

**UNRAVELING THE OCCUPANCY PATTERNS OF GUIANA DOLPHIN
IN SOUTHEASTERN BRAZIL**



**PROJECT 02192314 - UNRAVELING THE OCCUPANCY PATTERNS OF GUIANA DOLPHIN
IN SOUTHEASTERN BRAZIL**

BRAZIL, CANANÉIA ESTUARY (-25.047, -47,921).
FIELD EXPEDITIONS CARRIED OUT FROM AUGUST 2014 TO JUNE 2015.

A FINAL REPORT TO CONSERVATION LEADERSHIP PROGRAMME



FROM CANANÉIA INSTITUTE RESEARCH - IPEC



This project was developed to raise information about Guiana dolphin population at Cananéia estuary and devise conservation strategies to decision makers.

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The Cananéia Institute Research (IPeC), which believed in our competence to manage this project and let us grow as researchers at the beginning of our careers.

The Manager of the Federal Protected Areas Cananéia-Iguape-Peruíbe who believed in the project developed by researchers of IPeC a long time ago.

The CLP Team that was engaged to make the dreams of hundreds of young conservationists to become reality.

And, finally, a special thanks to Conservation Leadership Programme that gave us the opportunity to develop this project and turn scientific effort in a practical conservationist results that help us to save the dolphins population of Cananéia estuary.

SECTION 1

1.A. SUMMARY

At the Cananéia estuary, the Guiana dolphin plays an important ecological role that may be in risk, once there is a growing activity of observation tourism. Our objectives had intended to update information about population size, distribution and possible impacts of tourism on the Guiana dolphin local population. We have raised scientific based information to stakeholders in order to propose actions to mitigate such impacts. Distribution maps were created with identified areas of greater sensitivity regarding boat-dolphins negative interactions. The population size data was not enough to determine with enough precision the local dolphin abundance, but the 130 cataloged individuals indicate a minimum population size and probably a larger population that previously thought. We developed tourism monitoring activities and assessed their behaviors related to navigation in estuarine waters and boat-dolphins interactions. A leaflet was designed and printed as outreach material. We also produced a technical report that was used during the process of creating of the management plan of a federal protected area and a special zoning to cetacean conservation inside Cananéia estuary. To create the awareness of boat conductors, a possible future action is the planning of on long-term activities, including specific instructions workshops and activities with their.

1.B. INTRODUCTION

The Cananéia estuarine system, located in southern Brazilian coast, is an ecological and economic important coastal ecosystem (Diegues, 1987). It comprehends a tropical rainforest, sandbanks and mangroves (Schaeffer-Novelli et al., 1990). Classified both as “World Natural Heritage Site” and as “World Biosphere Reserve” (UNESCO, 1991, 1999), the region is within the greatest continuous remaining of high endangered Atlantic rain forest.

Despite it is inside of a mosaic of protected areas, which provide legal protection for resources exploitation, the region is susceptible to a series of threats led by human’s activities. Coastal urbanization has raised pollution and contamination of local rivers and beaches (Amorim et al., 2007). Tourism activities have brought, in opposition to monetary incoming, several environmental problems such as litter generation and uncontrolled use of the resources. These threats may cause biodiversity loss, which affects the proper functioning of the whole ecosystem, specially the most productive and most sensitive ones, such as estuaries (Chapin, 2000). Impact goes even further upon species with great ecological importance, such as top predators, responsible for balancing ecosystem (Wagner, 2010; Paine, 1966). Marine mammals act as key-species in whichever ecosystem they inhabit. In Cananéia estuarine system, the Guiana dolphin (*Sotalia guianensis*) plays this role, and apart from its ecologic importance, the species has an economic standing, being responsible for a considerable financial incoming to the town through the tourism of observation. The Guiana dolphin is typically found in coastal regions, such as estuaries, bays and open coastal areas, mainly due to food availability and predator protection (Monteiro-Filho, 2000). However, this proximity with the coast leads to this small cetacean be affected by anthropogenic impacts such as entanglement

in fishing nets, pollutant contamination and vessels traffic associated problems such collisions (IBAMA, 2011).



Figure 1. A group of Guiana dolphins fishing at Cananéia estuary, State of São Paulo, Brazil.

Thus, the raise in boat traffic and, mostly, the raise in observation tourism during the last years created a risky scenario for Guiana dolphin, the key-species of Cananéia estuarine system. The lack of planning and management and threaten this population. However, for the implementation of conservation actions is important to know how individuals use the area for their main activities (i.e. feeding, displacement and social interactions). Wherefore, identify what are these areas inside the estuary is essential for an effective planning aiming the species conservation.



Figure 2. Boats and jets skis travelling in high speed threatened dolphins by the possibility of collision.

For that reason, the overall goal of this project is to support management and conservational actions for the Guiana dolphin in Cananéia estuarine system, which allows a sustainable development of the region, grounded on scientific researches. To achieve this goal, we aim to identify sensitive areas, which need of attention in order to minimize traffic impacts on dolphins. We hypothesize that if we are able to identify the core areas used by Guiana dolphins inside the estuary, we will be able to overlap this information with boat traffic information and create such maps that show the areas with higher probability for collisions. Then, we will be able to support the decision makers and environmental entities responsible for this region to create an adequate conservation and management actions by restricting boat speed and by creating refuge areas in these sites (e.g. sites where dolphin watching by boat is restrict or controlled).

Besides that, we aimed to disseminate the results to local stakeholders, as boat riders, marinas, tourists and decision makers as well, through a technical report created by us. The reports contains the identification of all sites with higher risk to boat collision and some suggestions of conservation and management actions to be implemented inside the estuary in order to minimize the impacts over the dolphins. We also aimed to spread the information using a pamphlets and posters to demonstrate the riskier areas and guidelines to boat conductors while navigating in local estuarine waters.

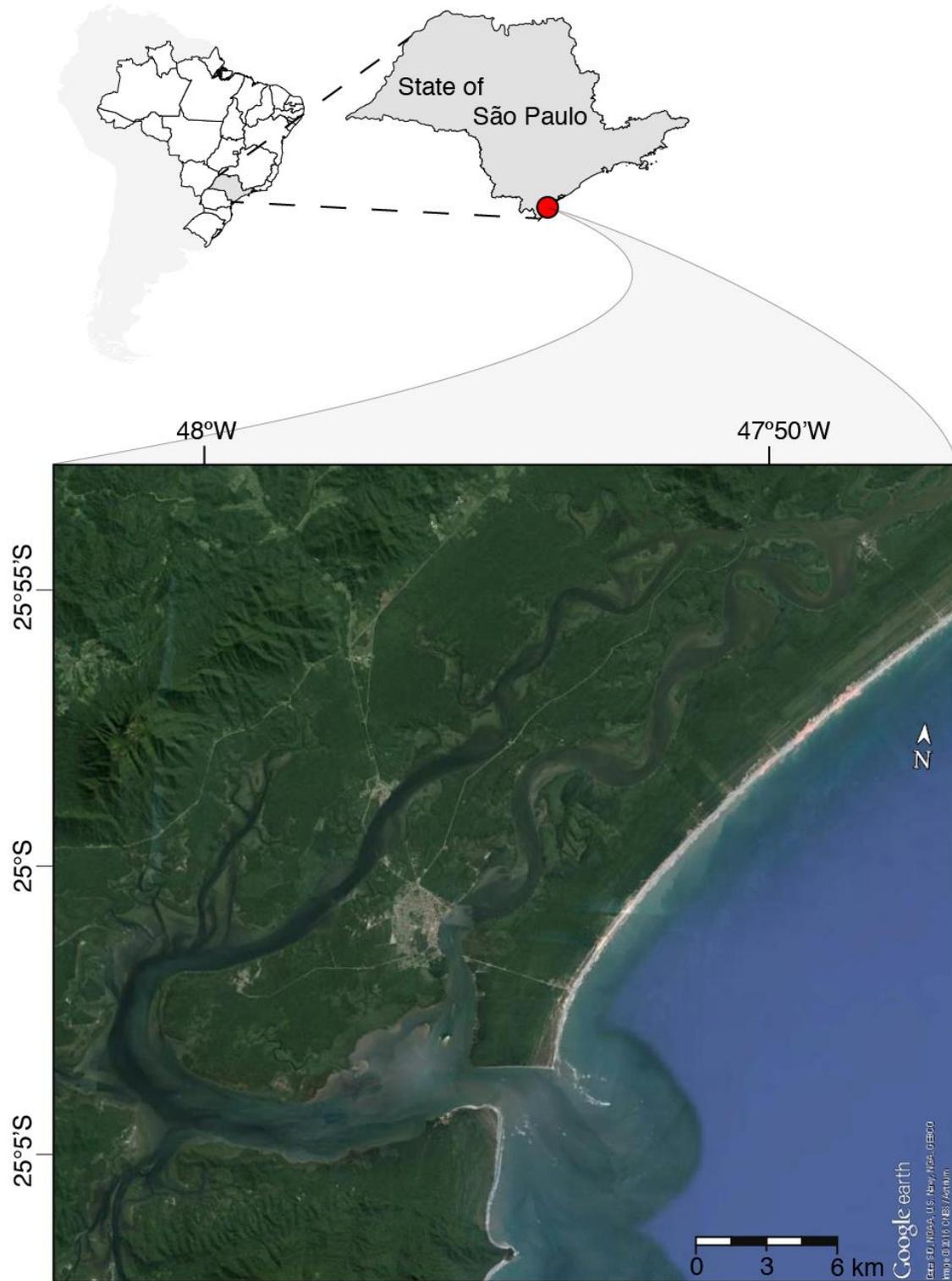


Figure 3. Satellite image of Cananéia estuary, southern coast of State of São Paulo, Brazil. Sheltered waters are used by Guiana dolphins throughout the year.

1.C. CLP PROJECT MEMBERS



Name: Caio Noritake Louzada

Nationality: Brazilian

Age: 28

Education: Master in Ecology and Conservation

Current occupation and employer: Caio has experience with scientific research, project planning, implementation and evaluation. Currently is a PhD. candidate in Zoology, where explores the social organization of Guiana dolphin. In addition, he works as an independent consultant for different projects at Cananéia Institute Research (IPEC).

Team role: Team leader, activities coordinator and occupation analysis.

Name: Eric Medeiros

Nationality: Brazilian

Age: 29

Education: Master in Zoology

Current occupation and employer: Eric has experience with scientific research, mainly with data collection in marine environment and data analysis, focusing in abundance estimation studies through capture-recapture models. Currently he is working as biologist at a beach monitoring project with marine mammals, sea birds and sea turtles developed by Cananéia Institute Research (IPEC).

Team role: Field surveys and population analysis



Name: Rebeca Pires Wanderley

Nationality: Brazilian

Age: 31

Education: Master in Zoology

Current occupation and employer: Rebeca has experience in field data collection, both in terrestrial and marine environment. Currently she is working at Cananéia Institute Research (IPEC) as biologist with rehabilitation of marine mammals, sea birds and sea turtles.

Team role: Field surveys

Name: Liisa Havukainen

Nationality: Brazilian

Age: 34

Education: Master in Psychobiology

Current occupation and employer: Liisa has experience with scientific research with cetaceans, mainly with behavioral ecology. Currently she is working with environmental consultant, mainly with offshore survey as marine mammal observer.

Team role: Field surveys



Is also important to state that the project was supported and advised by Emygdio Monteiro-Filho, who is the senior researcher of Cananéia Institute Research, specialist in marine mammals and full professor at Federal University of Paraná, Brazil.

SECTION 2

2.A. AIM AND OBJECTIVES

This project aimed to gather information about critical areas of Guiana dolphins (*Sotalia guianensis*) at Cananéia estuary in order to support management and actions by stakeholders and decision makers.

The main objectives of the project were:

1. Define the home range and mostly used areas (core areas) Guiana dolphins inside Cananéia estuary;
2. Evaluate the population status of Guiana dolphin in Cananéia estuary by estimating its abundance using mark-recapture methods through photo identification techniques;
3. Transform research into conservation by monitoring touristic boats activities and disseminating our results to stakeholders and decision makers, besides of all population and tourists that visit the region in the summer.

2.B. METHODOLOGY

Both, specific objectives 1 and 2, had the need of individual identification and further recognition of the identified animal. We made use of the photo identification technique for capture-recapture. It is a non-invasive method, which hardly affects animals' behavior (Würsig & Jefferson, 1990). Individual recognition is made through long-lasting natural marks on the animals' dorsal fin, acquired during lifetime. Photography of the dorsal fin are analyzed and compared to a photographic catalog of already identified individuals.

We used Program DARWIN (Stanley, 1995) which is a more efficient and computer-assisted matching process. The previous catalog of Cananéia Institute Research, containing 95 identified individuals from the local population, was used for this purpose. The updated catalog was expanded accordingly with field expeditions were performed.

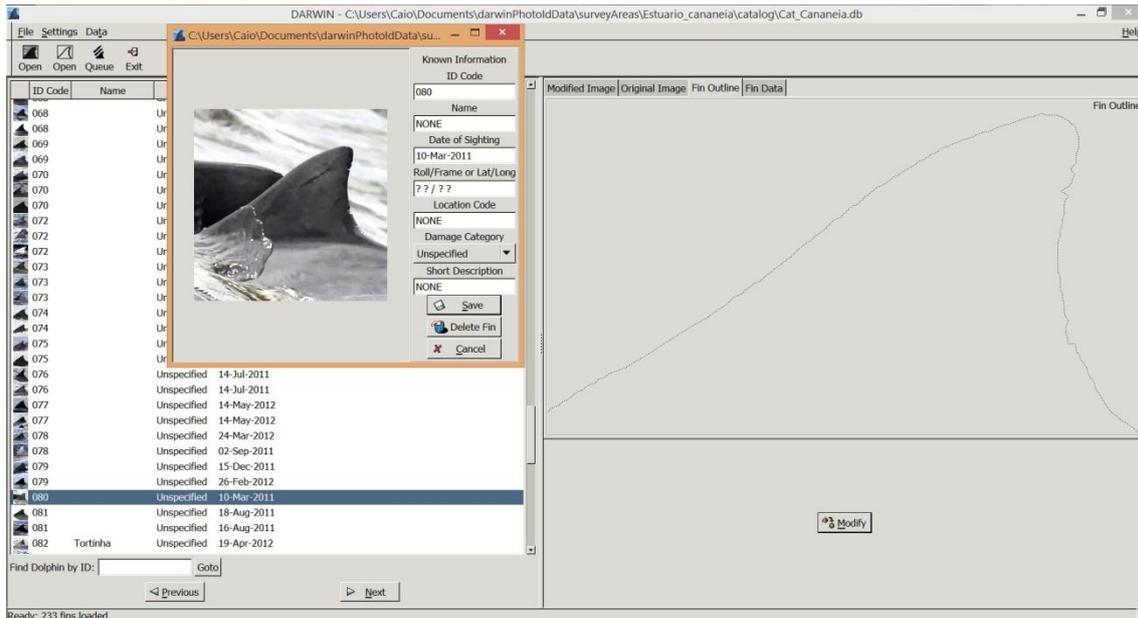


Figure 6. Example of program Darwin used in the photo identification process. The program creates a profile for each dorsal fin entered and compares newly inputted images with already existing ones in order to provide a possible match.

Ten monthly expeditions were carried out throughout 10 months, aboard a 26-foot boat with outboard motor, traversing predefined routes though the whole bay. As groups of Guiana dolphin were sighted, approach was made following recommendations for the species (Filla, 2008). Photographic and observational time lasting no longer than 20 minutes were held, during which all necessary data were collected. After each section, the boat returned to the determined track until complete sampling of the sector.

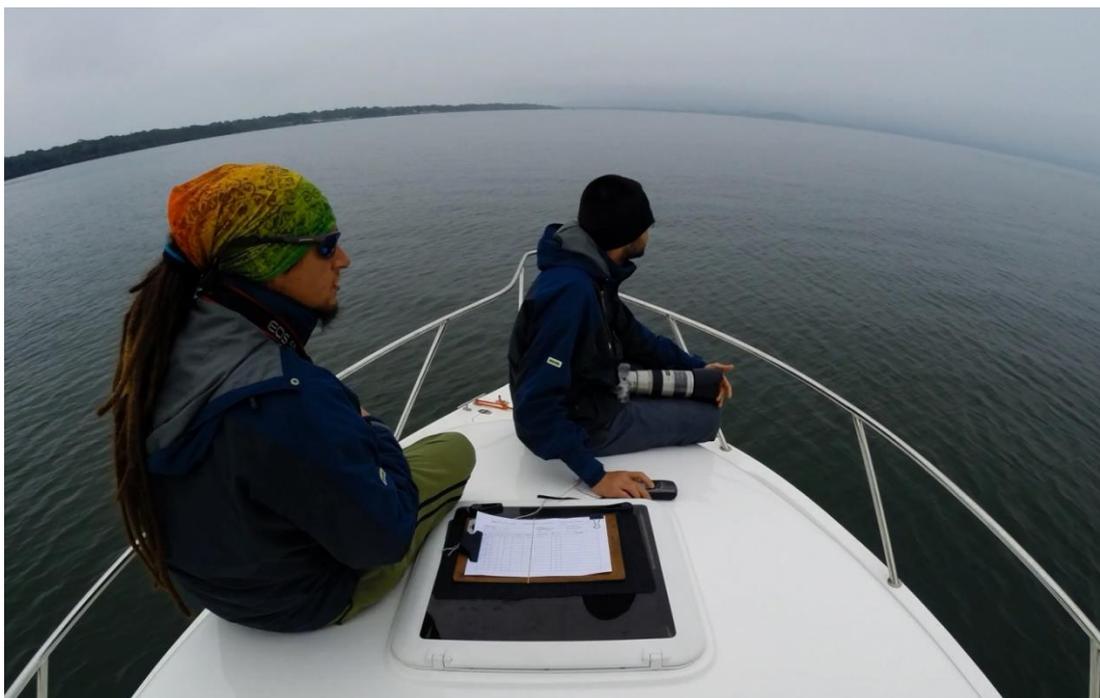


Figure 4. Team members in field data gathering. Two cameras, GPS, a filed spreadsheet, and plenty of observation were used to gather all information needed.

Although data collection was simultaneous, independent analyses were made for each specific objective. For specific objective 1, besides individual identification other data collected were: predominant behavior state, group structure and cohesion, presence of infants, geographic position. This information allowed mapping of occupancy of each individual in each area. Such analyses was made using the kernel method (Worton, 1989; Kie, 2013). All home-ranging analysis were made in the ArcMap 10.3 (ESRI, 2014). For specific objective 2, besides individual identification other data collected were: group size, composition, and geographic position.



Figure 5. Team members in data screening process back in the office after fieldwork day. In this moment, field spreadsheet was digitalized, photographs were uploaded, synchronized with GPS for exact location of each group and renamed.

In order to achieve the objective number three, we used two different approaches. The first one was to create a technical report with the results of our field efforts and considerations about more critical areas for collision between dolphins and boats. Besides that, this report devised some conservations strategies and management actions that could be adopted by decision makers. This report was shared with local stakeholders and decision makers. The second approach was to create a leaflet to be distributed to local

populations and tourists during the summer. Posters were also produced to be exhibited at different sites around the municipality.

2.C. OUTPUTS AND RESULTS

Our team surveyed about 3,124 Km around the estuary (Figure 7), from August 2014 to May 2015, and observed about 656 groups of dolphins with the goal of register its coordinates and photograph dorsal fin of adults dolphins . More than 55% of the groups had the presence of young in the group. More than 30,000 photos were taken. The results achieved in each one of the three main objectives are detailed below.

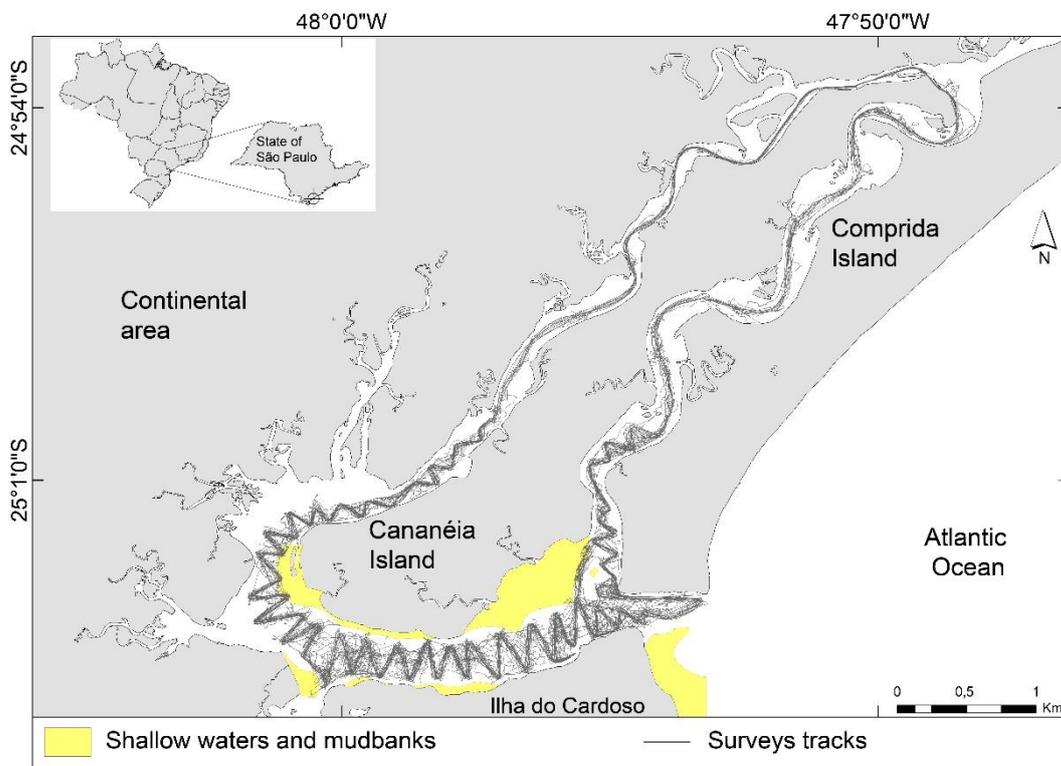


Figure 7. Map of the all surveys tracks plotted, performed from August 2014 through May 2016 throughout Cananéia estuary.

Distribution maps of Guiana dolphins

Kernel density maps (Figure 8) were created in order to identify areas most used by Guiana dolphins. Was assessed that dolphins used a core area of about 16 km². These core areas represent important areas for feeding, displacement and socialization. Moreover, we identified that other areas are more intensely used by dolphins than

previously known. So, it is important to have strategically conservation actions to this areas as well as previously known areas.

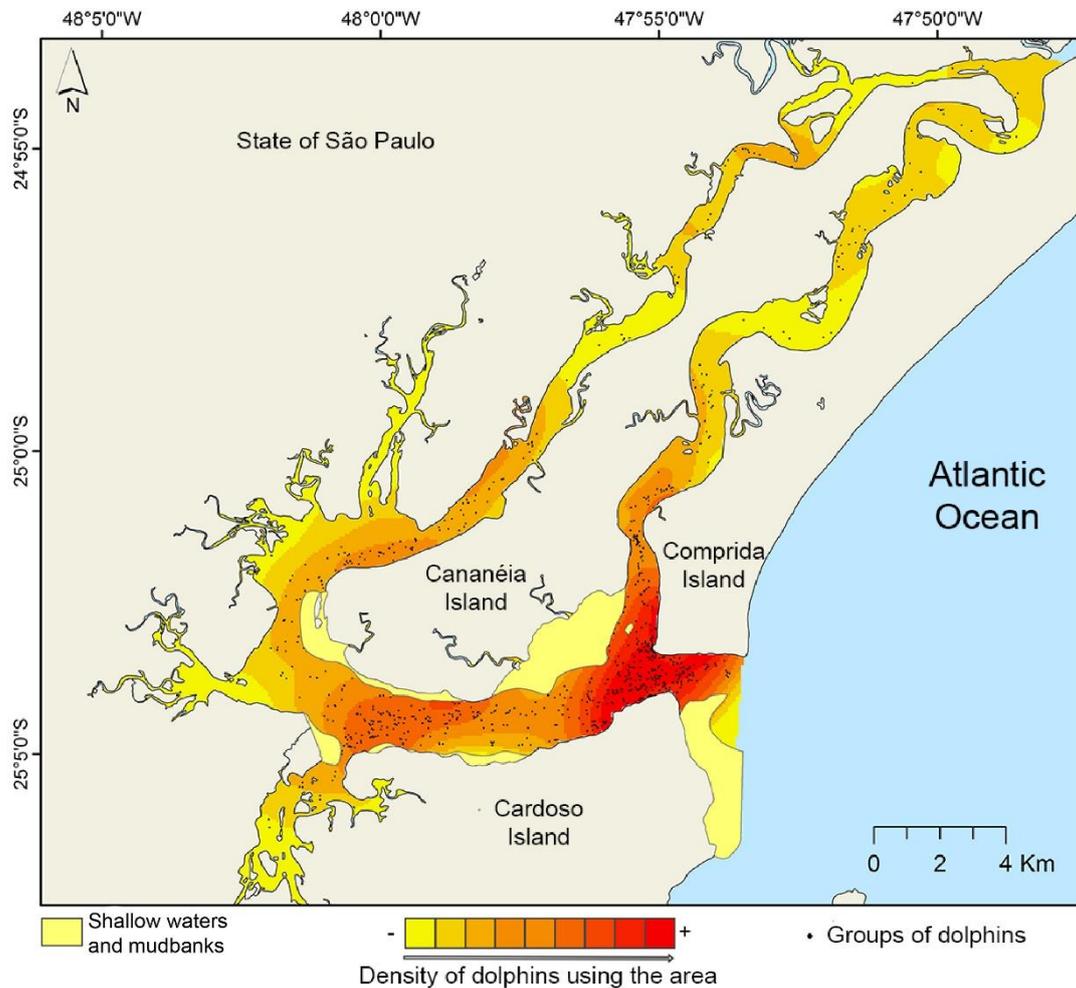


Figure 8. Kernel density map of dolphin groups sighted during field surveys, from August/14 through May/15. Although occupying the entire estuarine area, dolphins do present areas of more intense use (core areas).

Distribution maps of boats

We also used information about vessels locations throughout estuary to determine the most intense used area by boats. The kernel map was able to identify those areas with more boat traffic. These areas are located near the Cananéia’s downtown where there is a small harbor, at Pererinha beach (most tourist beach of the region) and near of “Ponta da Trincheira” (an important route of navigation to open sea).

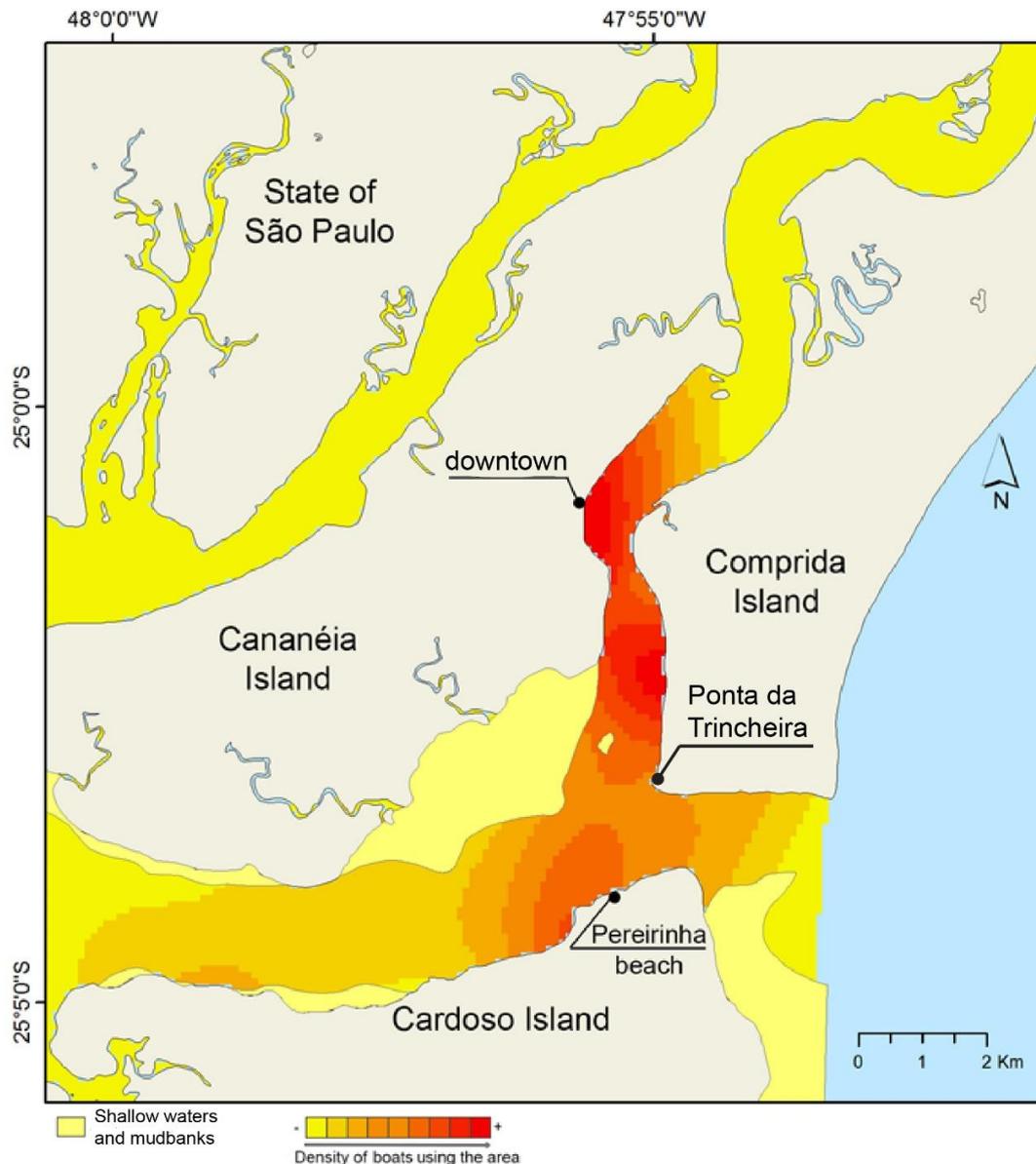


Figure 9. Kernel density map of vessels inside the estuary sighted during field surveys, from August/14 through May/15. Main used areas were waters near the city center and the most touristic beach called Pererinha beach.

After identifying the core areas used by dolphins and areas with more boat traffic, we overlapped these maps to assess which areas should receive more attention due to higher risk of collision between vessel and cetaceans, which we called “critical areas”. We identified as critical areas all navigation channel until Cananéia’s harbor at the downtown area and an area in the front of Pererinha beach. These areas are important to receive attention to management actions.

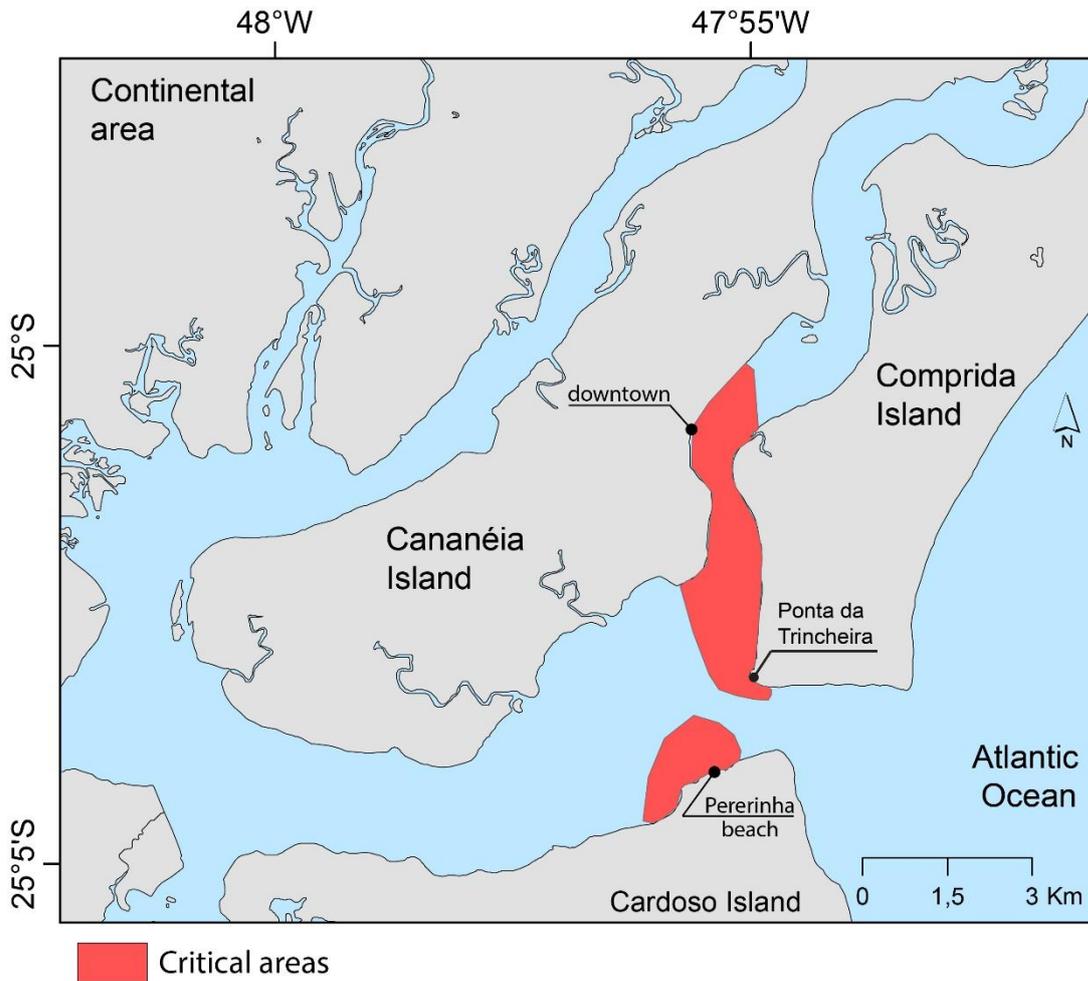


Figure 10. Map of critical areas identified after overlap information about dolphins density in the estuary and boat traffic. The area highlighted in red are sites where the collision between dolphins and boats are likely to occur.

Population abundance

To estimate the population abundance, 132 adult dolphins were identified and cataloged. However, unfortunately it was not possible to build a history of capture for those individuals with enough number of recaptures. Therefore, we were not able to create mark-recapture models to estimate population abundance with precision. Nevertheless, identifying 132 individuals leads us to believe that the size of the population in the Cananéia estuary is larger than previously known. Previous studies estimate a population of 200 individuals, but our estimated proportion of marked individuals (almost 2/3) raises the possibility of a population with at least 300 individuals. At the same time, this update of our photo-identification catalog is important to allow the permanence of field activities and in the near future an estimation of population size with precision.

Monitoring touristic trips

Monitoring activities of boats during touristic trips of dolphin observation or navigation to a touristic beach were performed from August 2014 to May 2015. This effort aimed to assess how the behavior of boat riders and possible impacts over dolphins. At the beginning we faced some resistance of boat conductors of small vessels to allow us to have a “free-ride” due to limited space available in the vessel. Therefore, we had to adopt alternatives strategies to monitoring these trips. Firstly, we used only large schooners to accompany trips (Figure 11). At a second time, we used observations from land-based sites and observation at our research boats. One hundred twenty five trips of different kinds of vessels were observed during field efforts. The main results found was that the schooners observed had a good behavior and followed almost all recommendations to dolphins observations activities. While, conductors of small boats usually traveled at high speed and do not followed the recommendations for navigations inside the estuarine waters, even they had received training and lessons from former IPeC’s researchers. We also observed that jet-skis are one of the main problems in the region, because they usually travel at high speed (Figure 12) and closely approach groups of dolphins. Moreover, this last audience, do not have knowledge about the good behavior recommendations for navigating inside estuary, neither have much awareness about the impacts over dolphins population.



Figure 11. A schooner navigates at estuarine waters and tourist are able to watching dolphins. Some of this trips were observed from land-based sites or (as in this situation) from our research boat. While other times, we accompany some trips aboard this kind of vessel.



Figure 12. A jet-ski navigates in high speed near the downtown area. These are one of most density area of dolphins, which increases the chances of collision between dolphins and vessels.



Figure 13. A small boat navigates in high speed probably conducted by a tourism in a region with high density of dolphins.

Technical report and Outreach materials

The CLP Project team members in partnership with others IPeC's researchers produced a technical report (see Appendices 1) which was provided to the Federal Protected Area Cananéia-Iguape-Peruíbe (APA-CIP) during the process of development of the management plan. We included in this report, data about the area of occupation by dolphins, which is larger than previously known. Suggestions that the creation of a special zone for sustainable use and conservation of cetacean should be bigger than a previously narrow area suggested also was made. Besides that, we included in this report, recommendations of good behavior for boat conductors and nautical activities.

Aiming to spread the information generated by this project, we designed a leaflet (Figure 13) and a poster. This outreach material had information about biology of Guiana dolphin and areas that need more attention while navigating along Cananéia estuary. Its aimed to create awareness among tourist, local community and boat riders, mainly the pilots of jet skis, and minimize the possible impacts over the dolphins. About 2,000 leaflets were distributed to these audiences during summer season of 2015/2016 throughout the city. Five posters were distributed at strategic places as marinas, nautical gas station, restaurants and events. These posters have the benefit of being portable to different places, accordingly with each event and situation.

BOTOCINZA *Sotalia guianensis*

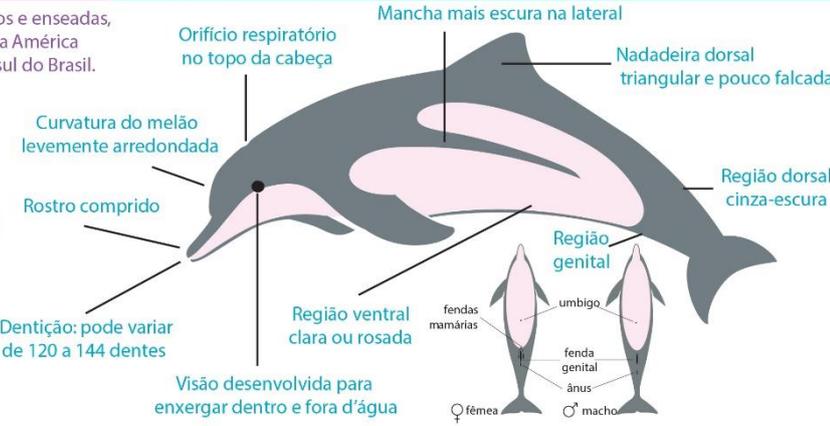
DISTRIBUIÇÃO

Áreas protegidas como estuários e enseadas, distribuídos desde Honduras, na América Central, até Santa Catarina, no sul do Brasil.



Lagamar

PRINCIPAIS CARACTERÍSTICAS



Orifício respiratório no topo da cabeça

Mancha mais escura na lateral

Nadadeira dorsal triangular e pouco falcada

Região dorsal cinza-escura

Região ventral clara ou rosada

Região genital

fendas mamárias

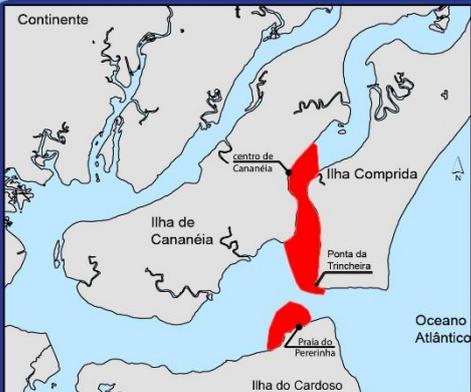
umbigo

fenda genital

ânus

♀ fêmea ♂ macho

Visão desenvolvida para enxergar dentro e fora d'água



Continentes

centro de Cananéia

Ilha Comprida

Ilha de Cananéia

Ponta da Trincheira

Oceano Atlântico

Praia do Pererinha

Ilha do Cardoso

As partes do estuário destacadas em vermelho são **áreas de maior risco** de colisão com botos-cinza e devem ser navegadas com **atenção e cautela**.

Sugestões de conduta de embarcações para proteção do boto-cinza no estuário de Cananéia



- Não provoque a separação de botos, especialmente das crias.
- Evite mudanças de direção e sentido de rumo das embarcações.
- Evite os esportes náuticos nas áreas com botos.
- Só engrenar o motor após uma distância mínima de 50 m dos botos.
- Nenhum resíduo sólido ou líquido pode ser lançado ao mar.

Permanência: ⌚ 30 min Nº de embarcações: 🚤 🚤

REALIZAÇÃO:



PATROCÍNIO:









Figure 14. Leaflet designed and produced during project development. About 2,000 leaflets were distributed in Cananéia during the summer of 2015/2016 to tourists and local community to raise awareness about navigation in Cananéia estuary.

2.D. ACHIEVEMENTS AND IMPACTS

The gathering of data on dolphin distribution enabled the creation of kernel density maps, which were used to detect areas of special attention for conservation inside the estuary due to high intensity use by dolphins. Kernel maps are extremely useful and visual; we used them to present a technical report upon the proposal of creating a sustainable use area for dolphin conservation and tourism activities. Local authorities that manage the federal environmental protection area of the study have debated such proposal during the project activities. Our results on dolphins' distribution enable a more precise

and updated estimates of core areas used by dolphins inside the estuary. Besides that, knowing the core areas and the riskier areas to collision with boat, we are able to devise some conservations and management actions to mitigate the impacts of boat traffic throughout the estuary.

One of the major impacts of this project was contribute to with the extension of the initially proposed zone called “Area of Estuarine Sustainable use and Cetacean Protection”. Initially this area was almost 20% smaller than the area proposed in the technical report produced by CLP project members and Cananéia Research Institute researchers (see map on Appendices 3). Owing to the fact that with this project we were able to gathered more precise and broader dolphin occupation data, we were able to support the creation of a wider protected area. The determination of this area as an important region inside the estuary to dolphin conservation.

Although we do not have enough data to estimate the population size. The data gathered until now will allow us to keep monitoring the population through forward surveys. With bit more data, we believe that we will be able to estimate the population size with enough precision to monitoring the population size through next years, and detect any sign of population decline, even for other anthropogenic factors. Therefore, the beginning of data gathering for population estimation in this project established a baseline monitoring necessary to allow future results in this topic.

Related to the boat tourism monitoring, while not were able to accompany aboard of small boats, the results of monitoring from different platforms, allowed us to identify that most o schooners have a praiseworthy behavior during trips and followed the recommended orientations to navigation and dolphin observation. While, most of boat conductors of small boats and jet-skis did not showed concerned about their impacts over the dolphins. These kinds of boats are the ones that generate greater impact and have more probability to collision with dolphins. Therefore, more focused actions should be held for these specific audiences.

The impacts of distributed leaflets and use posters in strategic sites through the municipality were important to create the awareness, mostly with tourists that visit the city during the summer months and do not have a daily familiarity with dolphins.

Knowing better the impacts and consequences of human activities helps to this audience to be engaged at the conservation efforts of our environment and species.

SECTION 3

3.A. CONCLUSION

All information resulted from this project were essential to support conservation strategies. Our main contribution was to management plan of the Federal Protected Area Cananéia-Iguape-Peruíbe, which was in development during the project execution. This plan had a proposal to create a special zone of sustainable use and cetacean conservation (called “Zona de Uso Sustentável e Conservação de Cetáceos – ZEUSCV” in Portuguese) that initially was narrow. Due to project’s data we were able to formulate a technical report in partnership with other IPeC’s researchers, that suggested a larger area for the ZEUSCV and good behaviors to navigation inside this zone. In February of 2016, this zone was officially created following the recommendations in our technical report.

During activities of monitoring touristic tours, we were able to asses that schooners have a better behavior during dolphin watching trips than boat conductors of small boat and jet-skis. These two kind of vessels are just the ones that have more impact over Guiana dolphins. Therefore, we have learned that future actions should be focused and directed in work raising awareness with these both specific audiences. Trainings and workshops with these audiences will have better achievements in this objective than us.

3.B. PROBLEMS ENCOUNTERED AND LESSONS LEARNT

The most challenging problem faced during the project was to develop activities with small boat conductors. They present resistance in having a “free-to-ride” researcher in place of a paying tourist aboard. Besides that, these small boats are the most impact generator over the dolphins. An alternative solution tried was to monitor boats onboard schooners or research boat or through land. This was possible to be done, but, with less accuracy due limiting field view and distance between vessels.

Nevertheless, it was possible to develop activities with conductors who already had a good relation with researchers in past activities. These conductors do understand the importance of such work. Another possible alternative is to plan on long-term activities in order to sensitize more boat conductors, including activities with their sons and daughters so they may pass on the message about the importance of research and impacts over the dolphins.

Another problem encountered during project development was the lack of enough data to estimate the population size with precision. While this problem do not lead to a main difficulty to project conclusion. It is important to keep going with field surveys to allow in the future have enough data to do this estimative. This kind of long-term project must be maintained and supported for several years.

During this project the team learned that we have to be focused in the main objectives of the projects, because many opportunities to collect and analyze other data raise during the development of the project. Beside that, it is important to have a good sampling design and field expertise, once minor problems that could occurs during field period of the project could comprise all other activities if we are not prepared to solve them.

3.C. IN THE FUTURE

Future activities must include more focused activities for specifics audiences as tourists that pilots jet skis and boat conductors of small boats. Boat conductors of small boats have different profiles compared with schooners conductors and if compared with jet skis pilots as well. These differences must be taken in consideration when formulating new activities. We suggest that, as a possible approach, would be to conduct several workshops that involves small boats riders in training activities and lessons. While, to create the necessary awareness to achieve the jet skis pilots another different approach should be used.

Besides that, awareness activities with local population and general tourists in the summer could be improved with the use of short movies and talks. In addition, it is important to conduct an evaluation process during these activities to keep tracking the effectiveness of the project.

SECTION 4

4.A. APPENDICES

1. Technical report produced by Cananéia Institute Researchers and CLP project team to devise some management actions inside the “Federal Environmental Protected Area Cananéia-Iguape-Peruíbe” (APA-CIP). Presented here only in Portuguese.

 <p>BASE DE APOIO CANANEIA Rua Tristão Lobo, 199 CEP: 11990-000 Centro – Cananéia – SP Tel.: (13) 3851-3055 e-mail: ipecpesquisas@gmail.com</p> <p>Instituto de Pesquisas Cananéia – IPEC</p> <p>MANIFESTAÇÃO TÉCNICA 001/2015 - INSTITUTO DE PESQUISAS CANANEIA - IPEC</p> <p>A presente manifestação técnica tem como objetivo contribuir com o processo de elaboração do Zoneamento da APA Cananea-Iguape-Peruibe, por meio da apresentação de resultados obtidos ao longo dos últimos 44 anos de pesquisas realizadas com a espécie <i>Sotalia guianensis</i> pelo Projeto Boto-Cinza do Instituto de Pesquisas Cananea (IPEC) no Complexo Estuarino-Lagunar de Cananea.</p> <p>INTRODUÇÃO</p> <p>Os ambientes litorâneos sofrem grande pressão antrópica em todo o mundo. No Brasil, milhões de pessoas vivem no litoral e a consequência é degradação acelerada de todos os seus ecossistemas associados. A criação de áreas de proteção é uma estratégia eficaz para a conservação de ambientes e das espécies que dele dependem. Considerado uma espécie bandeira dentre os cetáceos brasileiros, o boto-cinza <i>Sotalia guianensis</i> (van Bénédén, 1864) é um golfinho amplamente distribuído em todo o litoral brasileiro, sobretudo em áreas costeiras e estuarinas e, por isso, sofre constantemente com ameaças causadas por atividades humanas desenvolvidas nestas regiões, o que o coloca atualmente na lista nacional de espécie ameaçada de extinção (Portaria MMA nº 444 de 17 de Dezembro de 2014). Em Cananéia, a espécie é vista como um atrativo para o turismo e traz importantes benefícios econômicos para a comunidade local (Filla <i>et al.</i> 2012). Deste modo, é essencial a elaboração de uma proposta para o ordenamento do turismo de observação que possibilitem o aproveitamento do boto-cinza como vetor da economia local e um meio eficiente de sensibilização do publico em geral, garantindo concomitantemente, a sua conservação em médio e longo prazos.</p> <p>CONTEXTUALIZAÇÃO</p> <p>.....</p>	 <p>BASE DE APOIO CANANEIA Rua Tristão Lobo, 199 CEP: 11990-000 Centro – Cananéia – SP Tel.: (13) 3851-3055 e-mail: ipecpesquisas@gmail.com</p> <p>Trabalhos de longo prazo desenvolvidos pela equipe do Projeto Boto-Cinza (Filla, 2008; Filla <i>et al.</i>, 2008) resultaram em uma proposta de criação de uma “Área de regulamentação de uso prioritária para a conservação do Boto-cinza na região do Lagamar”, a fim de minimizar os impactos antrópicos negativos na população dessa espécie, bem como, regulamentar a navegação e criar plataformas de oportunidade para a prática do turismo de observação de base comunitária. Tal proposta embasou-se nos resultados gerados em 29 anos de pesquisa científica na região sobre diferentes aspectos da biologia e ecologia do boto-cinza. O processo de elaboração baseou-se em portarias e leis nacionais propostas em outras áreas para outras espécies de cetáceos e também em orientações da União Internacional para a Conservação da Natureza (IUCN, 1999). Esse processo de construção envolveu diferentes segmentos da sociedade civil, a saber: empresas de turismo, donos de escunas, mestres de embarcação, turistas, pescadores, monitores ambientais e demais moradores locais. Na ocasião, propôs-se a delimitação e o estabelecimento de normas e regras de conduta e navegação em setores de grande densidade populacional de botos no Lagamar.</p> <p>Até o ano de 2011, os estudos sobre a ecologia populacional do boto-cinza vinham sendo conduzidos, principalmente, na área compreendida entre as proximidades da balsa que liga a Cidade de Cananéia à Ilha Comprida e a Baía de Trapandé (Figura 01) (Monteiro-Filho, 2000; Bisi, 2001; Havukainen, 2004; Havukainen <i>et al.</i>, 2011; Godoy, 2011; Godoy <i>et al.</i>, 2015). Estes trabalhos geraram importantes resultados, que permitiram compreender os padrões de uso e distribuição do boto-cinza ao longo desta área, evidenciando que esta ocorre de forma heterogênea. O uso diferencial de áreas reflete a premissa de que os ambientes não são homogêneos e que, as dimensões da área de vida e os movimentos que os animais executam dentro deste espaço são determinados pela distribuição em mosaico dos recursos disponíveis (Defran <i>et al.</i>, 1999) especialmente o alimento e a proteção contra predadores (Monteiro-Filho, 2000).</p> <p>.....</p>
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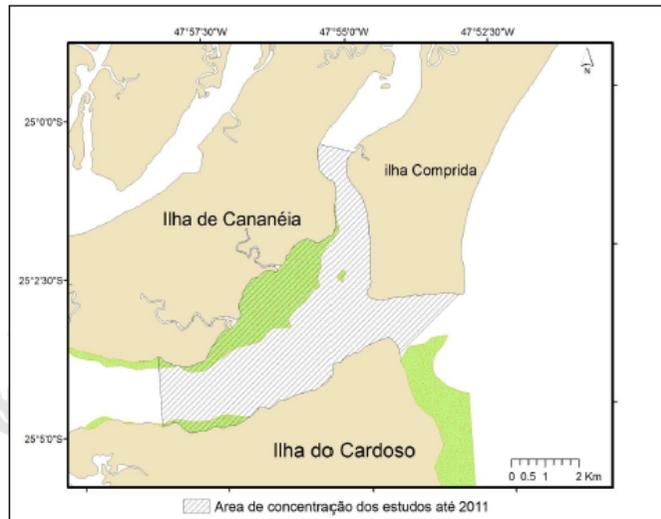


Figura 01. Área de concentração dos estudos sobre a ecologia populacional dos botos-cinza desenvolvidos pelo IPEC até 2011.

A partir de 2011, entretanto, a área de estudo dos trabalhos sobre a ecologia populacional do boto-cinza foi ampliada, de modo que as linhas de pesquisa de passando a ser desenvolvidas ao longo de todo o entorno da Ilha de Cananéia, possibilitando assim, compreender como os animais se utilizam dos demais setores do estuário.



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PROPOSTA DE AMPLIAÇÃO DA ZONA ESTUARINA DE USO SUSTENTÁVEL E PROTEÇÃO DOS BOTOS – ZUSPB

Os dados resultantes das linhas de pesquisa sobre “Estimativa de Densidade Populacional”, “Uso de Habitat” e “Ecologia Populacional e Padrões Sociais” desenvolvidas entre 2011 e 2015 (dados não publicados*) demonstram que o boto-cinza

utiliza de forma significativa, não só o trecho compreendido entre a Baía de Trapandê e balsa que liga Cananéia à Ilha Comprida, mas também, todo o Mar Pequeno até a porção sul do Juruvaiuva (Figuras 02 a 06).

Além disso, incursões a campo mais recentes realizadas no ano de 2015, também possibilitaram a realização de registros de um considerável número de agrupamentos de botos nas proximidades da Ilha da Casca. Ao observar a Figura 05, nota-se que a Ilha da Casca está localizada no entorno imediato de uma das regiões de maior adensamento de agrupamentos de botos. Considerando o exposto, somado aos fatos de que mais agrupamentos de botos-cinza começam a ser observados nesta região, conforme os números de incursões aumentam e de que tal região apresenta uma grande similaridade com outras áreas de grandes concentrações (p. ex. presença de baixios com fundos lodosos, manguezais ao entorno e presença de inúmeras presas), aliado ao princípio da precaução, nos leva a sugerir a grande importância das proximidades da Ilha da Casca para a ecologia da espécie e, portanto de extremo valor para a sua conservação.

* Os dados das referidas linhas de pesquisa ainda não foram publicados, pois fazem parte trabalhos de doutorado ainda em andamento. Tão logo os resultados sejam publicados, mesmos serão disponibilizados à APA Cananéia-Iguape-Peruíbe.



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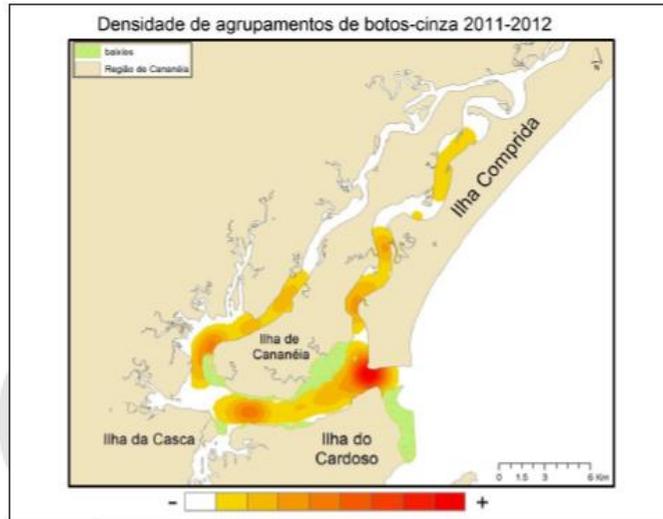


Figura 02. Mapa apresentando a densidade de agrupamentos de botos-cinza entre junho de 2011 a maio de 2012 em torno da Ilha de Cananéia.



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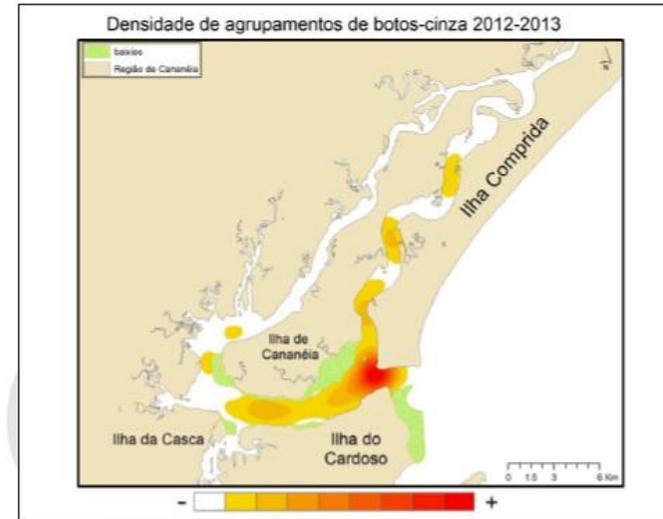


Figura 03. Mapa apresentando a densidade de agrupamentos de botos-cinza entre junho de 2012 a maio de 2013 em torno da Ilha de Cananéia.



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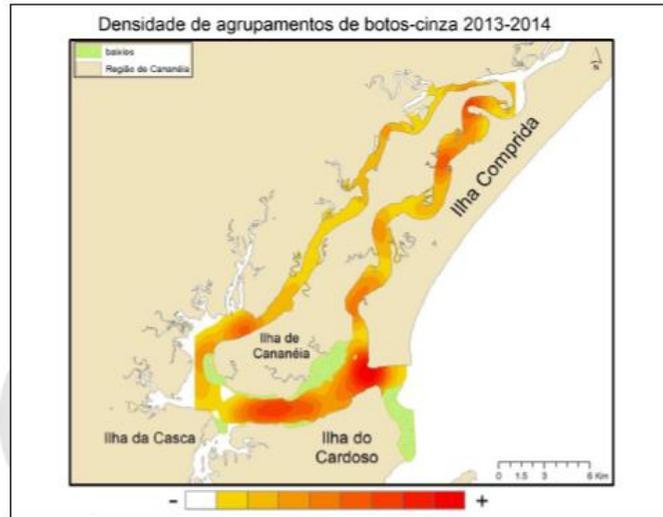


Figura 04. Mapa apresentando a densidade de agrupamentos de botos-cinza entre junho de 2013 a maio de 2014 em torno da Ilha de Cananéia.



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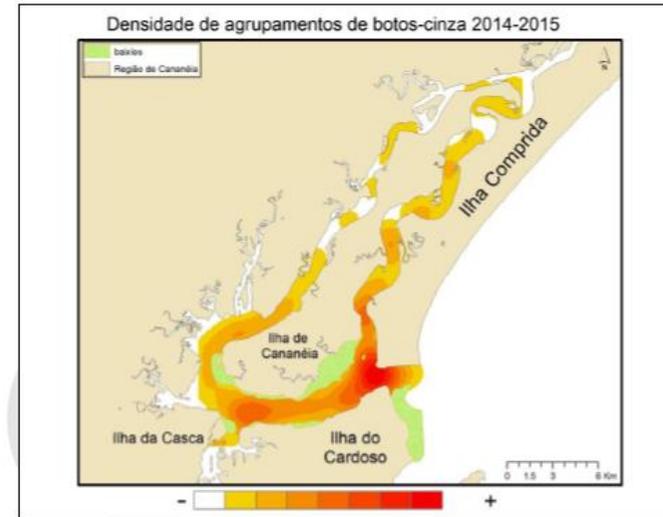


Figura 05. Mapa apresentando a densidade de agrupamentos de botos-cinza entre junho de 2014 a maio de 2015 em torno da Ilha de Cananéia.



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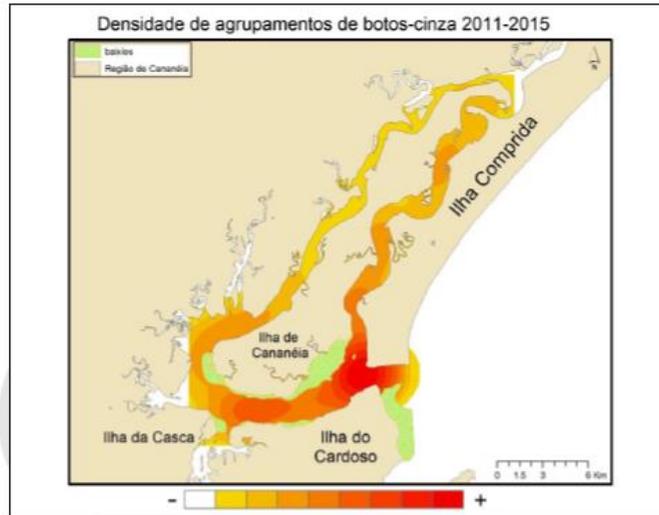


Figura 06. Mapa apresentando a densidade de agrupamentos de botos-cinza entre junho de 2011 a maio de 2015 em torno da Ilha de Cananéia.

Diante do exposto, considerando o intenso uso e as altas densidades detectadas na até a porção norte do Mar Pequeno até a área de entorno da Ilha da Casca, sugerimos que a “Zona Estuarina De Uso Sustentável e Proteção aos Botos – ZUSPB”, inicialmente proposta pela APA CIP (~70 km²), tenha seu limite norte ampliado até a parte sul de Juruvaúva (latitude: -24.9210°, longitude: -47.828°) e seu limite sul ampliado ao sul da Ilha da Casca (latitude: -25.091°, longitude: -48.015°) (~81 km²), conforme indicado na Figura 07, de modo a garantir a proteção do boto-cinza e a manutenção desta população em níveis viáveis nos limites territoriais da APA Cananéia-Iguape-Peruíbe.



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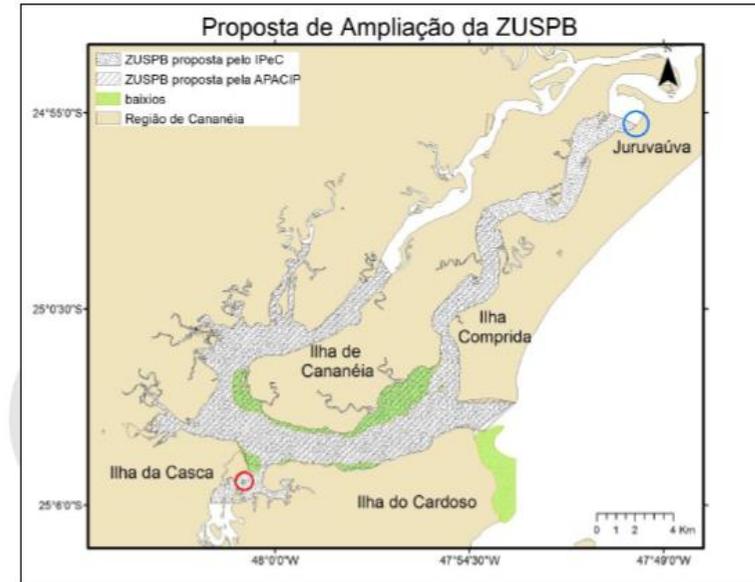


Figura 07. Mapa da região de Cananéia mostrando a área da ZUSPB – Proposta APACIP (área traçada) e a área proposta pelo IPeC para a ampliação da ZUSPB (área pontilhada). A região circulado de vermelho compreende a Ilha da Casca e a região com o quadrado azul compreende a parte sul do Juruvaúva.

Sem mais para o momento, colocamo-nos à disposição para prestar quaisquer esclarecimentos que se façam necessários, bem como para contribuir tecnicamente com a gestão da APA Cananéia-Iguape-Peruíbe no que estiver ao alcance das ações do Instituto de Pesquisas Cananéia.

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Monteiro-Filho, E. L. A. 2000. Group organization in the dolphin *Sotalia fluvianilis guianensis* in an estuary of southeastern Brazil. Ciência e Cultura. 52(2), 97-101.



2. Chapter of the Management Plan of Federal Environmental Protected Area Cananéia-Iguape-Peruíbe (APA-CIP) that determines the area called “Area of Estuarine Sustainable use and Cetacean Protection”. Presented here only in Portuguese.

> No caso de áreas já ajuizadas, deve ser seguido o Termo de Ajustamento de Conduta ou decisão judicial.

- São permitidas as atividades de pesquisa, monitoramento ambiental, educação ambiental, esporte e trilha que não utilizem veículos motorizados.
- É permitido o uso de veículo motorizado para deslocamento em trilhas já existentes. Para estas trilhas deverá haver monitoramento conjunto entre o proprietário/responsável e o órgão gestor da UC.
> Nestas trilhas não são permitidas atividades de rally e moto cross.
- São permitidas obras de infraestrutura para proteção dos recursos hídricos ou que visem ao abastecimento de água, desde que tenham licença e outorga do órgão responsável, ouvido o órgão gestor da UC.
- São permitidas a recuperação de caminhos antigos e a implantação de estruturas de baixo impacto ambiental voltadas ao ecoturismo e à educação ambiental, dando ciência antecipada da APACIP.
- É permitida a abertura ou o alargamento de trilhas ou acessos existentes desde que com a autorização do órgão ambiental e ouvido o órgão gestor da UC.
- É proibida a disposição final de resíduos sólidos.
- A APACIP dará ciência aos cartórios e à Secretaria de Patrimônio da União/SPU das restrições existentes nesta zona.

Indicadores

- Monitoramento da qualidade da água ao longo do tempo.
- Presença de espécies-topo de cadeia alimentar, guarda-chuva e bioindicadoras ao longo do tempo.
- Número de pesquisas ao longo do tempo.
- Número de solicitações de licenciamento para estruturas de ecoturismo ao longo do tempo.
- Número de estruturas voltadas ao ecoturismo e empregos ao longo do tempo.
- Trabalhos contínuos voltados à educação ambiental.

ZONA ESTUARINA DE USO SUSTENTÁVEL E PROTEÇÃO DE CETÁCEOS – ZUSPC

Descrição:
Área voltada à conservação da biodiversidade, focada especialmente na área de maior ocorrência do boto-cinza *Sotalia guianensis*, e da toninha *Pontoporia blainvilliei* segundo dados do Instituto de Pesquisas Cananéia (IPEC) e Instituto Oceanográfico da USP. Assim, é considerada prioritária para a conservação da população destas espécies e para a efetividade da APACIP. Estes cetáceos marinhos devem ser protegidos pela APACIP, em conformidade com o decreto de criação da UC e ações do PAN Toninhas e PAN dos Pequenos Cetáceos e Portaria IBAMA nº 117/1996. Esta área compreende a parte aquática e os bancos de areia localizados entre o bairro de Juruvaúva, na Ilha Comprida, e a Baía de Trapandé, passando pela Ilha da Casca e seguindo até a balsa do bairro Porto Cubatão, em Cananéia. Destaca-se que nesta área há maior fluxo de tráfego náutico, cercos-fixos e pesca amadora.

Objetivo

- Resguardo de áreas de coleta e exploração de recursos pesqueiros, com o ordenamento da atividade pesqueira de modo sustentável.

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- Proteção do ambiente estuarino, especialmente das espécies ameaçadas de extinção, como o boto-cinza *Sotalia guianensis*, a toninha *Pontoporia blainvilliei* e tartarugas marinhas.
- Proteção de bancos de areia e área de alimentação e descanso de aves limícolas e de arribação.
- Promoção da visitação ordenada e contemplação das paisagens do estuário.

Normas

- É permitida a pesca artesanal profissional e amadora, em conformidade com a legislação vigente e as regras definidas para a pesca neste Plano de Manejo, contribuindo ao atendimento da Meta 1 do PAN dos Pequenos cetáceos.
- São permitidas as atividades de turismo náutico desde que atendidas as normas gerais dispostas neste Plano de Manejo, contribuindo ao atendimento da Meta 3 do PAN dos Pequenos cetáceos.
- É permitido o uso de moto aquática “jetski” somente para deslocamento, em velocidade reduzida e proibidas as mudanças bruscas de direção, contribuindo ao atendimento da Meta 3 do PAN dos Pequenos cetáceos.
- É permitido o tráfego de quaisquer tipos de embarcação, desde que atenda às normas da Marinha e normas estabelecidas neste Plano de Manejo, contribuindo ao atendimento da Meta 3 do PAN dos Pequenos cetáceos.
- Não são permitidas a criação ou a engorda de espécies exóticas no estuário.
- É permitida a aquicultura de espécies nativas de baixo impacto desde que autorizada pela APACIP, conforme o procedimento de Autorização Direta, conforme procedimento disposto na IN ICMBio 04/2009.
- Para a construção de estruturas náuticas, são válidas as regras apontadas neste Plano de Manejo.
- São proibidos enrocamentos até o limite da linha da maré mais alta, bem como dragagens, salvo em casos de atividades decretadas como de utilidade pública e de interesse social (glossário, de acordo com o Código Florestal), desde que licenciado pelo órgão ambiental competente, conforme a Resolução SMA nº 102/2013, e autorizada pelo ICMBio, conforme procedimento disposto na IN ICMBio 07/2014.

Indicadores

- Relação entre o fluxo de embarcações e avistamentos de cetáceos (conforme métodos científicos adotados por Instituições de Pesquisa).
- Gerar indicador de capacidade de suporte para o fluxo náutico, visando a não interferência no comportamento dos cetáceos.
- Relação entre alterações de comportamento com o fluxo de embarcações (conforme métodos científicos adotados por Instituições de Pesquisa).
- Tamanho da população de cetáceos ao longo do tempo.
- Relacionar as informações de Captura Por Unidade de Esforço/CPUE – das atividades pesqueiras ao longo do tempo.

Áreas Funcionais:
Coroa próxima à Ilha de Cananéia (descrita ao final deste capítulo Zoneamento).

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3. TRÁFEGO NÁUTICO

Normas para embarcações

- O uso de moto aquática "jetski" em Cananeia, na ZUSPC, e em Peruibe, nos rios Uma e Guaraú, somente poderá ocorrer para deslocamento em velocidade reduzida e proibidas as mudanças bruscas de direção.
- Deverão ser divulgadas em local de embarque e desembarque de visitantes informações sobre segurança náutica e regras de tráfego, bem como de boas práticas ambientais.
- É permitida a prática de esportes náuticos, desde que não interfiram no comportamento dos cetáceos e nas atividades pesqueiras tradicionais.
- É proibido emitir ruídos e utilizar instrumentos sonoros tais como rádio, apito, instrumentos de percussão, fogos de artifício, sinalizadores e sirene que resultem no afugentamento intencional das aves. Excetuam-se as manifestações culturais tradicionais.

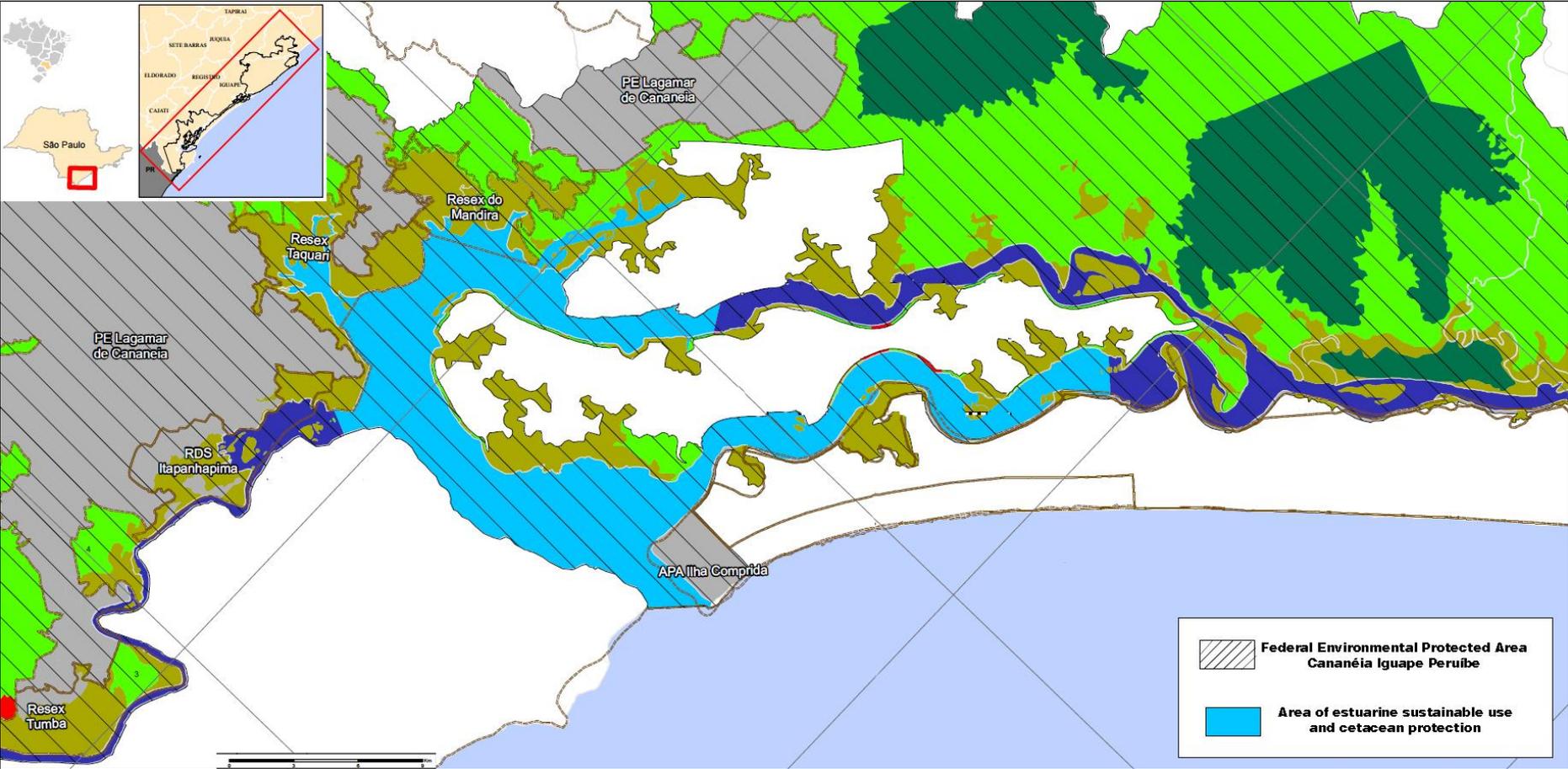
Normas para aproximação dos botos e outros cetáceos

- Não é permitido perseguir ou tentar direcionar cetáceos, bem como provocar a separação de animais, especialmente o isolamento de crias.
- Não é permitida a aproximação intencional junto aos cetáceos a menos de 50 (cinquenta) metros quando em atividade de observação direta.
- Quando houver a observação direta, os motores devem estar ligados e desengrenados para que a presença e localização da embarcação seja sempre notada pelos animais.
- A atividade de observação deve ser feita em silêncio.
- No máximo duas embarcações podem observar o mesmo grupo de cetáceos ao mesmo tempo.
- É proibido tocar os botos com os pés, mãos ou qualquer instrumento, bem como alimentá-los.
- O motor deverá ser reengrenado a uma distância mínima de 50 metros dos botos.
- O tempo máximo para permanência junto a um mesmo grupo de cetáceos é de 30 (trinta) minutos.
- Estas normas deverão ser informadas aos visitantes pelo condutor da embarcação.
- Não é permitido produzir ruídos excessivos, tais como música, percussão de qualquer tipo, fogos de artifício, sinalizadores ou outros, além daqueles gerados pela operação normal da embarcação, a menos de 300 (trezentos metros) de qualquer cetáceo. Excetuam-se as manifestações culturais tradicionais.
- É proibido praticar mergulho ou natação para aproximação intencional, com ou sem o auxílio de equipamentos, a uma distância inferior a 50 (cinquenta) metros dos botos.
- É proibido manipular os equipamentos de marcação, telemetria e biometria sem a autorização do ICMBio.

ESTRUTURAS NÁUTICAS

- Piers e rampas de acesso a embarcações deverão ser de uso coletivo.
- É permitida a construção de estruturas náuticas:
 - de baixo impacto, como as destinadas exclusivamente a guarda de embarcações, bem como estruturas e instalações náuticas, como piers flutuantes ou não, rampas de acesso às embarcações, desde que não impliquem no aterro do corpo d'água ou enrocamento, hoje classificadas

3. Map of the area called “Area of Estuarine Sustainable use and Cetacean Protection” created with the publication of the Management Plan of Federal Environmental Protected Area Cananéia-Iguape-Peruíbe (APA-CIP). Adapted and translated from the original map.



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4.C. ADDRESS LIST AND WEB LINKS

www.ipecpesquisas.org.br

<http://www.icmbio.gov.br/portal/biodiversidade/unidades-de-conservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2241-apa-de-cananea-iguape-peruibe.html>

4.D. DISTRIBUTION LIST

Research institutes:

- Instituto de Pesquisas Cananéia – IPeC (Cananéia Research Institute)

- Laboratório de Biologia e Ecologia de Vertebrados – UFPR (Biology and Ecology of Vertebrates Lab – Federal University of Paraná)

Environmental agencies:

- Parque Estadual Ilha do Cardoso - Fundação Florestal
- Área de Proteção Ambiental Marinha Litoral Sul - Fundação Florestal (Marine Protected Area)
- Área de Proteção Ambiental Cananéia-Iguape-Peruíbe – Instituto Chico Mendes para Conservação da Biodiversidade – ICMBio

