State Party Report

on the Sate of Conservation of

Iguaçu National Park (Brazil) (355)

submitted in response to World Heritage Committee
Decision 45 COM 7B.64

Photo: Adilson Borges

Site
Iguaçu National Park

State Party
Brazil

ID. NO.
355

Criteria
(vii) (x)

Registration Year
1986

November 2024

ICMBio INSTITUTO CHICO MENDES MMA

MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE

MINISTRY OF EXTERNAL RELATIONS

BRAZILIAN GOVERNMENT
BRASIL
UNITING AND REBUILDING

1. Executive Summary of the report

Baixo Iguaçu Hydropower Plant (HPP) is operating regularly, and the monitoring of its impact on the property is ongoing, with the latest reports issued in June 2024. Data demonstrate that the threshold reservoir outflow required to preserve the scenic beauty of Iguaçu Falls is being maintained. No impacts on biodiversity have been documented; however, the studies conducted have provided a better understanding of the endemic and endangered *Steindachneridion melanodermatum* catfish species, as well as its conservation status, leading to the proposal of adaptive management measures. While the potential impacts of the HPP on the OUV of the property require continued attention, ICMBio considers that the monitoring scheme in place is adequate. Similarly, the forthcoming *Action Plan for the Conservation of Fish Species in the Iguaçu River* (PAN Iguaçu), currently at the planning stage, will provide a suitable programmatic framework for implementing recommended conservation measures.

The recovery of the native forest along the former carriageway of Colono Road is well advanced, making it at this point difficult to distinguish its original path. Of the two bills introduced to seek the reopening of the road, one has been archived and is no longer under consideration, while the other advanced only as far as 2021 and appears to have lost momentum and political appeal. Currently, ICMBio's parliamentary advisory team sees little likelihood of the remaining bill resuming its progress in Congress and does not consider it a significant threat to the property.

Iguaçu National Park in Brazil and Iguazú National Park in Argentina have further broadened their exchange of information and coordination of activities. The latest joint census of the jaguar population within the binational Green Corridor, published in 2023, reported encouraging outcomes, underscoring the importance of the long-standing collaboration between the Brazilian 'Onças do Iguaçu' and the Argentinian 'Yaguareté' projects. New shared initiatives have been launched, paving the way for an international cooperation agreement to be soon proposed to the State Party of Argentina. Once agreed upon, the arrangement will provide a legal framework for developing joint action plans covering various aspects of site management, including biodiversity monitoring, control and surveillance, and sustainable tourism.

In 2022, ICMBio awarded a new concession contract for the provision of visitor services in Iguaçu National Park, valid for a 30-year term. The concession encompasses the revitalization, upgrading, operation, and maintenance of tourism infrastructure, along with the obligation to cover expenses related to conservation, protection, and management activities in the park. The investment obligations set forth in the concession contract have enabled the launch of a comprehensive infrastructure improvement program, developed in accordance with the strategies outlined in the *Public Use Plan* (PUP) and in line with the property's *Management Plan* and *Zoning*. The program's compliance with the property's core planning and management tools, the further design and construction guidelines contractually imposed on the concession holder, and the multi-phase, multi-stakeholder evaluation process designed for the assessment of individual projects are safeguards well-suited to ensure the protection—and promote the enhancement—of the property's Outstanding Universal Value.

2. Response to the Decision of the World Heritage Committee

2.1 Baixo Iguaçu Hydropower Plant (HPP)

> *The World Heritage Committee,*
> *(...)*
> *3. Regrets that no specific assessment of the impacts of the Baixo Iguaçu hydropower plant (HPP) on the Outstanding Universal Value (OUV) of the property was submitted prior to construction and operation of the HPP, as requested by the Committee in its Decision 40 COM 7B.70 and takes note that impacts to the property were considered during the Environmental Impact Study process for the project and extensive conditions were imposed by the Chico Mendes Institute for Biodiversity Conservation (ICMBio) and the Environmental Institute of Paraná (IAP), and considers it essential to comply strictly with the conditions imposed;*
>
> *4. Notes the information provided that the dam is operating in accordance with the standards required under its licensing, according to monitoring results, however* ***requests the State Party to ensure that monitoring programmes continue to provide up-to-date information to inform adaptive management of the HPP****;*
>
> *5. Also notes that collaboration between the States Parties of Argentina and Brazil was reinitiated following the COVID-19 pandemic and* ***reiterates its request to the two States Parties to develop a comprehensive monitoring, assessment and action plan to identify and address potential negative impacts from the HPP on the OUV of the contiguous properties of Iguaçu National Park and Iguazú National Park****.*

The attributes that express the OUV of Iguaçu National Park and may be potentially impacted by the Baixo Iguaçu Hydroelectric Plant (HPP) are the flow rate of Iguaçu Falls and the populations of key aquatic and semi-aquatic species in the Iguaçu River. They contribute to meeting World Heritage criteria (vii) and (x), which address the scenic beauty of the falls and the biodiversity within the property. Potential environmental impact drivers from the HPP that may affect these attributes are changes in the river's water flow and quality patterns, as well as the isolation of aquatic species populations upstream and downstream of the dam.

In response to the conditions imposed by the Chico Mendes Institute for Biodiversity Conservation (ICMBio) and the Environmental Institute of Paraná (IAP) for licensing the construction and operation of the HPP, the joint venture responsible for the project has established 32 environmental and social programs. Among these, the following are particularly relevant for monitoring the impact of the dam on the conservation values of Iguaçu National Park, including its OUV: the *Water and Sediment Monitoring Program*; the *Aquatic Environment Monitoring Program – Limnology and Water Quality Subprogram*; the *Aquatic Environment Monitoring Program – Ichthyofauna Subprogram*; and the *Monitoring*

Program for Terrestrial and Semi-Aquatic Fauna. The monitoring methodology has been adjusted to meet the specific requirements of Iguaçu National Park, including changes in the frequency of ichthyofauna sampling and revisions to the sampling grid for the water and sediment monitoring program. The latest reports for all four monitoring programs were released in June 2024 and can be accessed here (in Portuguese). The main findings are described below.

- The water and sediment monitoring indicates that the monitored parameters have not shown any significant changes, remaining within the expected range for a recently constructed reservoir.
- The ichthyofauna monitoring identified 54 fish species within the area of influence of the HPP, including 22 endemic, 19 native, and 8 exotic species. No significant changes in water parameters that could compromise the ichthyofauna were observed.
- Monitoring of semi-aquatic fauna found that the construction of the HPP did not impact the populations of surveyed key species **Williams' side-necked turtle** (*Phrynops williamsi*) and **Neotropical otter** (*Lontra longicaudis*).

Coordinated alongside the monitoring programs operated by the HPP, ICMBio has carried out the *National Action Plan for the Conservation of Aquatic and Semi-Aquatic Fauna of the Lower Iguaçu* (PAN Baixo Iguaçu), established in 2017. The PAN framework is a flagship management tool implemented by ICMBio to articulate and oversee actions for the conservation of targeted species, taxa, and natural environments. The results of PAN Baixo Iguaçu supported the conclusion that the damming of the Iguaçu River has not been shown to impact *Phrynops williamsi* or *Lontra longicaudis*.

The Plan has also surveyed **Surubim-do-iguaçu** (*Steindachneridion melanodermatum*). This catfish is of particular concern for being an endemic and endangered species, with geographic range restricted to the Lower Iguaçu River basin. A biotelemetric study on habitat and migratory behavior, conducted before and after the filling of the HPP reservoir and released in October 2022, determined that *S. melanodermatum* is a sedentary species, with movement along the river ranging from none to short-distance displacements. The results showed that the species exhibits predominantly resident behavior with strong site fidelity, particularly to Poço Preto, a deep pool in the river along Iguaçu National Park, and that the construction of the dam did not affect displacement patterns. Furthermore, a study on kinship released in February 2024 found that the population sample of *S. melanodermatum* captured in Poço Preto is in good conservation status regarding genetic variability. To ensure that this condition will be preserved, researchers recommended continuous monitoring and the use of supportive breeding for the conservation and management of the species. The final report on the study of genetic variability can be accessed here, and a summary leaflet for the study on habitat and migratory behavior can be found here, both in Portuguese.

PAN Baixo Iguaçu successfully accomplished its goals and was concluded, prompting ICMBio to launch the *Action Plan for the Conservation of Fish Species in the Iguaçu River* (PAN Iguaçu), which encompasses the entire Iguaçu River Basin and focuses exclusively on ichthyofauna. The new Action Plan incorporates the findings and recommendations from the previous program, including those related to *S. melanodermatum*, and will be

overseen by ICMBio's National Center for Research and Conservation of Continental Aquatic Biodiversity (CEPTA). Its first planning workshop was held in October 2024.

Regarding the flow rate of Iguaçu Falls, as informed in the State of Conservation Report submitted in response to Decision 44 COM 7B.122f, the National Water Agency (ANA) has set a requirement among the operational parameters for the HPP to maintain a minimum outflow of 350 m^3/s, in order to mitigate the potential impact of the project on the scenic beauty of the waterfalls. As indicated in the water and sediment monitoring report from June 2024, these conditions are being met.

In addition to the monitoring programs addressing the HPP's potential impact on the property, two other environmental programs established by the project owner are particularly relevant to Iguaçu National Park. The *Baixo Iguaçu Biodiversity Corridor Consolidation Program* aims to reforest the reservoir riparian zone and restore degraded areas in the surrounding farmland, connecting isolated fragments of native forest to the park. Meanwhile, the *Natural Resources Protection Program* focuses on preventing illicit extraction of natural resources in the park's buffer zone, including hunting and illegal fishing.

The updated report on the *Biodiversity Corridor Consolidation Program of Baixo Iguaçu* was released in June 2024, covering actions implemented between May 2022 and February 2024. A total of 146,240 seedlings were planted across roughly 198 hectares, encompassing row, enrichment and maintenance planting, using 74 native tree species. Furthermore, 25.65 hectares were restored using the high-density direct seeding (muvuca) of 28 native species. The report can be accessed here (in Portuguese).

The HPP and ICMBio maintain a Reciprocity Agreement for the implementation of the *Natural Resources Protection Program*, with their respective teams meeting regularly to exchange information and align actions of mutual interest. Program reports have not yet been released.

In conclusion, while the potential impacts of the HPP on the OUV of the property require continued attention, ICMBio considers that the monitoring scheme in place is adequate. Regarding biodiversity, while no impact from the HPP have been documented, the forthcoming *Action Plan for the Conservation of Fish Species in the Iguaçu River* (PAN Iguaçu), currently at the planning stage, will provide a suitable programmatic framework for implementing recommended ancillary conservation measures. Regarding the request for the engagement of the State Party of Argentina, please refer to **Section 2.4**.

2.2 Colono Road

> *The World Heritage Committee,*
> *(...)*
> *6. Expresses again grave concern regarding the potential legislative implication of the Bills under consideration, which propose the reopening of the Colono Road, and which could, if approved, create the conditions to re-inscribe the property on the List of World Heritage in Danger, in line with*

Paragraph 180 of the Operational Guidelines, and ***urges again*** ***the State Party to ensure the continued closure of Colono Road***.

The Colono Road was permanently closed in June 2001 following a ruling by the Brazilian Court of Appeals for the Fourth Circuit (TRF-4). Since then, the regeneration of the native forest along the former carriageway has advanced considerably, making it difficult at this point to distinguish its original path. As outlined in WHC/23/45.COM/7B, the Decision refers to Bills 'PLC 61/2013' and 'PL 984/2019', which seek the reopening of the road.

Bill 'PLC 61/2013', initially filed in the Chamber of Deputies in 2010 (as PL '7123/2010') and later referred to the Federal Senate in 2013, was archived in 2022 and is no longer under consideration.

Bill 984/2019, filed in the Chamber of Deputies in 2019, proposes an amendment to Federal Law 9,985/2000, which established the Brazilian National System of Natural Protected Areas (SNUC). The amendment would create a new category of protected area called 'Park Road.' Additionally, the bill proposes the establishment of the so-called 'Colono Park Road' along the route of the former 'Colono Road,' designating it as both a protected area and a rural road, as defined by the Brazilian Traffic Code.

The bill has garnered significant media coverage and public criticism, not only due to its anticipated impact on Iguaçu National Park, but also because of the insufficient elaboration of its amendment to the SNUC Law and its conflict with other legislation. The technical weaknesses of the proposal and its broader legislative implications beyond the specific instance of Colono Road suggest that the bill would face significant challenges in passing through all the necessary stages leading up to its presidential sanction.

Since at least 2023, there have been no public statements from the local leaders expected to be the main advocates of PL 984/2019, and the last action on the bill in the National Congress was recorded in 2021, suggesting that the proposal has lost momentum and political appeal. Furthermore, an online poll conducted by the Chamber of Deputies revealed that around 95% of voters strongly opposed the bill, highlighting the clear lack of public support.

At present, ICMBio's parliamentary advisory team sees no likelihood of PL 984/2019 resuming its progress in Congress, and the bill is not currently considered a significant threat to the World Heritage property. Nonetheless, the Institute continues to monitor the proposal, ensuring that any new developments, however unlikely, are detected early to allow for timely action.

2.3 Public Use Plan (PUP)

The World Heritage Committee,
(...)
7. Welcomes the completion of the Public Use Plan (PUP) and ***encourages the State Party to implement the strategy outlined in the Plan to ensure the sustainable use and development of tourism in the property***.

Iguaçu National Park's *Public Use Plan* (PUP) was developed through a multi-stakeholder assessment to explore gaps and opportunities for unlocking the park's potential for sustainable tourism, while ensuring proper regulation. It is a non-binding, non-exhaustive action program that outlines strategies, guiding principles, and key actions—including over 50 studies, assessments, projects, protocols, and regulations—to be developed and implemented with the aim of promoting public use, diversifying visitation opportunities, enhancing the visitor experience, and guiding tourism management. The plan aligns with the park's conservation goals, *Zoning* and *Management Plan*, as well as ICMBio's guidelines for planning and managing public use in protected areas.

The PUP was as a key supporting document in defining the investment obligations included in the new concession contract for the provision of visitor services in the park (see **Section 2.5**). The contract, awarded in July 2022, requires the concession holder to invest a total of BRL 500 million (approximately USD 90 million), covering several actions outlined in the PUP. Planned interventions focus on improving the trail network, enhancing mobility infrastructure, constructing or renovating facilities, and upgrading signage and recreational equipment. Major goals include enhancing the visitor experience and streamlining operations at the Cataratas visitation hub (centered around the Visitor Center and Iguaçu Falls), along with developing the remaining visitation areas.

In addition to the projects directly funded and executed by the concession holder, Iguaçu National Park has implemented important actions either outlined in the PUP or aligned with its strategies. Recent achievements include the establishment of the *Visitation Operational Protocol* (PROV). It provides a set of operational and locational guidelines for visitors, service providers, and other stakeholders involved in the park's public use, with the goal of organizing visiting areas, tourist attractions, and visitor activities. Additionally, a complementary ordinance regulating the recreational use of the stretch of the Iguaçu River along the park has been developed.

Furthermore, the park has promoted a series of workshops on site interpretation, covering topics such as the perspectives and heritage of indigenous peoples and the property's Outstanding Universal Value. Another important initiative was the establishment of a new base in the municipality of São Miguel do Iguaçu to support the Community-Based Tourism (CBT) project implemented in partnership with the Apepu Quilombola Community.

In conclusion, the strategy outlined in the PUP is already being implemented to ensure the sustainable use and development of tourism within the property. While the PUP did not aim to establish a timeline for the execution of the proposed actions, its strategies and guidelines have been fully incorporated into management, and the interventions are progressing at a pace that ICMBio considers appropriate.

2.4 Collaboration with the State Party of Argentina

> *The World Heritage Committee,*
> *(...)*

9. ***Also encourages*** ***the State Party to collaborate with the State Party of Argentina and report on the outcomes of the recommendations of the 2015 Reactive Monitoring mission to:***
a) Develop an action plan for joint patrolling and ensure that these activities are undertaken on a regular basis;
b) Establish a monitoring programme for key species within the property and, in cooperation with the Iguazú National Park, within the broader region*;*

Iguaçu National Park in Brazil and Iguazú National Park in Argentina have further expanded their exchange of information and coordination of activities. The most illustrative and long-standing example of their cooperation is the periodic census of the jaguar population (*Panthera onca*) in the 'Green Corridor,' the largest preserved stretch of Atlantic Forest in the continent's interior, which includes both protected areas. The census is carried out every two years, in connection with the *Onças do Iguaçu Project* in Brazil and the *Yaguareté Project* in Argentina, which have been collaborating since 2010 under an international cooperation agreement between the two States Parties. The jaguar, a species with a declining global population and classified by the IUCN as 'Near Threatened', is one of the flagship species contributing to the Outstanding Universal Value of both properties. The latest survey, conducted in 2022 and published in 2023, estimated that 93 jaguars currently live in the Green Corridor, showing a remarkable increase from the 40 individuals documented in 2005, and underscoring the significance of the joint conservation efforts of Brazil and Argentina.

Recent initiatives to foster collaboration between the two World Heritage Sites include the exchange of information aimed at harmonizing their biodiversity monitoring systems, and the formal invitation for the Argentinian park to attend the meetings of Iguaçu National Park's Advisory Council. As a celebration of their friendship and a symbol of their strengthening ties, the properties also introduced a friendly canoe race in 2023, which will be held annually. The two States Parties alternate the starting and finishing points and take turns selecting the date, which always coincides with an important commemorative event, either in Brazil or Argentina.

In 2024, the managers from both parks agreed, at the technical level, to support the proposal for an international cooperation agreement between the States Parties of Brazil and Argentina, which would serve as a legal framework for developing joint action plans covering various aspects of site management, including biodiversity monitoring, control and surveillance, and sustainable tourism. The draft agreement is currently under review by ICMBio, and official negotiations with the Argentine government are expected to begin in the coming months.

2.5 Tourism Development

The World Heritage Committee,
(…)
10. Notes with concern the reported plans to further develop tourism in the property, including a proposed cable car project and also ***requests*** ***the State***

Party to ensure that all proposed projects will be subject to an Environmental Assessment, in line with the Guidance and Toolkit for Impact Assessment in a World Heritage Context, before a decision to implement them is made;

In 2022, ICMBio awarded a new concession contract for the provision of visitor services in Iguaçu National Park, valid for a 30-year term. The concession encompasses the revitalization, upgrading, operation, and maintenance of tourism infrastructure, along with the obligation to cover expenses related to conservation, protection, and management activities in the park, in compliance with Brazilian environmental legislation and regulations governing federal protected areas.

Thanks to the investment obligations stipulated in the concession contract, the *Public Use Plan* (PUP) (see **Section 2.3**) has given rise to a comprehensive tourism infrastructure improvement program. The scheme is thoroughly aligned with the property's *Management Plan* and *Zoning*, updated in 2018, as referenced and welcomed in Decision 44 COM 7B.112. Compliance with these core planning and management tools serves as a primary safeguard, ensuring that the scope of the program aligns with the conservation goals of the property.

A second line of safeguard is provided by the design and construction guidelines contractually imposed on the concessionaire. The concession contract establishes a set of guidelines for interventions in Iguaçu National Park, including:

- Visual and architectural identity consistent with the park's natural environment, ensuring that interventions are integrated and harmonized with the landscape, generate low environmental impact, and enhance visitor experience and immersion in nature.

- Sustainable and responsible architectural and engineering solutions that are accessible, inclusive, integrated, and 'active'. This means that interventions should be environmentally friendly, and engaging for various population groups, taking their specific needs into account. They should also relate to the surrounding environment, respecting existing natural dynamics, so that they become an integral part of the user's experience in the space.

- Preservation of existing vegetation and incorporation of greenery in buildings, infrastructure, and equipment.

- Design solutions that minimize impacts on wildlife by, for instance, avoiding the risk of birds colliding with glass panels and preventing animal electrocution from wires and tracks.

Finally, as a third line of safeguard, each individual project undergoes a multi-phase, multi-stakeholder evaluation process. The environmental impact and mitigation assessment is conducted by the park's Science and Research team. It integrates the requirements for maintaining the attributes that ensure the site's compliance with the criteria under which it was inscribed on the World Heritage List, specifically addressing

the scenic beauty of the Iguaçu Falls, the biodiversity within the property, and its overall integrity.

Regarding the proposed cable car, referenced in document WHC/23/45.COM/7B, the project is listed as a mandatory investment for the concession holder, with an estimated cost of BRL 150 million (approximately USD 27 million). Its location, as preliminarily designated in the concession contract, is at the mouth of the São João River, about 8.5 km downstream from Iguaçu Falls. The project remains subject to a locational study to determine the most suitable site for its execution, considering the environmental and heritage impacts, as well as its technical and financial feasibility.

Given that proper environmental impact assessments are ensured, ICMBio asserts that the infrastructure improvement program for Iguaçu National Park—from plan to project—poses no threat to Outstanding Universal Value of the property. On the contrary, it is considered to positively contribute to its protection and enhancement.

As an example, regarding transportation infrastructure, the projected increase in visitor numbers by 2052 would require an additional 36 buses to operate between the Visitor Center and the Iguaçu Falls Trail, the park's main attraction. This implies that the business-as-usual scenario is unsustainable in the long term from both environmental and operational perspectives. Consequently, the program aims to diversify transportation modes by partially replacing the bus service with a bike lane, tram, and river line. In addition to being more sustainable alternatives, these options will provide new opportunities for a more immersive interaction with the landscape.

In turn, the proposed architectural approach for renovating existing buildings and constructing new facilities, in addition to ensuring the protection of the property's conservation values, will serve as a powerful tool for communication and education, highlighting the importance of sustainable choices that foster a more balanced and harmonious interaction between culture and nature.

As a final note, one of the concession holder's contractual duties is to draft the Visitation Guiding Number (NBV) Monitoring Plan. The NBV is a concept employed by ICMBio that is equivalent to carrying capacity. The Plan will identify the NBV for each attraction under concession and develop a system of indicators and procedures to monitor the impacts of visitation on the areas of the park designated for public use. The work will be based on *ICMBio's Methodological Guide for Managing the Impacts of Visitation with Emphasis on Visitor Experience and the Protection of Natural and Cultural Resources* (2011) and *ICMBio's Manual of Methods for Monitoring the Number of Visits to Federal Protected Areas* (2020). It is important to highlight that the NBV will also guide the planning and design of interventions under the park's tourism infrastructure improvement program.

The draft concession contract for visitor services at Iguaçu National Park, along with the *Conceptual Architectural, Engineering and Transportation Project* for the infrastructure improvement program, are publicly available here in Portuguese.

3. Other current conservation issues identified by the State Party which may have an impact on the property's Outstanding Universal Value

There are no additional conservation issues to report at this time.

4. In conformity with Paragraph 172 of the Operational Guidelines, describe any potential major restorations, alterations and/or new construction(s) intended within the property, the buffer zone(s) and/or corridors or other areas, where such developments may affect the Outstanding Universal Value of the property, including authenticity and integrity.

The property is currently implementing aa tourism infrastructure enhancement program, as outlined in **Section 2.5** above. General information is provided in this report, while the *Conceptual Architectural, Engineering, and Transportation Project* is publicly available here in Portuguese.

5. Public access to the state of conservation report

Brazil does not oppose granting full access to this report.

6. Signature of the Authority

Hidrelétrica
BAIXO IGUAÇU

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SUBPROGRAMA COMPORTAMENTO MIGRATÓRIO POR BIOTELEMETRIA DO SURUBIM-DO-IGUAÇU NA ÁREA DE INFLUÊNCIA DA UHE BAIXO IGUAÇU.

O estudo de caracterização do habitat e comportamento migratório do surubim-do-Iguaçu *(Steindachneridion melanodermatum)*, tem por objetivo subsidiar estratégias de conservação da espécie no trecho localizado a jusante da UHE Salto Caxias até o Parque Nacional do Iguaçu, nas proximidades das Cataratas do Iguaçu, incluindo os tributários do trecho.

O surubim-do-Iguaçu *(Steindachneridion melanodermatum)* é uma espécie de bagre endêmica do Rio Iguaçu considerada em perigo de extinção e com distribuição predominante no último trecho livre de rio (160 km), a jusante da UHE Baixo Iguaçu. Com o objetivo de avaliar os movimentos da espécie antes e após o fechamento desta usina, surubins-do-iguaçu foram marcados e rastreados por telemetria combinada de acústica e rádio. Um total de 100 indivíduos foram capturados a montante e a jusante do eixo da usina em 2017, submetidos a uma cirurgia para implante dos transmissores e devolvidos ao rio.

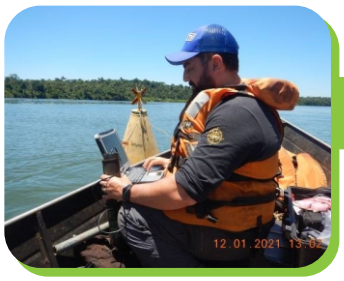
Para detecção do sinal de peixes marcados e identificar o seu deslocamento, foram instaladas 14 bases de telemetria (06 bases de telemetria acústica e 08 de radiotelemetria), distribuídas entre a usina de Salto Caxias (a montante da UHE Baixo Iguaçu) até o local conhecido como Poço Preto, a montante das Cataratas do Iguaçu.

Rastreamentos móveis de radiotelemetria foram realizados em todo o trecho navegável da área de estudo entre 2017 e 2021. Do total de peixes marcados, 87% foram detectados até dezembro de 2021. A maioria dos peixes marcados apresentaram registros de deslocamentos inferiores a 15 km, tanto antes quanto depois do fechamento da usina. E, apenas um indivíduo realizou um deslocamento de longa distância (>100 km). Esses resultados indicam que a espécie apresentou comportamento predominantemente sedentário, onde os indivíduos marcados concentraram-se próximos aos locais de soltura durante praticamente todo o período do estudo.

O número de peixes detectados na fase pós-enchimento foi menor em relação ao observado no período pré-enchimento do reservatório (80% e 92%, respectivamente), o que pode ser explicado pelo fato de que na fase pré-enchimento 46 dos 50 peixes marcados foram soltos no Poço Preto e na fase pós-enchimento, 25 indivíduos. Entretanto, o resultado de 100% na detecção dos peixes no Poço Preto foi igual nos dois períodos. O Poço Preto provou ser área de residência para a espécie, que aliado à localização da base fixa de telemetria acústica e a captura e soltura de peixes neste local explica as altas taxas de detecção. Já os peixes soltos a montante da foz do rio Floriano foram capturados em diferentes locais e as bases fixas mais próximas estavam localizadas a montante e a jusante do local de soltura. Por essa razão, a detecção destes peixes só ocorreu quando eles realizaram movimentos ou nos eventos de rastreamentos móveis.

Parte dos indivíduos capturados a montante da foz com o rio Floriano realizaram movimentos bidirecionais e exploraram uma extensão significativa de rio, com deslocamentos entre a Usina Hidrelétrica Baixo Iguaçu até 60 km para jusante (quatro indivíduos). Os demais permaneceram entre o Porto Moisés Lupion e 15 km a jusante da usina. Vale destacar que este grupo de peixes, mesmo tendo sido registrados em uma extensão de rio de ~60 km não foram registrados no Poço Preto. Além disso, essa extensão não foi percorrida como um movimento direcionado em curto espaço de tempo para montante e, sim, movimentos inicialmente para jusante com retorno ao ponto de partida e, eventualmente, algum movimento adicional para montante a menores distâncias que a jusante.

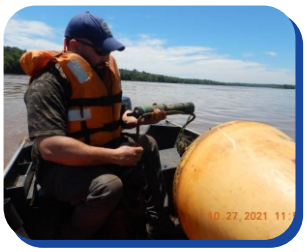
A não detecção de peixes soltos no Poço Preto em áreas a montante e a não detecção de peixes soltos a montante no Poço Preto pode indicar a presença de duas populações distintas de peixes nestas regiões.
Durante todo o período de monitoramento, tanto na fase pré como na fase pós-enchimento, nenhum dos 100 indivíduos marcados foi registrado pelas bases fixas ou em rastreamentos móveis nos tributários do rio Iguaçu, tanto a jusante quanto a montante do eixo da Usina Hidrelétrica Baixo Iguaçu. Em estudo prévio realizado com a espécie no rio Iguaçu, do total de 182 indivíduos de surubim-do-Iguaçu capturados, apenas dois (1%) peixes foram capturados em tributários a montante da foz com o rio Iguaçu (um no rio Capanema e um no rio Gonçalves Dias) entre janeiro de 2010 e dezembro de 2016, indicando a alta preferência da espécie pela calha do rio principal e seus poços profundos, em especial o Poço Preto (Assumpção et al., 2021a).



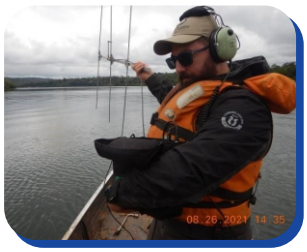
Download dos dados de telemetria acústica.

Soltura do surubim-do-iguaçu.

Somente dois peixes foram detectados pelas bases fixas instaladas na UHE Baixo Iguaçu: o primeiro retornou para a região onde foi capturado (montante foz do rio Floriano) e o segundo não foi mais detectado, indicando que o uso da área próxima ao barramento é eventual.



Manutenção de base fixa de telemetria acústica.



Rastreamento móvel embarcado.

Manutenção e download dos dados de base fixa de radiotelemetria.

Instalação de nova base de radiotelemetria na zona 8.

COMO CONCLUSÃO DESTE MONITORAMENTO É POSSÍVEL AFIRMAR EM LINHAS GERAIS QUE:

1. Os movimentos de *S. melanodermatum* no rio Iguaçu a jusante da UHE Baixo Iguaçu foram em sua maioria de curta distância (tanto na fase pré quanto na fase pós enchimento) e registrados para poucos indivíduos;

2. A espécie apresenta um comportamento predominantemente residente com grande fidelidade de sítio, principalmente à área do Poço Preto a montante das Cataratas do Iguaçu;

3. A ocorrência da espécie é rara a montante do eixo do barramento desde, pelo menos, o início dos anos 2000, provavelmente devido à pesca predatória e conservação das áreas de entorno;

4. Dos 49 peixes soltos a jusante do eixo da barragem, apenas dois indivíduos (4%) se aproximaram da área da usina;

5. Os movimentos da espécie foram muito semelhantes para os períodos pré e pós-enchimento (i.e.. distâncias percorridas, áreas de uso e residência).

Hidrelétrica BAIXO IGUAÇU
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