughout the species range
5. Foster multinational cooperation (ie, Amapá-Brazil and French Guiana, Suriname and Guyana, Southern Amazon and the Pantanal) to coordinate management of transboundary or connected protected areas, control of illegal mining and the integrity of continuous otter habitat
6. Create protocols in all range countries to regulate mitigation and compensation for projects like hydroelectric dams, gold mining, agriculture, deforestation and overfishing within the species range
7. Implement resilience and recovery projects in areas of human activities to help the return of giant otters after threat mitigation
8. Create global guidelines for giant otter watching by ecotourists including mandatory responsible behavior
9. Promote the value of giant otters through environmental education programs in communities that coexist with otters
10. Develop management plans to regulate overfishing to reduce conflicts and protect the prey base
11. Implement sustainable economic alternatives for communities that coexist with giant otters by training locals to guide otter watchers and strengthen local networks to participate in the regional decision-making processes
12. Create a map of risk and decision scenarios for stakeholders, incorporating otter presence and the current and future threats
13. Establish long-term giant otter conservation programs for key populations in Brazil (Pantanal, Amazonia, Cerrado), Bolivia (Amazonia), Peru (Amazonia), and Colombia (Orinoco)
14. Conduct population surveys in areas with poor or no knowledge about giant otter occurrence in the last decade, especially in Uruguay, Argentina, Brazil (Paraná Basin)
15. Document the illegal trade in Guyana where otters are removed from the wild, either to trade or breed for pets

estimate a population size of over 200 individuals (G. Georgiadis, pers. obs.). A long-term monitoring program of the Cantão Park in Tocantins State provided the first information about Giant otter ecology and behavior in this region (Georgiadis *et al*. 2015) but information about this population's genetic structure is still lacking.

The Paraná Basin, where the otter has not been sighted in a decade (Rocha-Mendes *et al*. 2005, Silvestre 2015) and is considered extinct or nearly extinct, is a potential site for a reintroduction program. In Corrientes, Argentina, a rewilding program plans to reintroduce Giant otters to the Iberá Wetlands, where the species was eliminated by hunting in the 1980s. The tradeoffs between natural recovery and reintroductions needs evaluation.

The Pantanal otter population should receive special attention because of its low genetic diversity (Pickles *et al*. 2011), southern distributional limit, and human disturbance (Harris *et al*. 2005, Alho and Sabino 2011).

Fisheries at the Amapá National Forest (Michalski *et al*. 2012), the Amanã Sustainable Development Reserve (Lima *et al*. 2014), the Orinoco region in Colombia (Trujillo *et al*. 2015) and on the Cuiabá River in the north Pantanal (C. Leuchtenberger pers. obs.) deserve attention. The development of otter-based ecotourism may provide benefits in these areas that help mitigate losses to fisheries in these areas.

Success Stories

Indigenous stories describe a harmonious relationship between Giant otters and humans. In Colombia, some indigenous groups believe that Giant otters guarantee the health of the river, culling contaminated fish, while others tell a story that Giant otters became people and fished like humans (Colombia 2016). While colonization and modernization of indigenous peoples have changed these views, there are still examples of indigenous people taking steps to protect the species within their territories.

In Bolivia, for example, the Tacana people list the Giant otter as one of the species which should not be hunted within the framework of traditional subsistence hunting (CIPTA 2008). Indigenous territories make up almost 30% of the Amazon basin, and many of these indigenous territories are large enough to ensure that subsistence hunting is essentially sustainable, and are often adjacent to, or overlap, national, state and municipal protected areas which make up another 20% of the Amazon basin. Working with local people in and around the protected areas and indigenous territories of the Amazon represents the greatest opportunity for the conservation of Giant otter population strongholds.

Long-term population monitoring programs have documented Giant otter recovery since early 2000 in: Manu National Park, Peru, on the Vermelho-Miranda Rivers, Brazilian Pantanal, in Balbina Lake and Amanã Sustainable Development Reserve in Amazonia, Brazil, in Cantão State Park in the Cerrado of Brazil, on the Upper Rupununi River of Guyana – showing growing numbers and expanding occupancy area (Georgiadis *et al*. 2015, Groenendijk *et al*. 2014, Leuchtenberger *et al*. 2015, Lima *et al*. 2014, Marmontel *et al*. 2015).

In Brazil and Peru, the Giant otter is seen as a charismatic species for ecotourism, attracting tourists interested in wildlife watching. At the Barranco Alto Lodge in the Southern Pantanal, Giant otter watching is conducted in a nonintrusive and careful manner. Ecotourism represents an important tool to improve human attitudes towards the species, creating economic alternatives for local people and reinforcing the conservation of Giant otters.

A non-profit organization has been working at the Jauaperi River, a tributary of the Negro River in the Brazilian Amazon, to raise international funds to address the threats of habitat degradation, while offering sustainable economic alternatives to the local community (Evangelista and Tosi 2015). This organization has reduced the migration from rural sites to the cities and improved the quality of the community. Local residents that were former Giant otter hunters are today esteemed guides for tourists and researchers (Duplaix *et al*. 2015, Evangelista and Tosi 2015).

A program was launched in Peru at 2017 aimed at investigating the effect of mining and other human activities on Giant otter populations. The program monitors Giant otter territories in the protected Manu National Park and compares them with the adjacent mined areas of the lower Madre de Dios River. The program focuses on demography and behavior of Giant otters and samples the local fish communities to understand their abundance and the mercury exposure risk for local Giant otters. In Guyana, where conservation planning is underway, the Giant otter is recognized as an important umbrella species and there is interest among conservation organizations working in the region in protecting this species – along with many other rare "giants" such as the jaguar, giant anteater, and river turtle.

Giant otter populations of the Pantanal appear to be recovering, with signs of reaching carrying capacity in some areas (Tomás *et al*. 2015). Specific conservation action plans have been developed in Brazil (ICMBio 2016), Colombia (Colombia 2016), Ecuador (Utreras *et al*. 2013) and Venezuela (Ferrer *et al*. 2017) to recover and maintain remaining populations. Continuing and effective conservation strategies are needed in these locations.

Giant Otter *Pteronura brasiliensis*
Projects and Funding Opportunities

Region	Actions	Costs
States/provinces/territories where giant otters coexist with traditional communities	Support to national, departmental and municipal protected area administrations, and other key actors, especially indigenous grassroots organizations	Not estimated
States/provinces/territories where there are relict populations of giant otters	Protected area creation in all range countries, including fish corridors, to connect fragmented populations and protect stable population	Not estimated
Argentina **Iberá Reserve** **Corrientes** **Brazil (Paraná Basin)**	Reintroduction programs to recover historical populations in Argentina (Corrientes) and Brazil (Paraná Basin)	$ 100,000/year for 5 years, two projects
All countries lacking a conservation plan for giant otters	Establishment of national conservation plans throughout the species range	Publication of conservation plans $ 20,000
Continent-wide	**Workshop to:** **1)** foster multinational cooperation to coordinate management of transboundary or connected protected areas, control of illegal mining and integrity of continuous otter habitat **2)** create protocols to regulate mitigation and compensation for projects like hydroelectric dams, gold mining, agriculture, deforestation and overfishing **3)** create a map of risk and decision scenarios for stakeholders, incorporate otter presence and current and future threats	Meeting for 50 participants $ 35,000 for 5 days
Guiana Shield	Resilience and recovery projects in areas of human activities to support giant otter return after threat mitigation	$ 60,000/year for 10 years in 3 countries
Brazil (Pantanal, Amazonia, Cerrado) **Bolivia (Amazonia)** **Peru (Amazonia)** **Colombia (Orinoco)**	Environmental education programs in communities that coexist with otters to promote the value of giant otters and to implement sustainable economic alternatives by training locals to guide otter watchers and to strengthen local networks to participate in regional decision making	$ 40,000/year for 2 years Four projects in 4 countries
Uruguay (Merin Lagoon Basin) **Brazil and Argentina (Paraná-Paraguay Basin)**	Population surveys in areas with poor or no knowledge about giant otter occurrence in the last ten years	$ 50,000 each for two projects
Brazil (Pantanal, Amazonia, Cerrado), Bolivia (Amazonia), Peru (Amazonia), Colombia (Orinoco)	Long-term population monitoring programs to evaluate population dynamics, behavior, health, genetics and ecological constraints in pristine habitats as control cases in assessing impacts on giant otter populations under high human impacts	$ 60,000/year for 5 years, 4 projects
Brazil (Tapajós River system)	"Before-After With Control" monitoring programs of giant otters in areas of hydroelectric power plant projects to evaluate impact on the species and to develop protocols for mitigation/compensation actions	$ 200,000 $ 20,000/year for 10 years
Brazil (Pantanal) **Peru (Manu National Park)**	Creation of global guidelines for giant otter watching by ecotourists including mandatory responsible behavior; conduct training workshops with locals to implement guidelines in areas with high ecotourism potential	$ 60,000 for 2 years Two projects