

# PREPARATION OF ACTION PLAN FOR THE CONSERVATION OF THE CHERRY-THROATED Tanager (*Nemosia rourei*)

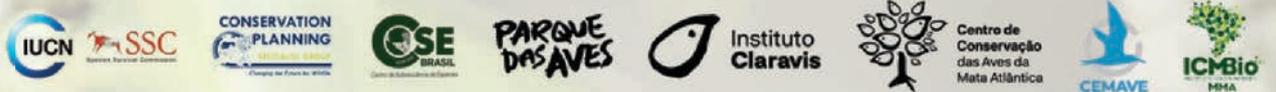
April 16 to 23, 2021

Virtual Workshop

FINAL REPORT



## ORGANIZATION



## PARTNERS



## REALIZATION



# PREPARATION OF ACTION PLAN FOR THE CONSERVATION OF THE CHERRY- THROATED TANAGER (*Nemosia rourei*)

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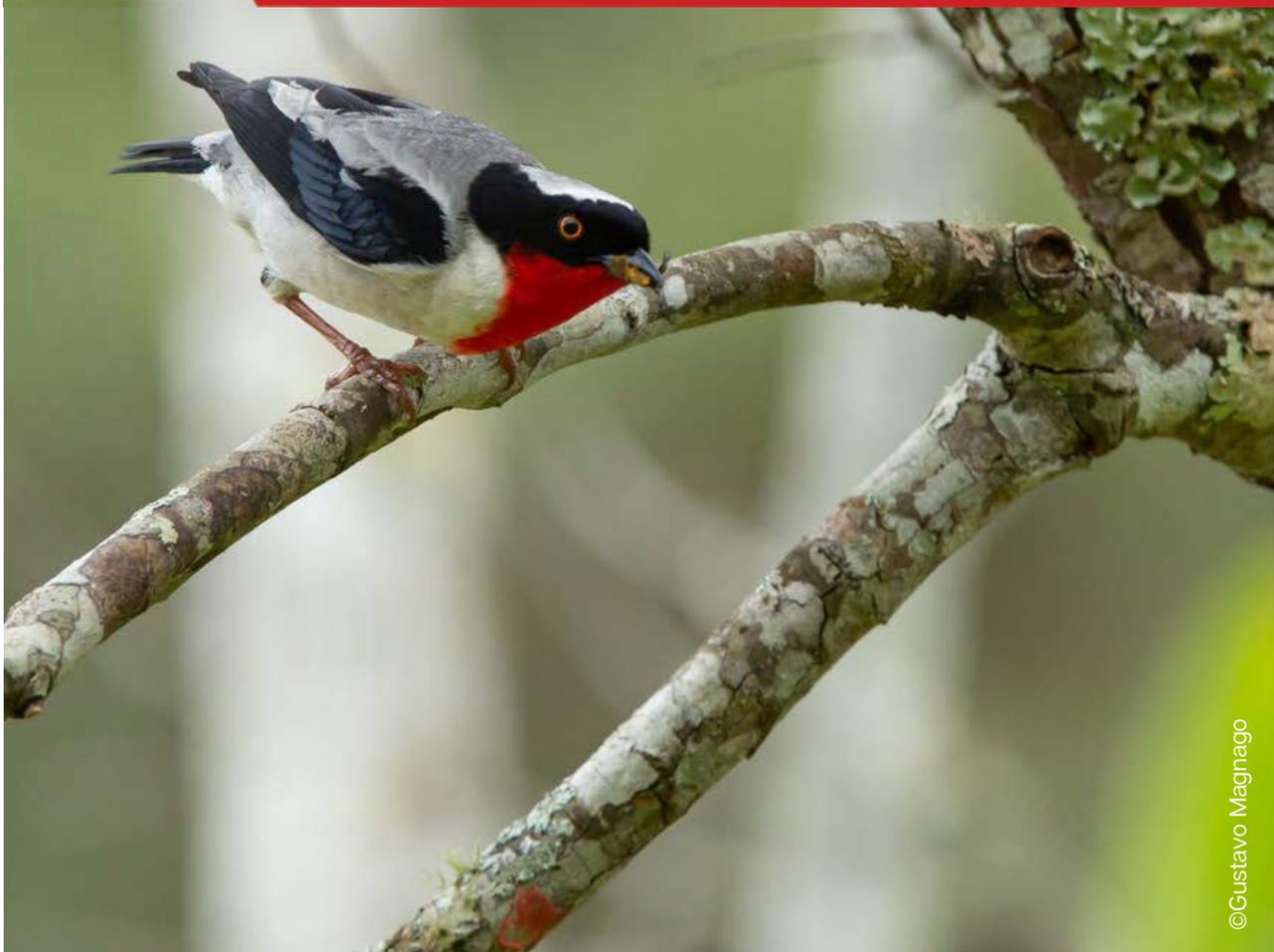
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This report complies with the work plan of the Cherry-throated Tanager Conservation Program (PCSA) carried out by Instituto Marcos Daniel (IMD), at the demand of the company Transmissora Caminho do Café SA (TCC), to meet a requirement of the environmental licensing agency IBAMA in the process of environmental licensing for the transmission line LT 500 kV Governador Valadares 6 – Mutum – Rio Novo do Sul. This report refers to objective C indicators: Identify the main threats to the species in its current occurrence areas (habitat loss, pesticides, hunting, exotic species); goals C-1 Conduct an expert workshop to identify, quantify and categorize threats to the species' conservation in order of risk and define the strategies and actions necessary to minimize threats to conservation; and C-2 Define actions necessary to optimize the suitability of the species' occurrence areas (connectivity, protection, forest recovery, buffering of edges from occurrence areas).

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April 16 to 23, 2021 | Virtual Workshop

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## ABBREVIATIONS AND ACRONYMS

<b>AZAB</b>	Brazilian Association for Zoos and Aquaria (Associação de Zoológicos e Aquários do Brasil)
<b>CAR</b>	the National Land Registry (Cadastro Ambiental Rural)
<b>CEMAVE</b>	National Center for Bird Conservation and Research (Centro Nacional de Pesquisa e Conservação de Aves Silvestres)
<b>CETAS</b>	Centre for reception and triage of rescued or confiscated wild animals (Centro de Triagem de Animais Silvestres)
<b>CPSG</b>	IUCN SSC Conservation Planning Specialist Group
<b>CSS</b>	IUCN SSC Center for Species Survival Brazil
<b>CR</b>	Critically Endangered
<b>ES</b>	State of Espírito Santo
<b>GAT</b>	Technical Advisory Group (Grupo Técnico de Assessoramento)
<b>IBAMA</b>	Administrative arm of MMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis)
<b>ICMBio</b>	The Brazilian government agency for biodiversity conservation (Instituto Chico Mendes de Conservação da Biodiversidade)
<b>IDAF</b>	State agency responsible for agricultural policy as well as administration of forest remnants in Espírito Santo (Instituto de Defesa Agropecuária e Florestal do Espírito Santo)
<b>IMD</b>	Instituto Marcos Daniel, a non-profit conservation organisation (Instituto de Ensino, Pesquisa e Preservação Ambiental Marcos Daniel)
<b>INCAPER</b>	State agency for research, technical assistance and rural extension (Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural)
<b>IUCN</b>	International Union for Conservation of Nature
<b>kV</b>	kilovolt(s)
<b>MG</b>	State of Minas Gerais
<b>MMA</b>	Ministry of Environmental (Ministério do Meio Ambiente)
<b>PAN</b>	National Action Plan (Plano de Ação Nacional)
<b>PCSA</b>	Cherry-throated Tanager Conservation Program (Programa de Conservação da Saíra-Apunhalada)
<b>REBIO</b>	Biological Reserve (Reserva Biológica)
<b>RPPN</b>	Private Protected Area (Reserva Particular do Patrimônio Natural)
<b>SSC</b>	IUCN Species Survival Commission
<b>TCC</b>	The power transmission line project that funds the PCSA (Transmissora Caminho do Café)



## EXECUTIVE SUMMARY

The objective of the workshop was to develop an integrated conservation action plan for the Cherry-throated Tanager *Nemosia rourei*, an endemic and Critically Endangered bird of the Brazilian Atlantic Rainforest. The workshop was held in virtual format between April 16 and 23, 2021, with 40 participants (for a list of participants and institutions, see Appendix A, for the agenda, see Appendix B). The workshop followed the One Plan Approach and used the CPSG's Principles and Steps for species conservation planning and the IUCN "Guidelines for the use of Ex Situ Management for Species Conservation" as the basis for the process, with the aim of bringing all relevant parties together and considering the full range of potential conservation actions, including intensive management options. The general objective of the conservation plan established by the participants was to contribute to an increase in the wild population of the Cherry-throated Tanager within five years. From this general objective, six specific objectives were identified, briefly described below: (1) interventions to reduce mortality and increase the reproductive success of the species, (2) integration with public policies; (3) habitat conservation, (4) creation of protected areas, (5) efforts to increase knowledge about the species; and (6) communication and education activities. Participants identified 50 specific actions with timelines and responsible parties, which will be implemented by the organizers and collaborators within the scope of the Cherry-throated Tanager Conservation Program (PCSA) of Instituto Marcos Daniel, together with other collaborating institutions.



# INTRODUCTION

## The workshop

This workshop aimed to establish an action plan for the conservation of Cherry-throated Tanager *Nemosia rourei*, based on the actions established by the National Action Plan for the Conservation of Atlantic Rainforest Birds (ICMbio, 2018), particularly action 7.2, which calls for an assessment of the need for integrated management actions for this species. This plan will support the actions of the PCSA and the public policies of government agencies under municipal, state and federal control. During the workshop, participants elaborated objectives and actions to combat the listed threats, as well as evaluating potential intensive management activities for the species, including ex situ activities. The workshop was convened by the Cherry-throated Tanager Conservation Program (PCSA), of Instituto Marcos Daniel (IMD), in partnership with Transmissora Caminho do Café (TCC/ALUPAR) and organized in partnership with the IUCN SSC Conservation Planning Specialist Group (CPSG) Species Survival Center Brazil, Parque das Aves, Instituto Claravis, and the National Center for Research and Conservation of Wild Birds (CEMAVE/ICMbio).

## Cherry-throated Tanager Conservation Program



PCSA is a partnership between Instituto Marcos Daniel and Transmissora Caminho do Café, a company of the ALUPAR Group. It was created in 2020 based on an IBAMA requirement for the environmental licensing of the construction and operation of the 500 kV Governador Valadares 6 Transmission Line – Mutum – Rio Novo do Sul in Minas Gerais and Espírito Santo. The PCSA was established to carry out research supporting the conservation of the Cherry-throated Tanager, and is active in areas of known occurrence of the species in the state of Espírito Santo, in the region of Mata de Caetés (including parts of the municipalities of Castelo, Vargem Alta, Venda Nova do Imigrante and Domingos Martins), in the municipalities of Santa, and in other areas of potential distribution of the species. The objectives of the PCSA are to define the area of historical occurrence of the Cherry-throated Tanager, carry out a population study in the areas of potential occurrence, identify the main threats to the species and carry out a program of conservation, environmental education and community engagement. The actions provided by the program are complementary and in accordance with the conservation actions listed in the National Action Plan for the Conservation of Atlantic Rainforest Birds.



## The Cherry-throated Tanager, *Nemosia rourei* Cabanis, 1870

The Cherry-throated Tanager (*Nemosia rourei*) is a passerine bird of the tanager family Thraupidae. It is considered Critically Endangered (CR) by state and national authorities and by the International Union for Conservation of Nature.



CRITICALLY  
ENDANGERED  
CR

Global Red List: CR (2021)

National Red List: CR (2014)

State Lists:

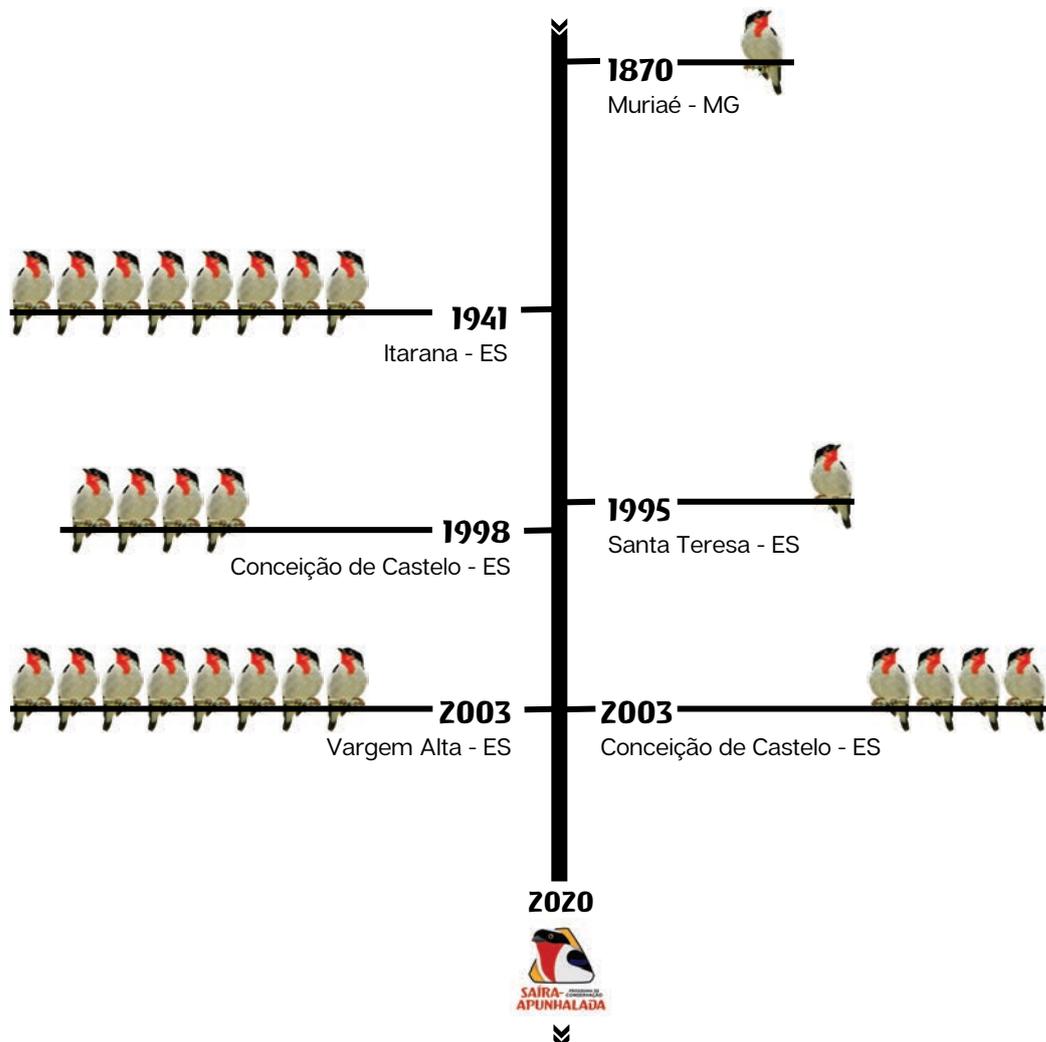
Espírito Santo: CR (2007)

Minas Gerais: CR (2010)

(ICMBio/MMA 2018, BIRDLIFE INTERNATIONAL 2018)

## Historical data

After its description in 1870 by Jean de Roure from a specimen purportedly collected in the municipality of Muriaé in the state of Minas Gerais, the species was only seen again in 1941 by the ornithologist Helmut Sick who observed a group of eight individuals in the municipality of Itarana, in the state of Espírito Santo (SICK and TEIXEIRA, 1979). After 54 years without new records, some researchers feared the species was extinct, although it was not officially declared extinct. In October 1995, the Cherry-throated Tanager was seen again by D. Scott in the Augusto Ruschi Biological Reserve (REBIO Augusto Ruschi) in the municipality of Santa Teresa, but without any documentary evidence such as photos or sound recording. In 1998 the species was considered rediscovered based on documented observations at the Pindobas IV Farm in Conceição de Castelo (PACHECO, 1998; BAUER et al. 2000). In September 2003 the species was found on a private property, Fazenda Caetés in the municipality of Vargem Alta (VENTURINI et al. 2005). In 2011 and 2013 the species had its occurrence documented in the Augusto Ruschi Biological Reserve by recording of its vocalization and photography (Gustavo Magnago, personal communication). After its official rediscovery in 1998, the species has been regularly observed in the Mata dos Caetés (MAGNAGO et al., 2017) in an area that is mainly formed by Fazenda Caetés, Fazenda Forno Grande and RPPN Águia Branca, on the border of the municipalities of Vargem Alta and Castelo. In January 2021, the PCSA team visually recorded the species again at REBIO Augusto Ruschi.



## Status in the wild

It is estimated with some confidence that there are fewer than 50 individuals, restricted to the state of Espírito Santo (ICMBio 2018). Between 2003 and 2005, the known population was 16 individuals, with eight individuals at Mata dos Caetés, six individuals at Fazenda Pindobas IV and two individuals at REBIO Augusto Ruschi (Venturini 2005). Currently known populations are restricted to the Mata de Caetés region, between the municipalities of Vargem Alta and Castelo; and the Augusto Ruschi Biological Reserve, in the municipality of Santa Teresa (Figure 1). These areas are approximately 84 km apart from each other, in a mosaic of deforested areas. Based on recent data collected by PCSA, the known population is now 11 individuals, with a group of six in Mata dos Caetés and another of five in REBIO Augusto Ruschi (Table 1). Repeated visits and search campaigns to Fazenda Pindobas IV indicate that the species no longer occurs there.

The population is likely in decline, based on data from historical and recent PCSA sightings, and the likely loss of individuals in areas of historical occurrence (Fazenda Pindobas in Conceição do Castelo and Itarana). PCSA modeled the potential distribution of the species based on historical records up to 2019, identifying an area of potential occurrence in the Caparaó National Park, in addition to areas with confirmed occurrence (LIMA, MAGNAGO e SANTOS, 2021). The presence of the species in Caparaó was not confirmed in the field campaigns carried out in 2021 by the PCSA. For more information on historical records, see the species record in Appendix C, from which this text is modified (See information update at the end of the report).

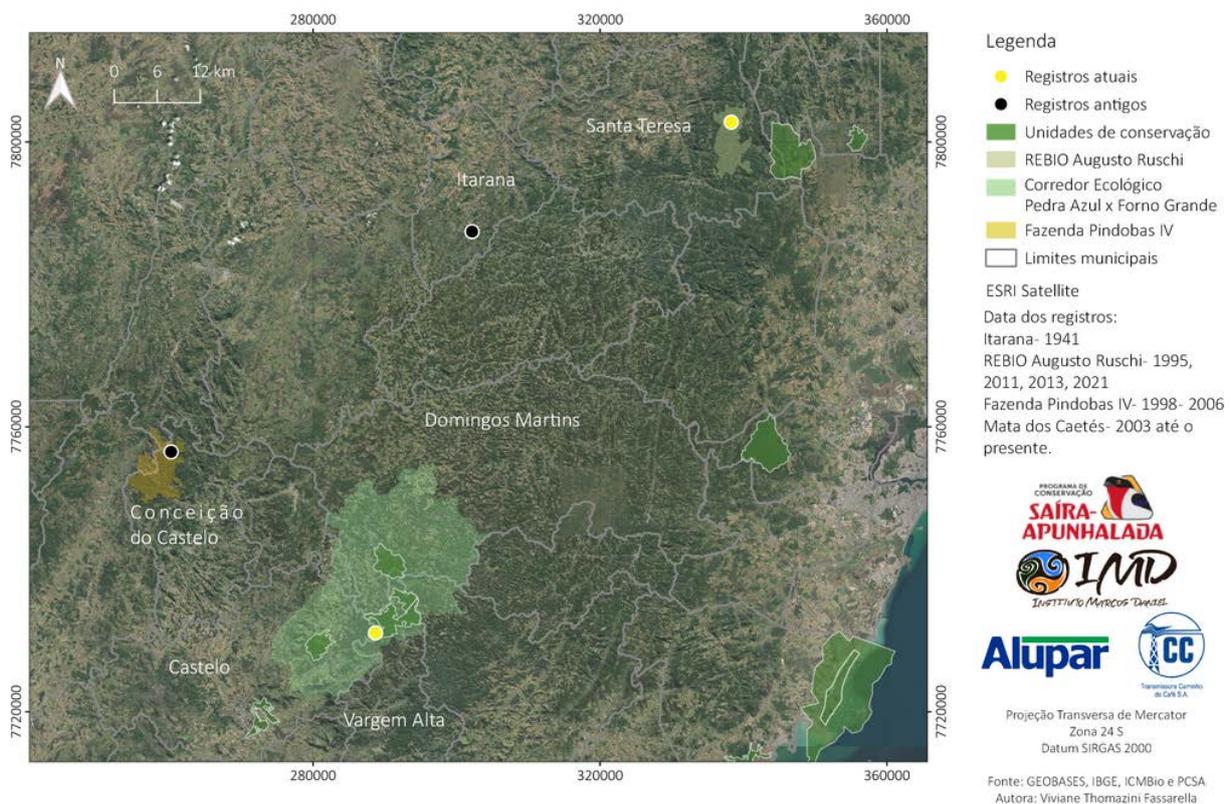


Figure 1. Records of historical (black dots) and currents (yellow dots) occurrence of Cherry-throated Tanager (*Nemosia rourei*).

Table 1. Current situation (April, 2020) of populations of Cherry-throated Tanager (*Nemosia rourei*) in areas of historical occurrence.

Local (year)	Historical records	Current situation 2021 (PCSA)
Itarana (1941)	8 individuals	Not found
Conceição do Castelo (2004)	6 individuals	Not found
Mata dos Caetés (2003)	8 individuals	6 individuals
Santa Teresa (2002)	2 individuals	5 individuals

## Habitat and home range

Cherry-throated Tanager inhabits dense montane and highland ombrophilous primary forests located between 850 and 1200 meters of altitude, and there are no confirmed records at lower elevations. The PCSA monitored a flock between Vargem Alta and Castelo, where all records obtained from 2003 to 2021 indicate a home range of 420 hectares. Although there are records of the species in edge areas with *Eucalyptus* sp., PCSA studies indicate that the Cherry-throated Tanager prefers trees with branches covered by epiphytes and lichens or with loose bark that serves as shelter for small invertebrates. Thus, it is possible to infer that the species shows a preference for ancient and structured forest, such as those in the Caetés forest and REBIO Augusto Ruschi (Figure 2).

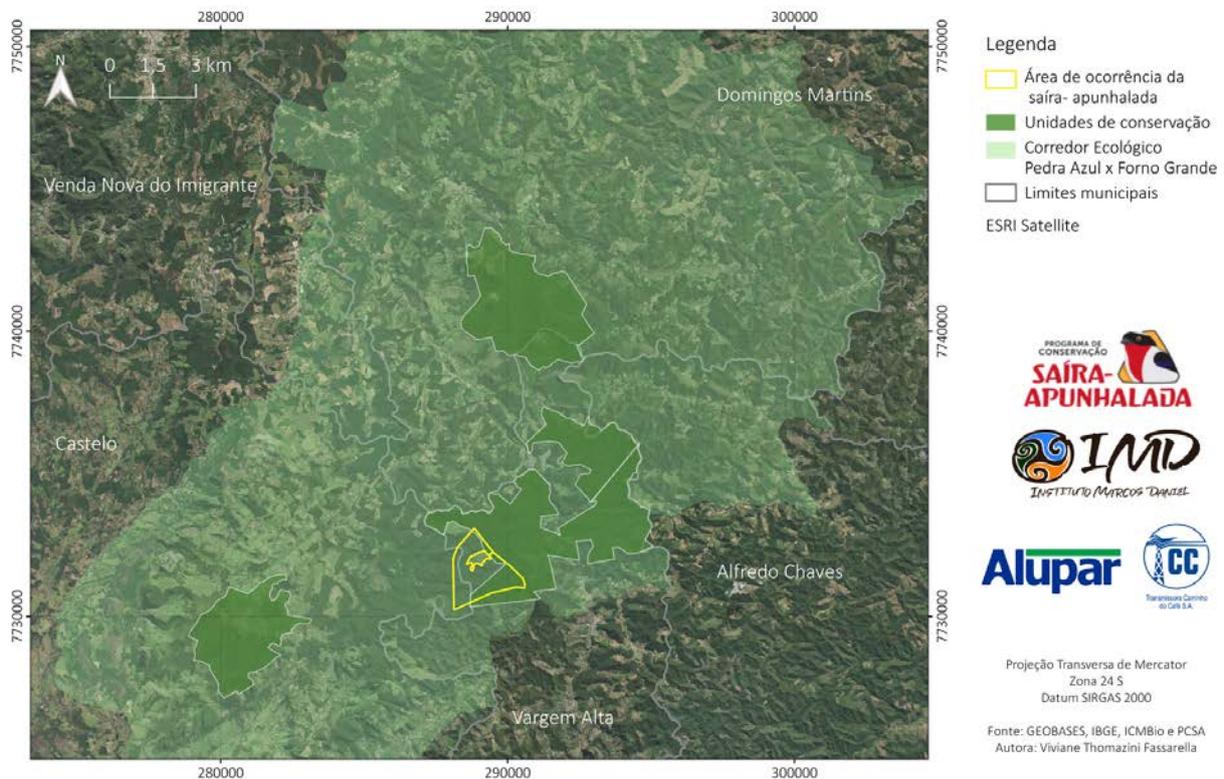


Figure 2. Area of current occurrence of the Cherry-throated Tanager (*Nemosia rourei*) established based on all records of the species in Caetés Forest, from 2013 to 2021.

## Feeding habits

Insectivorous. The Cherry-throated Tanager's diet is composed of small arthropods including adult and larval Lepidoptera, ants, and others, and there is no record of frugivory (but see updated information at the end of the report). Most of the foraging records of the species were searching for insects in trunks, epiphytes and branches, with an observation of the species making sallying flights after termites in the air.

## Reproduction

Before 2021, when this report was prepared, only three nests of Cherry-throated Tanager have been found (Table 2), with activities recorded between October and December, between 1998 and 2020 (Figure 3). Information on nests found in 2021 is given in the updated information at the end of the report. All three nests were made with lichen (*Usnea* sp.) and finished with spider silk. The chicks feed on small invertebrates carried to them in the bill by adults. We believe that pairs of Cherry-throated Tanager have only one clutch per year, and it is not known if there is more than one breeding pair per flock. As for the nesting site, the researchers believe that the species does not use the same location in different breeding seasons. In the 2020 nest, three eggs were laid, but only two hatched.

Table 2. The three recorded nests of Cherry-throated Tanager

Year/nest	Activity/month (day of month)	Nest helpers	Eggs	Nestling
1998	Nest building in late November (25)	–	–	–
2018	Nest building in October (22), nestlings in November (12)	Three individuals involved in nest building.	–	1
2020	Incubation, nestlings and fledging in November (01; 11; 26)	Five individuals assisting throughout the monitoring. 2 nestlings survived.	3	2



Figure 3. Records of the only three recorded nests of Cherry-throated Tanager (*Nemosia rourei*) prior to 2021. **A:** 1998 in Conceição do Castelo (Pindobas IV) (Venturini et al. 2002). **B:** 2018 in Caetés, Vargem Alta (Gustavo Magnago). **C:** 2020 in Caetés, Vargem Alta (PCSA/IMD).

## Social organization

Groups with more than eight individuals have never been observed. During nest monitoring carried out by the PCSA in 2020, a group of five individuals took care of the offspring, taking food to the nest. On another occasion, in 2018, only two individuals (probably a pair) participated in the care, with no sign of other individuals in the area. It is not possible to say whether the female or the male performs the incubation of eggs due to the absence of noticeable sexual dimorphism. The available evidence indicates that it is only one individual that incubates, as the bird that incubates the eggs leaves the nest for short periods, and there was no record of a change-over with one bird arriving to take the place of the other on the nest. *Nemosia rourei* often joins mixed flocks with other species such as *Sirystes sibilator*, *Orchesticus abeillei*, *Pachyramphus castaneus* and *Hemithraupis ruficapilla*, among others.

## Knowledge gaps

The type locality of the Cherry-throated Tanager is still uncertain. Originally it was identified as the municipality of Muriaé, Minas Gerais (CABANIS, 1870). However, this information was questioned (PACHECO, 1999). There has been no recent record from the type locality, but this may be because most of the region has been deforested and large areas of suitable habitat are now lacking.

The lack of basic knowledge about natural history is an obstacle to the establishment of intensive management actions. The taxonomic position of the Cherry-throated Tanager is still uncertain, and whether the species really belongs in the same genus as Hooded Tanager (*Nemosia pileata*) was questioned (L.F. Silveira, pers. comm.).

## Conservation actions in progress

The species currently occurs in two protected areas. One group persists in the Augusto Ruschi Biological Reserve, in the municipality of Santa Teresa, and the home range of another group partially overlaps with the Águia Branca Private Nature Reserve (RPPN) on the border between Domingos Martins and Vargem Alta, within the Mata de Caetés. The Mata de Caetés area is included in the Pedra Azul–Forno Grande ecological corridor, considered by the state government as a priority area for forest protection and recovery actions. It also partially overlaps the buffer zone of Pedra Azul State Park. Most of the habitat of the group in the Mata de Caetés is located in two private properties (Fazenda Forno Grande of the BRASIF Group and Fazenda Caetés of Santi and Valdir Pizzol) in addition to the Águia Branca RPPN (see update information at the end of the report).

Since 2011 there have been initiatives conducted by SAVE Brasil to create a large public protected area covering the areas where Cherry-throated Tanager occurs in the Mata de Caetés. However, this protected area was not implemented by the government due to pressure from local actors who did not agree with the initiative as they believed they would lose control over their lands.

Since 2020, the PCSA, developed by IMD, has been monitoring the population in the Mata de Caetés region and carrying out a program of environmental education and engagement with local communities.

In 2020, PCSA researchers located and subsequently protected a nest of the species. An observation platform was set up, about three meters high and 30 meters away from the nest. This platform served as the base for observations, carried out throughout the breeding season, until the chicks left the nest. Some potential predators such as Black Capuchin monkeys (*Sapajus nigritus*) and Channel-billed Toucans (*Ramphastos vitellinus ariel*), were scared off by the researchers when they approached the nest. A drone was used to verify the contents of the nest, and a supplementary feeding method with mealworms was tested. Given this experience, the workshop participants believe that it is possible to implement a nest monitoring program to repel potential predators, without offering any risk of disturbance to the species. The PCSA continues to carry out monitoring, data collection on diet and other aspects of natural history, as well as searching for the species in areas of high suitability indicated by modeling (LIMA, MAGNAGO and SANTOS, 2021).



The National Action Plan (PAN) for conservation of Birds of the Atlantic Rainforest (ICMBIO 2018) presents some general actions that contemplate the species: 1.2, 1.4, 1.5, 1.7, 1.8, 1.17, 2.1, 2.3, 2.9, 2.10, 6.3, and especially the actions 7.2 and 7.3.



## Social assessment

In 2020, PCSA carried out a social and environmental diagnosis of the community with the objective of implementing a community mobilization and engagement program in the region of Mata de Caetés (CAETANO e SANTOS, 2021). This diagnosis assessed the community's perception and relationship with the region's biodiversity and natural resources and identified opportunities and challenges for the performance of the social mobilization program.

The results of this diagnosis showed a clear contradiction between the reports of rural landowners who reside in the region and the perception they have about the forest and actions for its conservation. Despite being proud to live in the region and recognizing the well-being and quality of life provided by the place, these same residents use pesticides indiscriminately, have no interest in organic production and are opposed to the creation of protected areas. According to the diagnosis, the causes of this contradiction are: lack of information and technical knowledge about resources for more sustainable agricultural production, lack of programs to support sustainable production; and illegal use of natural resources, such as extraction of heart-of-palm (palmito) or illegal trade of wild animals.

Regarding the perception of the Cherry-throated Tanager, the diagnosis raised concerning information, revealing that some individuals in the community believe that the birds were introduced into the area to force or justify the creation of protected areas, thus preventing agricultural development. Based on these results, the PCSA's social mobilization program intends to develop educational actions that promote positive community engagement with the project. This engagement will involve dialogue with government and research bodies, creation of programs to encourage the use of more sustainable production techniques and development of income-generating programs, such as ecotourism, in addition to the inclusion of the community in strategies for the conservation of Cherry-throated Tanager.





## WORKSHOP PROCESS

## Principles and steps of the processes

This report was prepared to document the priority actions to be taken for the conservation of Cherry-throated Tanager in the wild. We adopted a logical, transparent and collaborative decision-making process, based upon the best available data, and involving experts in situ and ex situ conservation.

The planning and progress of the workshop was based on the [IUCN SSC CPSG'S species conservation planning Principles & Steps](#):

### Principles

1. Plan to act.
2. Promote inclusive participation.
3. Use solid science.
4. Ensure good design and neutral facilitation.
5. Reach consensus decisions.
6. Generate and share products quickly.
7. Adapt to new circumstances.

### Steps

1. **Prepare to plan:** clarifying the focus, selecting teams, identifying stakeholders and gathering information.
2. **Define success:** identify problems and needs and develop a vision.
3. **Understand the system:** describe species status, analyze threats, and identify challenges.
4. **Decide where to intervene:** identify intervention points and combine objectives.
5. **Agree how to intervene:** identify, evaluate and select strategies.
6. **Specify what to do:** define actions and activities and assign roles and responsibilities.
7. **Prepare to Implement:** Agree on the implementation framework and prepare to track progress.
8. **Share, learn and improve:** analyze implementation results, share with the community and improve the process.

The organizers, representatives of Instituto Marcos Daniel (IMD), the Center for Species Survival Brazil, Parque das Aves/Instituto Claravis and CEMAVE/ICMBio held several meetings in the months before the workshop to plan the scope of the event, define the list of participants and prepare the schedule of activities. The workshop methodology was adapted to allow an entirely online event to be held due to the Covid-19 pandemic.

As one of the actions identified in the PAN Birds of the Atlantic Rainforest for the Cherry-throated Tanager was the assessment of the need for integrated management, that is, the combination of in-situ and ex-situ strategies for the species conservation, a working group was established to discuss intensive population management options, including ex situ activities. The decision process used by the group was based on the [IUCN Species Survival Commission Guidelines on the Use of Ex Situ Management for Species Conservation](#) (IUCN/SSC, 2014).

The development of an action planning matrix was carried out in accordance with the methodology used by ICMBio for the establishment of national action plans for species conservation, with the objective of facilitating the integration of this plan into the National Action Plan for Birds of the Atlantic Rainforest.

The workshop was facilitated by representatives of CEMAVE/ICMBio and CPSG Brasil, and was held virtually between 16 and 23 April, 2021. Forty-seven participants participated, including internationally renowned experts as well as researchers, representatives of environmental agencies, public prosecutors, local communities, non-governmental organizations, universities, associations, and private institutions (Appendix A). The meeting agenda is provided in Appendix B.

## Workshop structure

The workshop followed these steps (Appendix B):

- Understanding of the species and threats;
- Establishing a vision of the future for the species;
- Review of the threats;
- Determining objectives;
- Identification of actions, responsibilities and deadlines;
- Definition of the Technical Advisory and Monitoring Group.

Before the workshop, in order to understand existing knowledge about the species, a species factsheet was compiled (Appendix C) with data on the status of the Cherry-throated Tanager in the wild, threats, knowledge gaps, past and ongoing conservation actions (SANTOS, MAGNAGO and PHALAN, 2021). This factsheet was shared with all participants and the organizers prepared videos with detailed presentations on these materials, which facilitated discussions and allowed prior translation of the material (English/Portuguese and vice-versa), optimizing the time of participants who were not bilingual.

After understanding the status of the species, the workshop process, the working rules and the National Action Plan for Birds of the Atlantic Rainforest were presented. The next step was the establishment of a vision for the future of the species, throughout a guided meditation activity, followed by a discussion of a proposed wording developed by some of the participants, which was refined and approved in plenary. At the next step, participants were asked to reflect on threats to the species' conservation. Through the online platform Padlet, participants generated a list of threats to the conservation of the Cherry-throated Tanager.

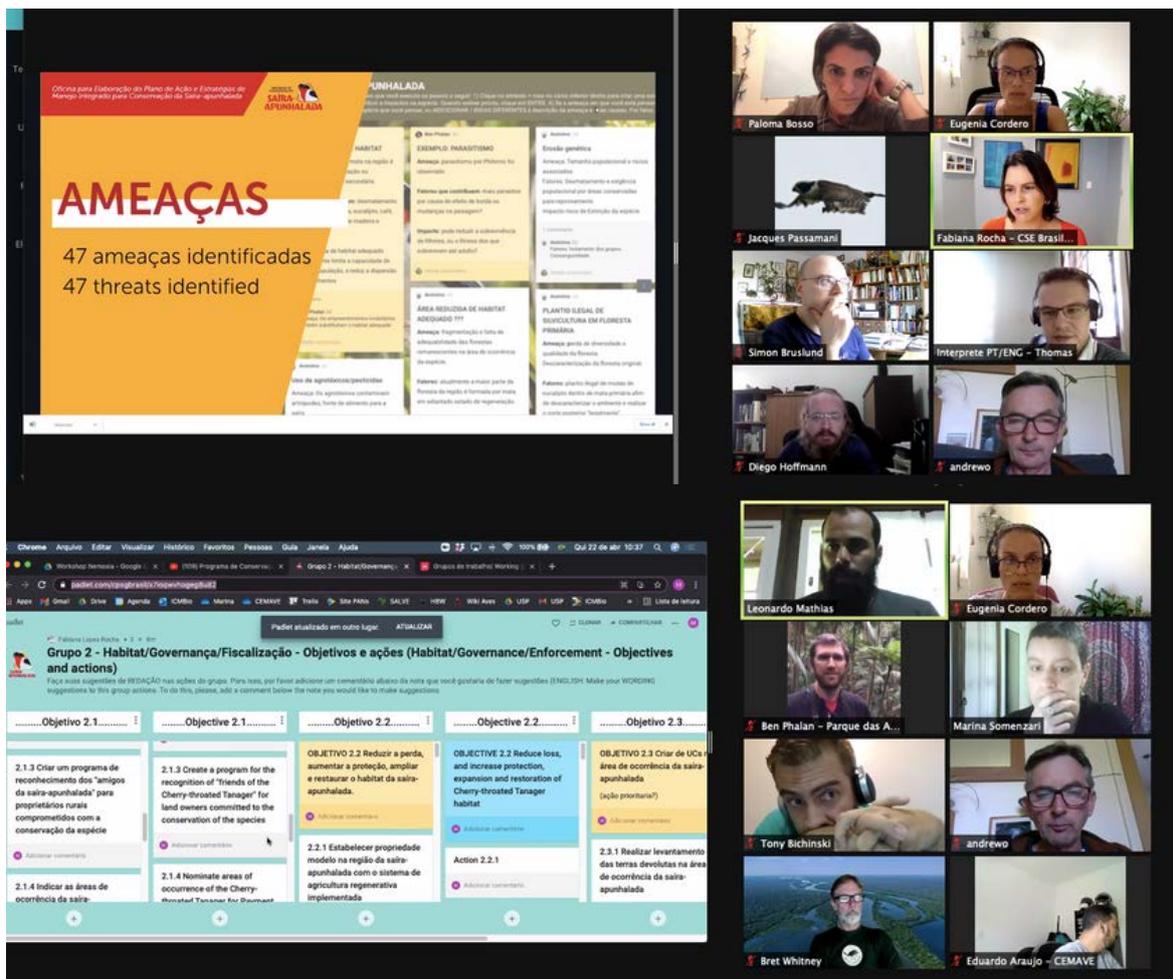
The facilitators organized these threats into four thematic groups according to the areas of action needed to address them, which were validated by the participants:



Working groups were established for these four topics. Participants choose which of these groups to participate in, according to their experience and interest. Each group developed objectives and actions related to the threats allocated to their group. Subsequently, the results of each group were presented and discussed in plenary, and all the groups met again to discuss the plenary suggestions to review the contents and the writing of the specific objectives and actions proposed.

The online platforms Padlet, Mural and Google Docs were used to capture and organize the participants' ideas and discussions. It is worth noting that the workshop was simultaneously translated from English to Portuguese and Portuguese to English throughout, as well as written simultaneous translation of all chat discussions, post-its and other materials used during the workshop, so language was not a barrier to equal participation in any of the communication channels and platforms used during workshop.

All actions resulting from the recommendations (Table 3) were reviewed at the end of the workshop when, in a participatory and consensual manner, the next steps, work schedule and those responsible were defined.



## Assessment of intensive management options

For this workshop we adopted the following definitions:

**Intensive management:** the management of individuals or populations that involves invasive interventions, including, but not limited to, ex situ options.

**Ex situ:** conditions in which individuals are spatially constrained, removed from many of their natural ecological processes, and managed at some level by humans. It refers to individuals (or live biological samples) that are held in artificial, human-controlled settings, from highly artificial environments to semi-natural conditions, whether they are held temporarily or over long periods. Such settings, in the case of birds, may include zoos, breeding centers, wildlife rescue or rehabilitation centers and other facilities.

Ex situ conservation and other intensive management activities have the potential to reduce or mitigate primary threats, offset the effects of threats, restore wild populations, and prevent species extinction by buying time to reduce threats to species in the wild. Such activities can complement other conservation activities so that species do not disappear before suitable conditions in the wild are restored. The consideration and integration, when appropriate, of ex situ and other intensive management activities into species conservation plans ensures that all possible conservation options are used together to support in situ conservation. Engaging all stakeholders, considering all populations of a species, and considering all intervention options in developing an integrated conservation strategy is known as the [One Plan Approach](#) (Byers et al. 2013).



The IUCN ex situ guidelines outline a five-step decision process, adapted here to assess the value of intensive management as a conservation tool:

**1****Step 1. Compile species status and threats**

To inform discussion of conservation actions, it is necessary to review and gather all relevant information about the species, both in the wild and in human care. This information is used to assess population viability and to understand the threats that impact the species.

**2****Step 2. Define the role or roles that intensive management could play in the overall conservation of the species**

Possible intensive management strategies proposed should address one or more specific threats or constraints to the viability and conservation of the species, as identified in the threat status review and analysis, and aim to improve its conservation status.

**3****Step 3. Determine the characteristics (and ex situ population sizes) needed to fulfill the identified conservation actions**

The conservation objectives and functions identified for the intensive management program will determine the required structure, scale and duration of the actions.

**4****Step 4. Define the resources and knowledge needed for the intensive management program to fulfill its function(s) and assess its feasibility and risks**

It is important to assess the resources needed; the feasibility and likelihood of success at all stages, including any return of individuals to the wild; and the risks, including any risks to the species in the wild and to other conservation activities. These factors must be weighed against the risks of not taking appropriate conservation measures.

**5****Step 5. Make a decision that is well informed (using the information collected above) and transparent (showing how and why the decision was made)**

The decision to include intensive management in the species conservation strategy should be determined by weighing the potential benefit to the species, together with the probability of success, against the overall costs and risks. The potential benefits, costs and risks of alternative conservation actions, and inaction, must also be considered.

If the decision is made to start an intensive management program, the following considerations will be important for developing this program:

- formulate the actions necessary for the program to meet its conservation objectives;
- develop data collection and management protocols for proper monitoring;
- develop the intensive management program in accordance with existing conservation plans, agreements, and policies;
- consult throughout the process with all stakeholder groups and organizations; and
- establish a timetable with clear and achievable deadlines for the implementation of actions.

The IUCN ex situ guidelines suggest regular program evaluation so that progress can be measured, and so that it can be adjusted and improved. This includes not only evaluating the program's success, but also its role within the overall conservation strategy for the species, which is susceptible to change over time. Regular reporting on intensive management activities is also important to generate awareness and support, meet legal requirements and contribute to knowledge about intensive management for conservation.

We followed the process outlined above to develop an integrated conservation plan for the Cherry-throated Tanager. The intensive management options considered in this workshop included all those identified in the IUCN ex situ guidelines and the Amphibian Ark Conservation Needs Assessment Process (Amphibian Ark 2012). We also included some intensive management options that do not require an ex situ population.

The discussions relevant to each option are summarized in the next sections. A description of each of the ex situ conservation roles, including those identified as unimportant or inappropriate at this time, is provided in **Appendix D**.



## RESULTS AND RECOMMENDATIONS

## Vision

The workshop began with the collective construction of the desired future vision for the species, with this declaration then guiding subsequent steps:

“

*Existence of viable Cherry-throated Tanager populations in the wild, with suitable habitat protected and with the community and public authorities acting collaboratively in their conservation, inspiring hope for a thriving environment for all its inhabitants and future generations.*

”



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# Threat review

After an introductory presentation on the status of the species, the participants were invited to reflect on the threats to the conservation of the Cherry-throated Tanager. Through the Padlet platform, participants described 47 threats, and these were organized into a list of 25 distinct threats (**Appendix E**). These were classified into four groups according to the areas of action needed to address them, that served as the basis for more detailed discussion and planning, as follows:



## Forest loss, degradation and fragmentation | Group 3

The most mentioned threats were forest loss, degradation and fragmentation, caused by different factors including agricultural expansion, real estate speculation, infrastructure works (transmission lines, sewage pipes, roads, dams), illegal forestry, logging, illegal extraction of heart-of-palm (*Euterpes edulis*), and urban expansion. Because of insufficient protection of forest areas, there is a shortage of suitable habitat for the Cherry-throated Tanager. The Mata de Caetés region has been under strong pressure from real estate speculation. Rural properties are often illegally subdivided into small lots to allow the construction of real estate projects.



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### **Use of pesticides**

| Group 2, 3 & 4

The Cherry-throated Tanager is restricted to mature forest, away from forest edges, making it especially vulnerable to forest degradation and fragmentation. The region also suffers from the indiscriminate use of pesticides by rural producers, and it is suspected that this practice could negatively affect the supply of food for the Cherry-throated Tanager, which feeds exclusively on insects and other invertebrates.

These threats are exacerbated because of the absence of integrated public management, lack of support for enforcement actions, and economic recession. There is a commercial incentive for the use of pesticides, low interest in more sustainable production methods, and a lack of technicians from responsible agencies with agro-ecological training.

### **Local perceptions of the species**

| Group 4

The social context for the conservation of the Cherry-throated Tanager is worrying. A socio-environmental survey was carried out with residents and landowners in the region of Caetés, which highlighted negative perceptions of the species and its habitat (CAETANO and SANTOS, 2021). Some people had a jaundiced view of the work of law enforcement agencies, most were unaware of the existence of the species, and some reported a belief that the species had been introduced into the region to force the adoption of protective measures for the environment.

### **Illegal trade**

| Group 3

The lack of coordination between environmental education actions with the objective of mitigating existing conflicts between rural producers and environmental agencies, and public policies, was identified as a problem for the species. Illegal trade in wild birds was identified as a possible threat, and it is believed that people who practice this illegal activity, and who are active in areas where the species occurs, are also linked to drug trafficking, bringing an additional danger to people, including researchers who access these areas.

The participants also pointed out, as a threat, the concern that the workshop itself and the expansion of the PCSA's actions could promote greater visibility for the species and thus arouse the interest of traffickers due to its rarity. To face this threat, there is a need for monitoring and law enforcement actions to take place together with the actions in this conservation action plan. There is no evidence that the species has been a focus of traffickers so far, but it is still a risk that must be considered.

### **Tourism**

| Group 3

The excessive use of playback to locate individuals by incautious bird watchers can be indicated as another threat to the species.

### **Quarrying**

| Group 3

Concerns were raised about the quarrying of ornamental rocks, which takes place in between two forest fragments where the species once occurred, at Mata de Caetés (Castelo and Vargem Alta) and Fazenda Pindobas IV (Conceição de Castelo). Mining generates noise and dust from rock explosions, in addition to heavy vehicle traffic and these may represent important threats to the persistence of the species in nearby areas. The risks should be reviewed and discussed,

along with the actions needed to address the activities and environmental licensing of other similar operations more generally in the region.

### **Stochastic events**

**| Group 1 & 2**

Other identified threats are associated with the low population size of the species, making it especially vulnerable to stochastic events such as extreme weather events, diseases, parasitism, and predation, random variation in sex rates and vital rates. Furthermore, there is concern about genetic problems such as inbreeding, which can create bottlenecks that are difficult to reverse. Its cooperative reproductive behavior and low population size could negatively affect the reproduction potential of the species.

### **Climate change**

**| Group 2**

The impact of climate change in the region is still unknown, but forecasts point to an increase in temperature, a reduction in the rainfall regime, an increase in the occurrence of consecutive drier days and a higher frequency of storms.

### **Knowledge gaps**

**| Group 2**

Finally, another problem is the lack of studies on the biology and ecology of the species which constitute an impediment to a better assessment and understanding of the effects of these threats on the conservation of the Cherry-throated Tanager.



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## Overview of the workshop objectives and recommendations

A general objective and specific objectives were defined, considering the implementation period of this plan (**five years**) and the extremely vulnerable situation of the species, which has only 11 known individuals.

### General objective:

Contribute to increasing the population size of the Cherry-throated Tanager within five years.

### Specific objectives:

- 1 Reduce Cherry-throated Tanager mortality, maintain genetic variability and increase reproductive success.
- 2 Integrate the Cherry-throated Tanager conservation plan into public policies relevant to the areas where the species occurs
- 3 Reduce loss, increase protection, expand and restore Cherry-throated Tanager habitat.
- 4 Create protected areas within the distribution of the Cherry-throated Tanager.
- 5 Increase knowledge about the natural history and ecology of the Cherry-throated Tanager, particularly its distribution and current and future habitat suitability, as well as its phylogenetic position, genetic variation and threats to its conservation.
- 6 Encourage communication, education and integration between the different actors involved in and affected by activities to conserve the Cherry-throated Tanager, in a participatory and continuous manner.

In groups, the participants developed actions to deliver each of the specific objectives. **The detailed action spreadsheet is available at [this link](#).** Below follows a summary of the discussions and recommendations.

Initially, fundraising was identified as one of the specific objectives. However, there was subsequently a consensus among the participants in the plenary that there must be a robust fundraising plan that contemplates and responds to the resource needs for each group of actions.

Table 3. Objectives and actions for the conservation of the Cherry-throated Tanager (*Nemosia rourei*)

## **1 Reduce mortality of Cherry-throated Tanagers, maintain genetic variation and increase reproductive success.**

- 1.1 Review, test and implement protocols for nest protection by day and night.
- 1.2 Develop and implement methods to protect nestlings from excessive parasite infestations (e.g., botflies).
- 1.3 Follow protocol for guarding juveniles after fledging.
- 1.4 Investigate technical solutions and training for nest protection, including remotely operated deterrents.
- 1.5 Investigate and develop methods (feeders, insect types) to provide supplementary food, including how to manage risks.
- 1.6 Determine most appropriate candidate model species.
- 1.7 Work with model species to develop intensive management protocols, including diet, feeding, husbandry, veterinary care, reproduction, double-clutching.
- 1.8 Work with model species to develop methods for use in the field, e.g. capture, release, nest manipulations, ringing/banding, biological sampling, supplementary feeding, nest protection.
- 1.9 Prepare emergency plan in case rescue of eggs, nestlings or adults needed.
- 1.10 Identify location and team close to Cherry-throated Tanager habitat for installation of an emergency rescue facility (perhaps mobile response unit?).
- 1.11 Explore feasibility of biobanking live tissue if opportunity arises.
- 1.12 Implement ex situ interventions with Cherry-throated Tanager if and when specific conditions are met.

## **2 Integrate the Cherry-throated Tanager conservation plan in public policies within the distribution area of the species.**

- 2.1 Present the Conservation Action Plan for the Cherry-throated Tanager to obtain support from political actors in the creation of Protected Areas within the Pedra Azul - Forno Grande corridor.
- 2.2 Present the Conservation Action Plan for the Cherry-throated Tanager to the Tripartite Commission and request the inclusion of the areas in the integrated law enforcement operations of the three federated entities.
- 2.3 Nominate areas of occurrence of the Cherry-throated Tanager for Payment of Environmental Services (PES).

- 2.4 Advocate for the inclusion of the Cherry-throated Tanager's occurrence areas as protected areas in the municipal master plans or municipal organic laws.
- 2.5 Articulate with the state public authority the recognition of the Action Plan for the conservation of the Cherry-throated Tanager as a public policy.

### **3 Reduce loss, and increase protection, expansion and restoration of Cherry-throated Tanager habitat.**

- 3.1 Establish model property in the region of the Cherry-throated Tanager with the regenerative agriculture system in place.
- 3.2 Identify inspection agents to be triggered on demand for the daily satellite image monitoring of the Public Prosecutor's Office.
- 3.3 Elaborate, together with private institutions and in conjunction with the inspection agencies, a proposal for monthly monitoring of deforestation by drone (and satellite images) of the areas where the Cherry-throated Tanager occurs.
- 3.4 Support the development of bioacoustic monitoring of hunting activity in the region in the Cherry-throated Tanager.

### **4 Create protected area within Cherry-throated Tanager distribution area.**

- 4.1 Conduct survey of unclaimed lands in the Cherry-throated Tanager 's area of occurrence.
- 4.2 Propose the transformation of unclaimed lands in the state into Protected Areas according to the result of the action 4.1.
- 4.3 Recover the process of state protected area creation in the Caetés forest region.
- 4.4 Develop proposals for the creation of Protected Areas (public or private) in the Caetés forest region.
- 4.5 Propose to Mr. Klaus Meyerfreund the creation of RPPN on his property to promote the connection between the area where the cherry-throated tanager occurs and the Forno Grande State Park.
- 4.6 Prepare a map of the priority area, including data on the occurrence of threatened species and areas of relevance for conservation (such as IBAs, AZE, ecological corridors) to assist in territorial management.

## 5

**To Increase the knowledge about the Cherry-throated Tanager, regarding its natural history and ecology distribution, particularly its distribution, current and future habitat suitability, as well as its phylogenetic position, genetic variation and conservation threats.**

- 5.1 Establish an acoustic monitoring program to detect the species, other populations, as well as determine the home range and habitat use, as well as the presence of predators and competitors.
- 5.2 Establish a continuous nest monitoring program of the Cherry-throated Tanager to evaluate predators and predation rates, reproductive success, and parental care.
- 5.3 Establish a scientific tourism program for the Cherry-throated Tanager.
- 5.4 Establish the phylogenetic position of the species.
- 5.5 Estimate the home range and habitat use, sex ratio, social, reproductive and foraging behavior of the CTT, as well as the population dynamics using individual marking and monitoring.
- 5.6 Identify endo and ectoparasites of the CTT and its nests using molecular, parasitological, and morphological techniques.
- 5.7 Determine the macro-and micro-habitat of the CTT, with field studies, remote sensing, and modeling of habitat suitability.
- 5.8 Evaluate the effect of pesticides on the invertebrate community and the Cherry-throated tanager.
- 5.9 Evaluate the effects of mining on the Cherry-throated Tanager.
- 5.10 Assess the risk of forest fires on the habitat of the Cherry-throated Tanager.
- 5.11 Develop protocols for capture, marking, and handling the CTT, including recommendations for the collection, storage, and processing of biological samples.
- 5.12 Measure the abundance and density of prey and parasitic flies at different distances from the edge of the forest.
- 5.13 Training in handling and sampling collection of the Cherry-throated Tanager.

## 6

**Foster communication and integration between the different actors involved in and affected by conservation activities for the Cherry-throated Tanager, in a participatory and sustained way.**

- 6.1 Evaluate and update the existing PCSA's communication plan aimed at society in general.
- 6.2 Develop the PCSA's existing environmental education programs with the regional school community and expand the program to all areas with CTT occurrence.

- 6.3 Implement PCSA's tourist itinerary program in private properties, with a focus on bird watching and expand to all areas with Cherry-throated Tanager occurrence, respecting existing restrictions within protected areas.
  - 6.4 Promote coordination between researchers and environmental agencies to make data resulting from research available to support the management of conservation units and territorial management for licensing.
  - 6.5 Organize training for rural producers on sustainable productive practices and regenerative agriculture in areas with Cherry-throated Tanager occurrence.
  - 6.6 Disseminate, in a participatory and continuous way, the knowledge about sustainable productive practices to the local community.
  - 6.7 Systematize and periodically update the data of potential donors of financial resources (public, private or third sector) to develop proposals for carrying out environmental education, conservation and community engagement projects.
  - 6.8 Promote and participate in campaigns and events with the Cherry-throated Tanager as a flagship species to achieve rapport with the local community.
  - 6.9 Create and operate the seal "Cherry-throated Tanager friends" aimed at companies that, through their own actions or by supporting the actions of the Plan, help in the protect the species.
  - 6.10 Produce and commercialize the "Cherry-throated Tanager trademark".
  - 6.11 Survey and publicize existing credit lines for financing agroforestry systems with banks.
  - 6.12 Disseminate and encourage the production of forest products, such as heart-of-palm and its derivatives in the Cherry-throated Tanager region.
-



## RECOMMENDATIONS FOR INTENSIVE MANAGEMENT

Participants identified 12 actions related to intensive management within specific objective 1 (reduce Cherry-throated Tanager mortality, maintain genetic variability and increase reproductive success). These actions are presented below:

## Monitoring and protection of nests

Several actions deal with proactive improvement of breeding success. Participants recognized that nest predation and chick parasitism are natural phenomena. However, given the rarity of the species, the known number of individuals and the possibility that changes in land use have increased these problems and reduced food resources, it was considered necessary to intervene to prevent extinction and support population recovery. Protection measures can include human presence near the nest to deter predators, as well as other interventions and technologies to exclude or discourage predators.

Supplementary feeding might help increase the reproductive success of the species and increase the survival rate of the chicks after leaving the nest. It is necessary to first establish protocols for these interventions, considering uncertainties and minimizing risks.

To prevent access to nests by diurnal and nocturnal predators, options include equipment that produces repellent noise or odor, and the installation of physical barriers to prevent potential predators from climbing the trees. This last practice has already been successfully carried out by the Hyacinth Macaw Project, as reported by workshop participant, Tony Bichinski, who participated in the installation of galvanized metal plates around the trunks of trees with nests. These plates served as barriers to protect the nests from predators such as the Tayra *Eira barbara* and small cats *Leopardus* spp.

A suggestion from participants who work with the Alagoas Antwren was the removal or pruning of branches or vines that connect to other trees, isolating the nest tree and making access difficult for snakes and small mammals. The researchers observed that during incubation of eggs, sometimes the incubating bird leaves the nest and joins the rest of the group for 20 to 30 minutes. This leaves enough time for researchers to carry out the necessary procedures at the nest without causing any disturbance to the birds. Caution is important so birds do not associate human presence as something negative. Monitoring success of interventions is important to evaluate and improve the methods if harm is caused. It is still necessary to identify the feasibility of nocturnal nest monitoring and protection.

Participants suggested testing supplemental feeding methods to increase the reproductive success and survival of the chicks after leaving the nest. An initial assessment will be needed to identify whether there is a need for supplemental feeding. The benefit of supplemental feeding is uncertain, but it was noted that the pair that had a chick in 2018 may have failed, and it was thought that only one of the two chicks that fledged in 2020 subsequently survived, suggesting that poor food availability may be a factor limiting juvenile survival. If a need is identified, supplementary feeding should only take place during the reproductive period, and may extend for a limited time after the chicks leave the nest (although tests can be done outside the breeding season, when the risks would be smaller). Supplementing the parents instead of the nestlings.

directly is more feasible and perhaps with fewer risks. The intervention should anticipate and address the following potential issues: creating a dependence on supplementary food; possible nutritional deficiency or imbalance in nestlings; presence of fungi or other pathogens that can be harmful to birds; and preventing the risk of attracting other dominant insectivore birds to the feeder which may displace, disturb or predate the target species or nests. Some options for sourcing insects – in addition to using commercially available insects such as mealworms and crickets – include establishing partnerships with beekeepers in the region, raising caterpillars, and collecting insects from the wild. Despite some preliminary efforts with supplemental feeding in 2020, there is no tested or proven method efficiency for this species. In cases with access to the nest, supplementary feeding of the chicks may be viable, as well as the removal of parasitic fly larvae (*Philornis* spp.). The challenges and risks of supplemental feeding include: designing feeders that will be accepted by birds; reducing interference from other birds, ants and other predators; and the risks of disease or parasite transmission. An example of supplementary feeding was cited from a project with white-eyes *Zosterops* sp. where 60% of the birds died due to food contamination by *Clostridium* sp. So, it will be better to use insects native to the areas where the Cherry-throated Tanager occurs and to follow strict sanitary protocols.

The viability of finding nests is not as low as might be expected, since the researcher Gustavo Magnago and the PCSA team have already found two nests. Still, finding nests will require a high level of effort, with resources and personnel available for constant monitoring of the known Cherry-throated Tanager flocks over several continuous months. Access to nests can be difficult due to the height at which they are built and depends on safe access to the nest such as a strong tree trunk to allow researchers to climb up. Another concern is the possible disturbance caused by monitoring activities in the vicinity of the nests. In 2020, the researchers set up an observation platform, 3 m above the ground and about 30 m away from the nest, which did not cause a visible change in the behavior of the birds. Even so, it is necessary to assess how well the species tolerates continuous human presence, and to develop a protocol to minimize the risk of disturbance, including a recommendation on the expected behavior of researchers during the monitoring of the nests and on the use of drones, cameras and other technologies. This protocol should also address the safety of researchers in the field, with a proposal to work with at least two people, relying on an efficient communication system with the research base. With the experience acquired in 2020, participants were confident that it is possible to implement a nest monitoring program and to drive away potential predators, without posing a risk of disturbance to the species.

Improving the identification of insects that make up the Cherry-throated Tanager diet was identified as a demand for metagenomic studies. Training individuals to take supplementary food is an option that has been used with other bird species including the Fatu Hiva Monarch *Pomarea whitneyi*. This method could also be used to capture birds for clinical examination and identification.

## Working with model species

Removing any individual from the tiny wild population would have a serious impact. Therefore, it will be important to develop and test protocols with other species beforehand. Working with model species can facilitate the development of intensive management methods, including ex situ protocols. The identification of appropriate model species was recommended to develop intensive management protocols, including diet, feeding, management, veterinary care, breeding, double-clutching, hand-rearing and methods for use in the field, including capture, release, nest manipulations, ringing, sample collection, supplementary feeding and nest protection. Double-clutching is the removal of the first clutch of eggs from a nest, encouraging the parents to lay a replacement clutch of eggs. A model species can be used to incubate the eggs, as long as measures to avoid imprinting the offspring on the wrong species are implemented. The purpose of double clutching is to accelerate population growth. It will be important to confirm that the Cherry-throated Tanager is capable of laying a second clutch before starting this intervention.

Simon Bruslund developed a spreadsheet of potential model species, systematically considering all species in the families Passerellidae, Teretistridae, Nesospingidae, Calyptophilidae, Mitrospingidae, Cardinalidae and Thraupidae to find species similar in ecology and size. Parameters were determined for each species (habitat, diet, distribution, altitude, size, social behavior and ex situ availability) and species were scored according to each parameter. Then, leaning on the combined experience of the other participants, and with an emphasis on species occurring in the region, we identified a list of potential model species for developing intensive population management methods in Espírito Santo (Table 4) and in Paraná (Table 5), the latter in partnership with Parque das Aves, in Foz do Iguaçu.

Table 4. Potential model species for development of intensive population management methods for Cherry-throated Tanager (*Nemisia rourei*) in Espírito Santo.

Priority	Popular name	Scientific name	Global Red List
1	Rufous-headed Tanager	<i>Hemithraupis ruficapilla</i>	LC
2	Brassy-breasted Tanager	<i>Tangara desmaresti</i>	LC
3	Brown Tanager	<i>Orchesticus abeillei</i>	NT
4	Gilt-edged Tanager	<i>Tangara cyanoventris</i>	LC
5	Fawn-breasted Tanager	<i>Pipraeidea melanonota</i>	LC
6	Hooded Tanager	<i>Nemisia pileata</i>	LC
7	Orange-headed Tanager	<i>Thlypopsis sordida</i>	LC

Table 5. Potential model species for development of intensive population management methods for Cherry-throated Tanager in Paraná (Foz do Iguaçu).

Priority	Popular name	Scientific name	Global Red List
1	Fawn-breasted Tanager	<i>Pipraeidea melanonota</i>	LC
2	Hooded Tanager	<i>Nemosia pileata</i>	LC
3	Orange-headed Tanager	<i>Thlypopsis sordida</i>	LC
4	Brassy-breasted Tanager	<i>Tangara desmaresti</i>	LC
5	Rufous-headed Tanager	<i>Hemithraupis ruficapilla</i>	LC
6	Gilt-edged Tanager	<i>Tangara cyanoventris</i>	LC
7	Brown Tanager	<i>Orchesticus abeillei</i>	NT
8	Red-crested Finch	<i>Coryphospingus cucullatus</i>	LC
9	Chestnut-backed Tanager	<i>Stilpnia preciosa</i>	LC
10	Guira Tanager	<i>Hemithraupis guira</i>	LC
11	Cinnamon Tanager	<i>Thraupis sayaca</i>	LC
12	Black-goggled Tanager	<i>Trichothraupis melanops</i>	LC
13	Hepatic Tanager	<i>Piranga flava</i>	LC
14	Ruby-crowned Tanager	<i>Tachyphonus coronatus</i>	LC
15	Blue-and-yellow Tanager	<i>Rauenia bonariensis</i>	LC
16	Red-crested Cardinal	<i>Paroaria coronata</i>	LC

## Sequence of interventions

There was consensus among participants that there is not yet sufficient experience to implement more invasive interventions at this time, but that success with other actions can open up these possibilities. Considering that there is no established ex situ population of any insectivorous tanager species, there are many uncertainties about the success of maintaining the species in human care. Although the known population is very small, 11 birds is the highest number of individuals that have ever been located at the same time. It can be inferred that the population has declined because of historical loss of habitat, and the area of suitable habitat continues to decline. Experiences with nest protection with model species, and eventual rescue of eggs or birds that would otherwise die without intervention can open up possibilities for interventions with greater degrees of difficulty and invasiveness (Figure 5). For example, the rescue of individuals can open up possibilities for hand-rearing, collection of biological samples for biobanking, and potential future translocation to enable greater genetic variability among subpopulations. Nest research activities may open up the possibility of translocation of eggs or chicks from one nest to another, but at this point it seems unlikely to find simultaneous nests in the two populations, which are in very close stages of chick development, and both of which can be readily accessed (see updates at the end of the document).

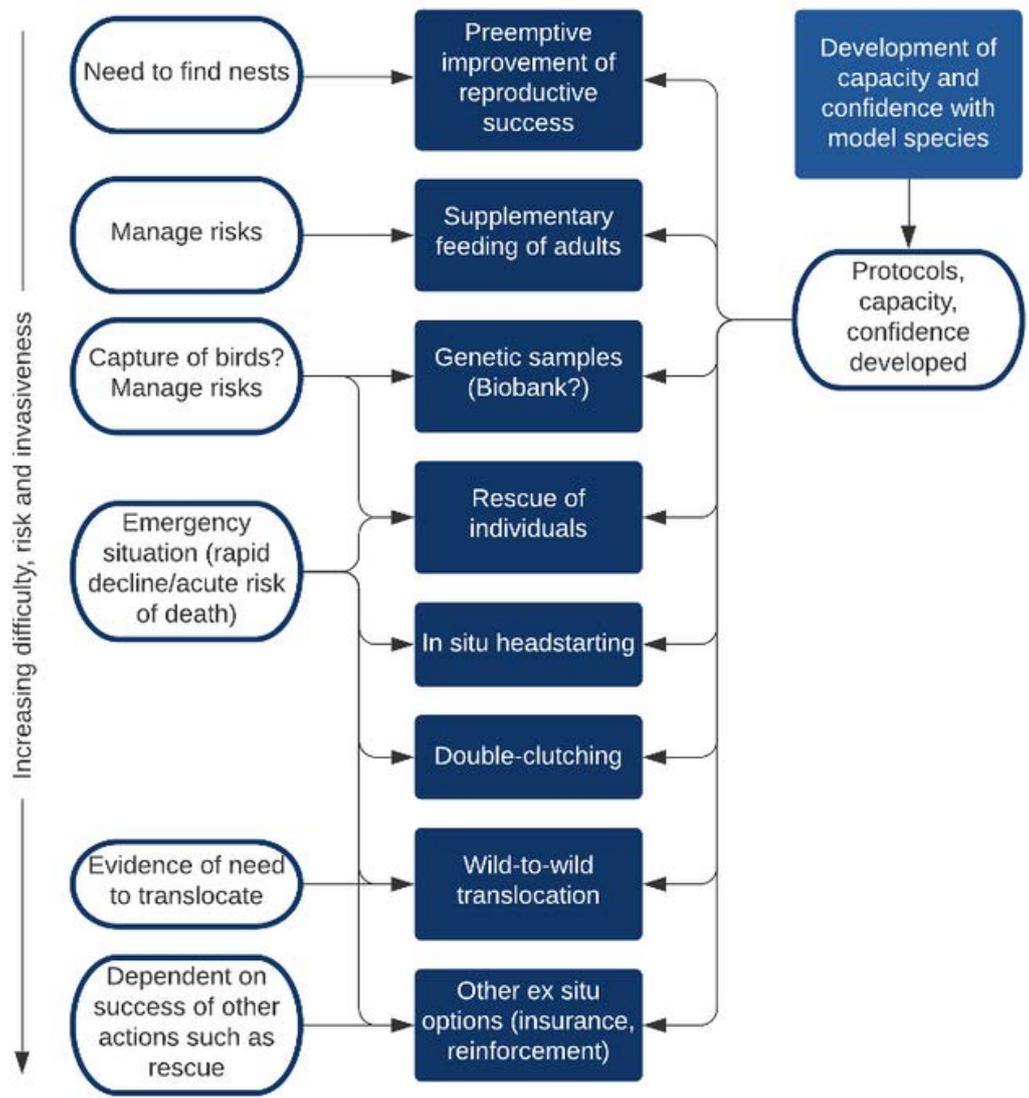


Figure 4. Management interventions (blue boxes) and respective needs or conditions (unfilled boxes) in ascending order of difficulty and invasiveness from top to bottom in the diagram.

To assess the triggers and in which situations the most invasive interventions should be considered – for example, rescue and translocation of an individual, or double-clutching – one of the working groups, composed by Gustavo Magnago, Pedro Develey, Benjamin Phalan, Tony Bichinski and Paloma Bosso was created. In general, such actions will only be considered if there is a clear benefit to the species (e.g., rescue to prevent the death of an individual and thus prevent further population decline), low risk, and if there is sufficient confidence in the team's ability to successfully implement the action. In practice, this may involve a quick decision in the field; therefore, scenarios and possible responses have to be discussed in advance. There is a concern that there may not be enough time to obtain accurate data, and thus actions with clear benefits and that do not represent a high risk for the species can be implemented in parallel with research and data collection. To conclude, intensive population management actions can help to mitigate the effects of threats and buy time for the species. A summary of recommended and non-recommended interventions and their actions is available in Table 6.

Table 6. Recommended and non-recommended intensive population management interventions for Cherry-throated Tanager (*Nemosia rourei*)

Intensive management interventions	Recommendation
<ul style="list-style-type: none"> <li>- Proactive improvement of breeding success.</li> <li>- Protect juveniles after leaving the nest.</li> <li>- Test supplemental feeding methods.</li> <li>- Research and training to develop intensive management methods with model species.</li> <li>- Emergency rescue of individuals at imminent risk of death.</li> <li>- Collect biological samples whenever the opportunity arises.</li> </ul>	<p><b>Proceed with attention</b> to minimizing risks, adapt and refine protocols.</p>
<ul style="list-style-type: none"> <li>- Assisted rearing of wild chicks in the nest.</li> <li>- Population restoration: reinforcement (translocation)</li> </ul>	<p><b>Proceed with great care</b>, depending on the level of intervention and availability of expertise.</p>
<ul style="list-style-type: none"> <li>- Insurance population.</li> <li>- Rescue population.</li> <li>- Demographic manipulation.</li> <li>- Ex-situ research population.</li> <li>- Ark.</li> <li>- Assisted colonization.</li> <li>- Population for conservation education.</li> <li>- Population restoration: reintroduction.</li> </ul>	<p><b>Not recommended at this time.</b> We need confidence in the methods and stronger evidence that these specific interventions are needed.</p>

### Preparing for ex situ interventions

Establishing an ex situ facility or base will be essential to develop the research and training activities with model species that can be used in the case of an eventual rescue situation. The base must be located close to the habitat of the Cherry-throated Tanager; must have enclosures of suitable height to accommodate the species's foraging behavior; must have an adequate structure for reproductive management with equipment for incubating eggs and hand-rearing offspring; and must have a facilities for the production of insects for in situ and ex situ feeding of the Cherry-throated Tanager. It is essential to adopt strict health and sanitary protocols to prevent the transmission of diseases between birds under human care and birds in the wild, or contamination through supplementary feeding.

Workshop participants will develop a robust protocol to guide emergency decisions that may arise, related to partially-predated or abandoned nests, encounters with injured birds, and any other situations that require intervention to prevent the death of individuals. **This protocol must include details of the procedures for:**

- Assessing the need for intervention: for example, at what point a nest can be considered abandoned; in which situations an adult should be rescued; what signs should be observed to determine if a bird needs veterinary care;
- Determining how to conduct the collection, transport and incubation of eggs: stipulate the necessary care to remove eggs from a nest and assess their viability; the necessary equipment and the correct method to transport them to the ex situ base; how they will be incubated, including details of when they will be artificially incubated and hand-reared or incubated by a foster species;
- Evaluating criteria for release: the protocol should include information on the age and physiological and behavioral conditions that permit the release of birds reared in human care, in which location they will be released, and how the release should take place; it should also provide an assessment of criteria for avoiding release and when it would be appropriate to instead begin the emergency establishment of an insurance population;
- Diet: a detailed procedure for offering food to chicks and adults should be determined, based on the physiological needs for each life stage. A diet should also be prepared for birds that are sick or in need of supplementation. The details of food management should include information on sanitary conditions and procedures for storing and handling food, including all steps related to the rearing and supply of insects that will make up the birds' diet.
- Expert input: it will be necessary to establish a network of professional contacts, including veterinarians, who can be called on in an emergency when the birds need specific care.
- Expertise required: the protocol must be specific and rigorous regarding what experienced professionals need to be involved at each stage of the process.

## Collection of biological samples

The collection, storage and preservation of biological samples (feces, feathers, blood or tissue) were identified as important to obtain information on genetic diversity and to answer some questions relevant to the conservation of the Cherry-throated Tanager. Collections may take place when dead birds are found, when capturing adults for ringing, when accessing the nest for protective interventions, or during the period that the birds are in an ex situ environment, either due to temporary rescue or seizures from the illegal wild bird trade (if that occurs). It was proposed to obtain tissue from the specimen deposited at the Berlin Museum, as well as searching for the specimens lost from the National Museum of Rio de Janeiro.

One of the functions of the collections would be the preservation of material in a biobank for future use with population restoration or genetic reinforcement. There are conservation initiatives in other countries with other groups of animals threatened with extinction, with emerging techniques for preserving lineages through cryopreservation. Initiatives by the São Paulo Zoological Park Foundation and the Brasília Zoo have also been able to preserve gametes of some species of mammals, but so far not of birds. The collection and preservation of living tissue would require careful preparation and likely the availability of specialized equipment and supplies such as liquid nitrogen. The experts at the workshop do not have experience with these preservation techniques, but there was consensus that this option should be evaluated. Other uses for sample collections are more pertinent to research and are included in the section on research recommendations below.



## RECOMMENDATIONS FOR RESEARCH

There are still many **knowledge gaps** regarding the Cherry-throated Tanager. The research recommendations aim to better understand the natural history of the species, and include studies of:

- home range;
- habitat use at macro and micro scales;
- sex ratio;
- social and reproductive behavior, including parental care and the role of nest helpers;
- reproductive success;
- diet and foraging behavior, including insect species and any trends in prey populations;
- predators and predation rates; and
- endo- and ecto-parasites (including hemoparasites).

Answering these questions may require field studies, remote sensing, modelling, molecular and morphological techniques, and marking and monitoring of individuals. It was suggested to establish an acoustic monitoring program to detect individuals of the species, including possible new populations, as well as the presence of predators and competitors. This program can help to understand Cherry-throated Tanager interactions with other species, assess its dependence on mixed flocks, and over time investigate whether there is population decline of species that make up mixed flocks. On the impacts related to climate change in the species' area of occurrence, workshop participants recommended research on modeling physiological adaptations and habitat suitability.

Taking biological samples opens up possibilities to understand the sex-ratio of the population, if there are problems related to genetic variability or inbreeding, and would enable clarification of the phylogenetic position of the species. There is a need to develop protocols for capture, marking and handling of Cherry-throated Tanagers, including recommendations (and training) for the collection, storage and processing of biological samples. Only one individual of this canopy species has been captured, in 1998, but no mention was made of biological samples having been collected (Bauer et al. 2000). According to Prof. Dr. Luís Fábio Silveira, the Cherry-throated Tanager may represent an endemic genus of the Atlantic Forest, and this issue will only be resolved through genetic analysis. Biological samples can also be used to investigate blood parasites (eg. *Plasmodium* spp.) and if a whole body is available histologic samples from all organs may provide a deeper picture for specialized avian pathologists.

Extraction of DNA from feathers was the strategy preferred by workshop participants. However, participants recognized that some information may only be available from a blood sample. In this case, the recommendation is to proceed with great caution and with a researcher with extensive experience in safely collecting blood from small passerines. There was a long discussion about the risks related to blood sampling, as this is a rare species with a small body mass (approximately 20 g). It was agreed that the experience of the researcher to carry out a collection is decisive for mitigating the risks related to this procedure. Prof. Dr. Maria Alice Alves reported that her team of researchers has experience in taking blood from the Restinga Antwren *Formicivora littoralis* (not recognised by BirdLife International, but considered an Endangered species on the national red list), which is similar in size to (and even a bit smaller than) the Cherry-throated Tanager.

Research efforts were also suggested to improve our understanding of threats to the species, to enable a better response of these threats. Knowledge gaps include understanding the possible effects of pesticides on the invertebrate community and on Cherry-throated Tanager; the effects of mining; the risk of forest fires; and the threat posed by parasitic fly larvae (*Philornis* spp.) at different distances from the forest edge. Finally, participants suggest establishing a scientific tourism program for the Cherry-throated Tanager to increase public interest in the species, collect more data about its natural history, and provide tangible benefits to the local community.





# RECOMMENDATIONS FOR HABITAT, GOVERNANCE AND ENFORCEMENT

The participants made recommendations for the integration of the Cherry-throated Tanager conservation plan into public policies in the area where the species occurs, working towards the creation of protected areas and for the inclusion of the area in the integrated inspection operations of federal, state and municipal authorities. It was suggested that areas of occurrence of the Cherry-throated Tanager could be put forward to receive Payments for Environmental Services, and to be included as protected areas in municipal master plans or municipal organic laws. Another recommendation was to lobby the state government to recognise the Action Plan for the conservation of the Cherry-throated Tanager as a public policy.

Reducing loss, increasing protection, expanding and restoring Cherry-throated Tanager habitat were identified as priorities. For this, it was suggested to establish a model property in the region, incorporating regenerative agriculture; identify law enforcement officers to receive alerts based on daily monitoring of satellite images by the Public Prosecutor's Office; elaborate a proposal for monthly monitoring of deforestation by drone and satellite, in collaboration with private institutions and public inspection bodies; and develop bioacoustic monitoring of hunting activity in the region where the Cherry-throated Tanager occurs.

Protected areas are an important tool for the preservation of habitat; thus a specific objective was created for this purpose: to create protected areas in the region where the Cherry-throated Tanager occurs. An opportunity was identified to inventory vacant lands without title in the area where the Cherry-throated Tanager occurs, and to propose the transformation of these areas into protected areas. Although previous attempts to declare a public protected area were not successful, the participants believed that it is worth rescuing the process of creating a state protected area and preparing proposals for the creation of public or private protected areas in the Caetés Forest area. A specific opportunity was identified to propose to Mr. Klaus Meyerfreund the creation of private reserves (RPPNs) in his property, to promote connectivity between the area where the Cherry-throated Tanager occurs and the Forno Grande State Park. To assist in territorial management, it was recommended to prepare a map of priority areas including data on the occurrence of threatened species and areas of relevance for conservation, including IBAs, AZE, and ecological corridors (see updates at the end of the document).



## RECOMMENDATIONS FOR COEXISTENCE AND COMMUNICATION

The threats identified in the coexistence and communication category refer to conflicts between rural producers and environmental agencies, which occurred in the past and which still influence the community's perception in relation to the conservation of Cherry-throated Tanager; also the lack of information and consequent lack of involvement and benefit by rural producers in public policies; and insufficient educational actions in these communities. Participants highlighted the importance of maintaining effective, high-quality and ongoing communication between conservation actors and the different interest groups directly or indirectly involved in or affected by the conservation of the species. The need to work together with municipal and state environmental agencies to publicize this action plan was highlighted. This articulation between agencies is necessary to focus local attention on the species, which is included in the National Action Plan for Conservation of Birds of the Atlantic Rainforest.

Expansion of PCSA's environmental education program to the regional school community was recommended, along with the promotion of closer connections between researchers and environmental agencies to make the data resulting from research available to support environmental management. There is a need to develop a systematic fundraising strategy, collating information on potential donors (public, private or third sector) to prepare proposals for carrying out environmental education, conservation and community engagement projects.

Several actions should focus on the communities within the range of the Cherry-throated Tanager. Participants recommended organizing training for rural producers on sustainable production practices and disseminating, in a participative and continuous way, this knowledge for the local community. This may include raising awareness of existing credit lines for financing agroforestry systems and stimulating commercial production of the fruits of the palm *Euterpe edulis* and their derivatives in the region. To help with this, it would be helpful to create a "Friends of the Cherry-throated Tanager" certification aimed at companies that, through their own actions or by supporting the actions of the Plan, help protect the species, and produce and market the "Cherry-throated Tanager brand". It was recommended to promote, and participate in campaigns and events, using the Cherry-throated Tanager as a flagship species to achieve engagement with the local community.

A need was identified to implement the PCSA tourist itinerary program in private properties, bringing the activity of bird watching to areas where the Cherry-throated Tanager occurs. An important point in this regard concerns the zoning of restrictions in protected areas. Within public and private protected areas, there are restrictions on access, including hours of entry, for bird watching depending on the management plan, which reduces the viability of the activity in these places. This is an important aspect to be considered in the management and creation of new private protected areas that intend to receive bird watchers.



# IMPLEMENTATION AND MONITORING



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The action plan consists of the [objectives and the specific actions](#) identified during the workshop. Each action has a responsible party, collaborators, products and expected results listed in a spreadsheet, which was reviewed and agreed upon the participants. The spreadsheet was shared with all participants. The responsibility for coordinating the implementation and monitoring of the plan lies with Instituto Marcos Daniel/PCSA.

An advisory group was formed to coordinate and monitor the actions together with the collaborators and responsible parties, and to give updates on the progress of these actions in the periodic meetings of the National Action Plan for Conservation of Atlantic Rainforest Birds. The group is composed of Benjamin Phalan (Parque das Aves), Paloma Bosso (Parque das Aves), Pedro Develey (SAVE Brasil), Marcos Marsaioli (Espírito Santo Public Ministry), Diego Hoffmann (Universidade Federal do Espírito Santo), Aline Lobato (RPPN Águia Branca) and Marcelo Renan de Deus dos Santos (IMD/PCSA).

In 2022, the PAN Birds of the Atlantic Rainforest will enter in its 2nd management cycle, already with an innovative format and with full synergy with the conservation initiatives implemented by this work group. The actions formulated in this workshop will be incorporated into the National Action Plan for Birds of the Atlantic Rainforest after the evaluation of the technical advisory group (GAT) as to the best format for integrating conservation actions for this species.

#### Update of information obtained by PCSA after the workshop period:

After the workshop, and before the conclusion of this report, the IMD, through the Cherry-throated Tanager Conservation Program (PCSA), obtained new data on the species, which change some information contained in this report:

1 – In **October 2021**, during nest monitoring, the PCSA team spotted the Caetés Forest Cherry-throated Tanager flock feeding on a fruit and feeding the chicks as well, suggesting that the species is not exclusively insectivorous.

2- In **September 2021**, the PCSA team found and monitored two nests at an interval of one week, in Caetés Forest and in Santa Teresa, at REBIO Augusto Ruschi. In Caetés Forest, the 3 chicks left the nest and started to accompany the flock, thus, the size of the flock increased to 10 individuals, 7 adults, possibly including 2 hatched in the previous year and 3 nestlings from 2021. The chicks in the nest at Santa Teresa did not survive a period of heavy rains, but these birds built another nest which was being monitored at the time this report was prepared.

3- In **July 2021**, IMD, in partnership with Rainforest Trust and American Bird Conservancy acquired a part of the Forno Grande Farm, with 285 hectares, for the creation of a private reserve.



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## ACKNOWLEDGMENTS

We express our gratitude to all the people who participated in the workshop and contributed to the development of the Cherry-throated Tanager Conservation Plan.

We would also like to thank the people who were unable to participate in the workshop, but who helped us carry it out: Eduardo Bordignon and Marcelo Reinert from ALUPAR and Marcio Santos Ferreira from Vale Natural Reserve.

To the entire IMD team, including those behind the scenes, who gave their contributions and fundamental support.

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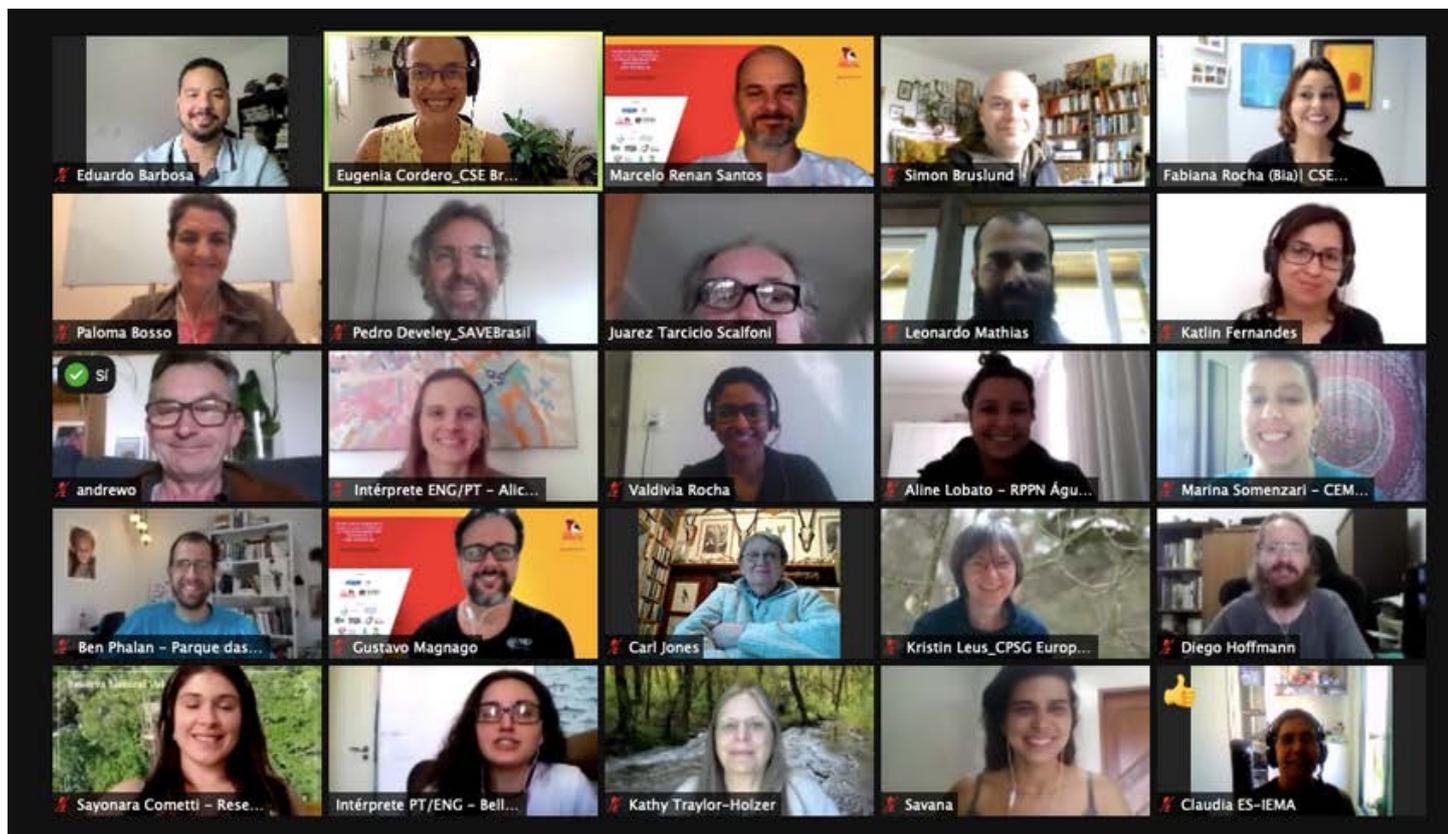
## APPENDICES:

- A - Participant List
- B - Agenda
- C - Species Fact Sheet
- D - Descriptions of potential ex situ roles
- E - Threats identified

## A - PARTICIPANT LIST

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\*Also participated in the workshop as specialists.

## B - AGENDA

### DAY 1 - APRIL 16

### Background information and main threats



Time	Activities
9:00	Welcome and institutional opening
9:40	Ice breaker - what do we have in common?
10:00	Species background <i>Presentation   Questions &amp; Answers</i>
10:40	BREAK
11:00	Threats background <i>Presentation   Questions &amp; Answers</i>
11:40	Establishing a Vision <i>Instructions   Word cloud   Plenary</i>
12:30	Organization of main threats <i>Instructions   *Brainstorm exercise*</i>
13:00	CLOSE FOR DAY

\* Brainstorm \* is an exercise on an external platform that can be performed individually between 2:00 pm and 6:00 pm (1 hour expectation)

### DAY 2 - APRIL 19

### CPSG Process, vision and defining objectives



Time	Activities
9:00	Opening, agenda of the day
9:05	Ice Breaker: where are we from?
9:15	CPSG Process, One Plan Approach & National Action Plan <i>Presentations   Questions &amp; Answers</i>
10:15	Vision proposal review <i>Plenary</i>
10:40	BREAK
11:00	Main threats review <i>Grouping of threats and division of working groups</i>
11:30	Objectives and ex situ roles <i>Presentations   Instructions   Work in groups</i>
13:00	LUNCH BREAK
14:30	Objectives and ex situ roles <i>Work in groups</i>
16:00	CLOSE FOR DAY

## B - AGENDA

### DIA 3 - APRIL 20 Defining objectives and actions



Time	Activities
9:00	Welcome and institutional opening
9:05	Ice breaker
9:15	Objectives and ex situ roles <i>Plenary</i>
10:40	BREAK
11:00	Actions / Integrated management <i>Instructions and work in groups</i>
13:00	LUNCH BREAK
14:30	Actions / Integrated management <i>Work in groups</i>
17:20	CLOSE FOR DAY

### DIA 4 - APRIL 22 Developing actions



Time	Activities
9:00	Opening, agenda of the day
9:05	Intergroup review / Integrated management actions <i>Instructions   work group exchange</i>
10:40	BREAK
11:00	Intergroup review <i>Plenary</i>
13:00	LUNCH BREAK
14:10	Integration of feedback from intergroup review <i>Work in groups</i>
17:00	CLOSE FOR DAY

### DAY 5 - APRIL 23 Actions and next steps



Time	Activities
9:00	Opening, agenda of the day
9:05	Plenary - Consensus and consolidation of actions spreadsheet
10:40	BREAK
11:00	Plenary - Consolidation of actions spreadsheet
12:30	Define responsibilities, monitoring schedule, final adjustments
13:00	CLOSE OF WORKSHOP

## C - SPECIES FACT SHEET



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### Species fact sheet

# *Nemosia rourei* Cabanis, 1870.

Cherry-throated Tanager

Saíra-apunhalada (portuguese)

How to reference this document:

SANTOS, MRD, MAGNAGO, G; PHALAN, B. **Species fact sheet: *Nemosia rourei***. Vitória: Instituto Marcos Daniel, 2021, 9 p.

## 1. Taxonomy

Animalia, Chordata, Aves, Passeriformes, Thraupidae.

## 2. Threat category

The cherry-throated tanager (*Nemosia rourei*) is a passerine bird from the Thraupidae family. It is a rare, endemic to the Atlantic Forest, and it's under the status of "critically endangered" (SIMON, 2009, BIRDLIFE INTERNATIONAL, 2018, ICMBio, 2018).

Espírito Santo: CR

Minas Gerais: CR

Brasil: CR (D)

Global evaluation CR B1ab(i,ii,iii,v); C2a(ii); D

## 3. Historical data:

After its description in 1870 by Jean Cabanis stem from a specimen supposedly collected in the municipality of Muriaé, at Minas Gerais state, the species was spotted again only in 1941 by the ornithologist Helmut Sick, who sighted a group of eight individuals in the municipality of Itarana, at Espírito Santo state (SICK e TEIXEIRA, 1979). After 54 years without any new records, many researchers considered the species extinct. In October 1995 the cherry-throated tanager was sighted again by D. Scott at Biological Reserve (REBIO) Augusto Ruschi, at the municipality of Santa Teresa, however, it wasn't documented. In 1998 the species was considered rediscovered in nature based on a record at Pindobas Farm IV in Conceição de Castelo (PACHECO, 1998; BAUER et al. 2000). In September 2003, the species was found in a private property, Caetés Farm, in the municipality of Vargem Alta (VENTURINI et al. 2005). In 2011 and 2013 had its occurrence documented at the Biological Reserve Augusto Ruschi by a recording of its vocalization with a photographic record (Gustavo Magnago, personal communication). After its official rediscovery in 1998, the species has been watched with

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greater frequency at Mata dos Caetés (SAVE Brasil, 2012), in an area mainly formed by Caetés Farm, Forno Grande Farm and Águia Branca's Natural Heritage Private Reserve, at the border between the municipalities of Vargem Alta and Castelo. In January 2021, PCSA's (Cherry-throated Tanager Conservation Program) team visually registered the species again at REBIO Augusto Ruschi.

### 4. Information on the Population

#### a. Distribution

There are still doubts about the location of the type specimen. Pacheco suggests that the location could be in the state of Rio de Janeiro (PACHECO, 1999). Until then Muriaé (MG) was officially considered as the location of the specimen used for the description of the species in 1870. In the state of Espírito Santo, the known distribution was restricted to only a few points in the mountainous region such as Conceição do Castelo, Castelo, Itarana, Santa Teresa and Vargem Alta (Sick, 1979).

Currently there are only two confirmed areas of occurrence and they are in Espírito Santo, REBIO Augusto Ruschi (Santa Teresa) and Mata de Caetés (Border between Castelo and Vargem Alta).

PCSA did a potential distribution modeling based on historical records until 2019, identifying an area of potential occurrence in the Caparaó National Park, in addition to the areas with confirmed occurrence. Caparaó's presence was not confirmed in the field campaigns carried out in 2021 by the PCSA.

#### b. Population size

It is safely estimated that there are fewer than 50 individuals (ICMBIO, 2018). Between 2003 and 2005 the known population was of 16 individuals, 8 individuals in Mata dos Caetés, 6 individuals in Fazenda Pindobas IV and 2 individuals in REBIO Augusto Ruschi (VENTURINI, 2005). Recent data collected by PCSA bring a known population of 11 individuals, with a group in Mata dos Caetés with 6 individuals and another in REBIO Augusto Ruschi with 5 individuals.

#### c. Habitat and life area

It inhabits primary forests between 850 to 1200 meters of altitude. The PCSA monitored a flock in Vargem Alta where all records from 2003 to 2021 indicate a living area of 420 hectares. There are records in border areas with Eucalyptus sp. PCSA studies indicate that the cherry-throated tanager prefers trees with branches covered by epiphytes and lichens or with loose barks so that they serve as shelter for small invertebrates, which are *Nemosia rourei's* food. In other words, the species shows a preference for ancient and structured forest, which is the case of the Caetés forest and REBIO Augusto Ruschi.

#### d. Population trend

Probable decline based on data from historical and recent PCSA's sightings, and the probable absence of individuals in an area of historical occurrence (Conceição do Castelo – Pindobas Farm), total deforestation in the Itarana region and occurrence of small flocks in the two areas of current occurrence (table 1).

Table 1: Current *Nemosia rourei* population in historical occurrence areas situation.

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Location	Historical Record	Current situation (PCSA)
Itarana	1941 = 8 individuals	2021 = not found
Conceição do Castelo	2004 = 6 individuals	2021 = not found
Mata dos Caetés	2003 = 8 individuals	2021 = 6 individuals
Santa Teresa	2002 = 2 individuals	2021 = 5 individuals

### 5. Reproductive Biology

#### a. Age of first mating

No data.

#### b. Mating system

No data.

#### c. Clutch size

PCSA had the opportunity to monitor 2 nests. In 2018 it was not possible to check the number of eggs and there was only 1 nestling. In 2020 we were able to see 3 eggs and the birth of 2 nestlings.

#### d. Breeding season and interval between breeding

The species has had only 3 known nests. In Conceição do Castelo (Fazenda Pindobas IV), a nest under construction was found on November 25, 1998 (VENTURINI, 2002). In Mata dos Caetés the two nests monitored by the PCSA were found in October, one nest under construction on October 22, 2018 and the other with an individual sitting in the nest on October 31, 2020. The birth of the nestlings was on November 12, 2018 and November 11, 2020 (Table 2).

Table 2: Dates of Nemosia rourei nests located until 2020.

Nest	Nest building	Birth of the nestlings
Conceição do Castelo 1998	November 25	-
Mata dos Caetés 2018	October 22	November 11
Mata dos Caetés 2021	-	November 12

#### e. Reproductive success rate

A nest monitoring in 2018 indicated that it was unsuccessful. The monitoring of a nest in 2020 indicated that the two nestlings left the nest and started to follow the flock, however, later the flock

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went from 7 to 6 individuals, indicating a possible death, it is not known whether an adult or one of the nestlings.

### 6. Natural History

#### a) Longevity and survival rate.

There is a 6-year ringed specimen record (VENTURINI, 2002).

#### b) Generation duration.

No data.

#### c) Body size.

12,5 cm, 22 g (Bauer, 2000).

#### d) Social organization.

It forms flocks observed with up to 8 individuals. Often, during the use of the playback technique, it is noticed that one of the individuals in the group assumes a dominant posture while the others forage close by. During the monitoring work carried out by PCSA, a flock with 5 individuals took care of the offspring, bringing food to the nest. On another occasion, only 2 individuals (couple) participated in the reproductive period, with no sign of other individuals in the area. Due to the lack of sexual dimorphism, it was not possible to identify whether the male or the female hatch the eggs, or if there is a flock relay in this function, but everything indicates that it is only the female that hatches, because the incubating bird leaves the nest for short periods, and we never recorded a relay of a bird arriving to take the place of the other in the nest. The flocks of *Nemosia rourei* can form mixed flocks with other species such as *Sirystes sibilator*, *Orchesticus abeillei*, *Pachyramphus castaneus* and *Hemithraupis ruficapilla*, among others.

#### e) Daily movements.

During PCSA's monitoring, the band at Mata dos Caetés formed by 5 adult individuals and 1 three months old juvenile covered approximately 2,200 m during the day foraging and sometimes moving on flights of up to 50 m.

#### f) Diet

Insectivorous. Butterflies, ants, caterpillars, and other small insects.

### 7. Threats

a) Habitat loss: Historically, the main threat has been habitat loss. One of the areas of historical occurrence in Itarana, was completely deforested in the locality with the species registration (SICK 1970). The region of current occurrence is partially protected in Conservation Units (Santa Teresa and Vargem Alta). However, the existence of signs of deforestation in the current area of occurrence for agriculture and the real estate pressure for the construction of condominiums and country houses may mean that this threat continues. The fractionation of rural properties for sale of plots is a current

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trend in Espírito Santo. In the region of Mata de Caetés there was a gain in forest cover from the 1970s, whose area is included in Águia Branca's Private Reserve. However, in this area of secondary forest there are no records of *Nemosia rourei*, that is, it only inhabits the areas of old forests. Thus, the recovery of forest areas has not yet directly influenced the distribution of the species on the local scale.

b) Agriculture and Pesticides: Agriculture can threaten the species because it makes intensive use of pesticides in the bordering areas of the forest. As the species is insectivorous, the use of low selectivity pesticides can compromise the insect populations on which the bird feeds. Another possibility of effect is through bioaccumulation in birds with a potential endocrine interfering effect. Contamination of birds could be via contaminated food or water. Both in the region of Mata de Caetés and in Santa Teresa, the use of pesticides in crops is intense.

c) Illegal exploitation of forest resources: The illegal extraction of palm hearts (*Euterpe edulis*), hunting and capturing passerines is also an important threat. The palm hearts is the main component of a typical dish from Espírito Santo, which is especially eaten in the Holy Week, when there is an increase in demand. The palm heart species is threatened with extinction and extraction is prohibited, however, the PCSA team identified traces of palm heart extraction in the monitored areas. According to testimonies from people in the Caetés region, the trafficking of palm heart, drugs, and birds is carried out by the same people, therefore it is not an activity resulting from a need of the traditional local community, but it is part of the criminal context and demands police intelligence actions.

d) Poaching: Poaching is an illegal but common activity in Espírito Santo, being a problem in the areas where *Nemosia rourei* occurs. Due to the low population density, the species is not directly captured, but the defaunation of forests and the impoverishment of the biological community is visible and can compromise biodiversity in the short term and the ecosystem in the medium term.

e) Genetic variability: Such small populations are expected to suffer loss of genetic variability due to inbreeding, compromising population fitness, increasing the occurrence of birth defects and decreasing the chances of survival. The occurrence of infectious and parasitic diseases is a factor related to this because the lower genetic diversity can compromise the ability of the birds' immune system to fight pathogens.

f) Diseases and parasites: There are no specific studies on the occurrence of pathogens and parasites in *Nemosia rourei*. However, during the monitoring of the nest in 2020, the PCSA team verified through images and visually that at least one of the nestlings was infested with larvae of *Philornis sp.*, A parasitic fly that lays eggs in the nest, the larvae penetrate the skin of the nestlings and develop in the subcutaneous tissue, reaching approximately two centimeters, and nestlings can be parasitized by several larvae. After a certain period, the larvae leave the nestlings and soak in the nest, completing the cycle. The nestlings survived the parasitosis and left the nest.

## 8. Conservation actions

### a. Public policies

The species is included in the National Action Plan for Birds of the Atlantic Forest of ICMBio.

### b. Existing activities.

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### *I. Species and habitat management*

There have been initiatives in the past by SAVE Brasil to create a large public protected area covering the area of occurrence of *N. rourei* in Mata de Caetés. However, this conservation unit was not implemented by the government due to pressure from local actors who did not agree with the initiative.

### *II. Scientific research*

As it is a rare species, the little that is known about its behavior comes mainly from occasional observations about its foraging behavior, diet, interaction with other birds, and nesting activities (VENTURINI et al. 2002, 2005; BAUER et al. 2000). There are very few works carried out with the species, one of them took place in 2016 by Instituto Marcos Daniel, where a survey of data on the ecology of the species was carried out in Caetés / Vargem Alta (IMD and RAINFOREST TRUST, 2016). The PCSA started a flock's continuous monitoring program to collect information on natural history and ecology in 2020.

### *III. Protected areas*

The species occurs in two protected areas: REBIO Augusto Ruschi, in the municipality of Santa Teresa and in the Águia Branca Natural Heritage Private Reserve (RPPN) on the border between Domingos Martins and Vargem Alta. However, most of the existing flock habitat use area is on private property.

### *IV. Landscape management*

The Mata de Caetés area is contemplated within the ecological corridor Pedra Azul - Forno Grande, considered thus by the state government, a priority area for forest protection and recovery actions. This area is also part of the buffer area of the Pedra Azul State Park. The current area of occurrence of the species includes two private properties (Forno Grande Farm of the BRASIF Group and Caetés Farm of Santi and Valdir Pizzol) in addition to the conservation units.

## 9. Key knowledge gaps

The lack of basic knowledge about natural history is an obstacle to the establishment of ex-situ management actions.

## 10. Priority actions

### *a) Definition of priority areas for protection or creation of protected areas*

The definition of priority areas for the creation of conservation units (protected areas) or for protection is necessary because even in large forest blocks such as the one in the Caetés region, the cherry-throated tanager has been registered in only a small portion of the area, exactly where the forest is oldest and most conserved. This ecological requirement makes any fragmentation, in which the species is found, a priority area for conservation.

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In addition to the cherry-throated tanager, the Caetés region is home to several other species of birds of interest for conservation, such as: *Biatas nigropectus*, a species endemic to the Atlantic Forest and of Vulnerable status according to the criteria of the IUCN Red List. This is the only locality with a species record for the state of Espírito Santo, which has expanded the distribution area by almost 200 km north of the area currently known in the literature (IUCN, 2016). In addition to *Biatas nigropectus*, there are another 28 species of fauna globally threatened, with birds among 6 species under vulnerable status (VU) and 16 species under near threatened status (NT) in addition to *Nemosia rourei* which is under critically threatened status (CR) (SAVE BRASIL, 2012). Four species of mammals under globally threatened status, with emphasis on *Callithrix flaviceps* (EN), endemic to forests above 650 m from a small stretch of the Atlantic Forest between the states of Minas Gerais and Espírito Santo. In the area there is also the mountain turtle (*Hydromedusa maximiliani*) considered vulnerable (VU) and the pumpkin toadlet (*Brachycephalus alipioi*) (NT).

### b) Connection of priority areas through ecological corridors

Forests over 30 years old, like most of the Águia Branca Natural Reserve, still do not have records that they are used by *N. rourei*. However, the connection of fragments used by the species is a long-term strategy so that in the future gene flow occurs again, avoiding congenital problems. They can also help protect central areas of older forests from negative edge effects and other impacts.

### c) Monitoring and protection of nests

There is little information about the reproductive success of the species. Before 2020, the only monitored nest failed. During the monitoring of the nest in 2020, it was decided to do monitoring throughout the day, and chase away possible predators. This effort may continue with future nests, including measures to reduce the incidence of *Philornis* sp. with traps, and to protect against nocturnal predators by installing barriers on the tree trunk and cutting branches that connect with other trees. Nest management can be instrumental in ensuring reproductive efficiency.

### d) Ex situ reproduction of *Nemosia rourei* for population increase

With such a small population, it is important to evaluate the possibilities of ex situ reproduction or integrated management. One challenge is to replicate the conditions that the species requires in captivity. Removing any individual from the population in the wild can harm the population, so it will be important to develop protocols with other species (for example, *Nemosia pileata*) beforehand.

### e) Sensitization of landowners about the protection of the species and change in the perception that the existence of the species is a problem for agriculture.

According to the socio-environmental diagnosis carried out by PCSA in the region of Mata de Caetés, rural producers have a perception that they are penalized for the existence of an endangered species, as this makes them the target of more intensive environmental inspection and greater limitations on the land use. They also feel victimized for having preserved areas of forest while others have not maintained them and can “enjoy” their properties better without being inspected. Thus, they are

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refractory to conservation actions such as the creation of protected areas and are resistant even to the performance of the PCSA team, with reports of hostile conduct with the team.

f) *Environmental awareness about the species and the importance of preserving and connecting the fragments where it is still found.*

Disclosure of the species to local communities is important because there is a lot of misinformation related to its existence, myths and prejudices. It is important to direct efforts to sensitize landowners to adhere to programs for the recovery of forest areas and the enhancement of environmental assets through payment mechanisms for environmental services, ecotourism, or some form of income generation, so that there is a change in perspective that standing forest is a loss. These actions must be planned and conducted with the participation of the community so that they have legitimacy and success.

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## **D - DESCRIPTIONS OF POTENTIAL EX SITU ROLES**

The roles listed below are based on a combination of the role descriptions in the IUCN SSC Guidelines on the Use of Ex Situ Management for Species Conservation (IUCN/SSC 2014) the IUCN SSC Guidelines for Reintroductions and Other Conservation Translocations (IUCN/SSC 2013), and those in Appendix I of the Amphibian Ark Conservation Needs Assessment (Amphibian Ark 2012).

### **Ark**

Maintain a long-term ex situ population after extinction of all known wild populations and as a preparation for reintroduction or assisted colonization if and when feasible.

### **Insurance population**

Maintain a long-term viable ex situ population of the species to prevent predicted local, regional or global species extinction and preserve options for future conservation strategies. These are typically species that are threatened and/or declining and for which it is unsure whether in situ threat mitigation will have the sufficient effect in a sufficient timeframe to prevent the extinction of the species or to prevent a dramatic decline in the numbers, populations and/or genetic diversity of the species. An ex situ population may be desired as an insurance population from which individuals can be taken for genetic and/or demographic supplementation or other conservation translocations as required, but these are not yet actively planned the foreseeable future.

### **Rescue population (temporary or long term)**

Establish an ex situ population for a species that is in imminent danger of extinction (locally or globally) and requires ex situ management, as part of an integrated program, to ensure its survival. The species may be in imminent danger because the threats cannot/will not be reversed in time to prevent likely species extinction, or the threats have no current remedy. The rescue may need to be long term or temporary (for example, to protect from catastrophes or predicted imminent threats that are limited in time, e.g. extreme weather, disease, oil spill).

### **Demographic manipulation**

Improve a demographic rate (survival or reproduction) or status (e.g. skewed sex ratio) in the wild, often of a particular age, sex, or life stage. An example is a head-start program that removes individuals from the wild to reduce high mortality during a specific life stage and then subsequently returns them to the wild.

### **Population restoration: Reintroduction**

Serve as a source of individuals for population restoration to re-establish the species to part of its former range from which it has been extirpated.

### **Population restoration: Reinforcement**

Serve as a source of individuals for population restoration to supplement an existing population (e.g. for demographic, behavioral or genetic purposes).

## **D - DESCRIPTIONS OF POTENTIAL EX SITU ROLES**

### **Conservation introduction: Ecological replacement**

Introduce the species outside of its indigenous range to re-establish a lost ecological function and/or modify habitats. This may involve species that are not themselves threatened but that contribute to the conservation of other taxa through their ecological role.

### **Conservation introduction: Assisted colonization**

Introduce the species outside of its indigenous range to avoid extinction of populations of the species.

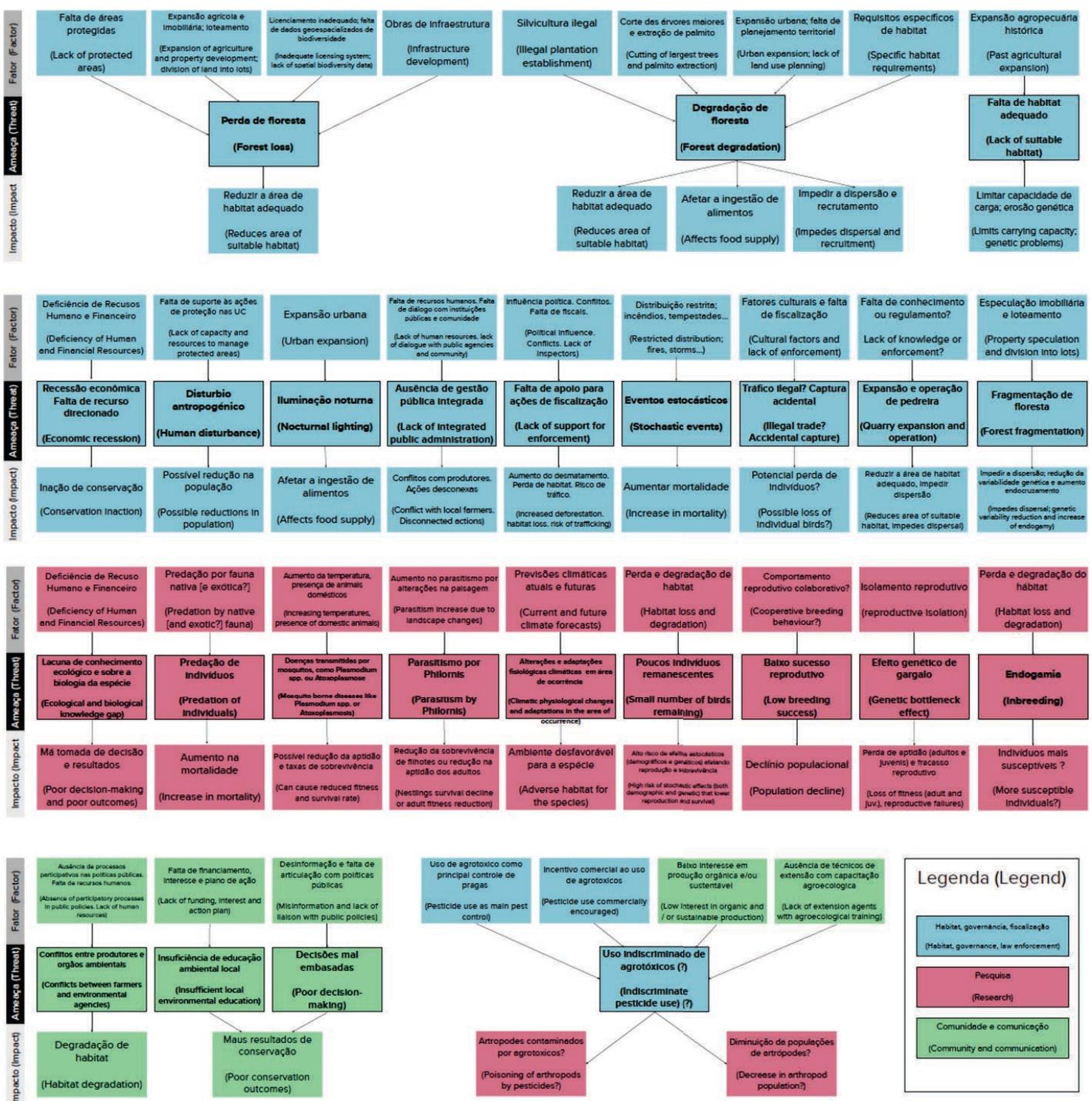
### **Ex situ research and/or training**

Use an ex situ population for research and/or training that will directly benefit conservation of the species, or a similar species, in the wild (e.g. develop monitoring methods; address data gaps in disease transmission or treatment). The research or training must address specific questions essential for success of the overall conservation strategy for the species. This can include non-threatened species serving as a model for threatened species or establishing ex situ populations of a threatened species to gain important species-specific husbandry and breeding expertise that is likely to be needed in the future to conserve the species.

### **Conservation education**

Forms the basis for an education and awareness program that addresses specific threats or constraints to the conservation of the species or its habitat. Education should address specific human behavioral changes that are essential for the success, and an integral part of, the overall conservation strategy for the species. This primarily involves ex situ locations visited by the intended human audience.

# E - THREATS IDENTIFIED



# PREPARATION OF ACTION PLAN FOR THE CONSERVATION OF THE CHERRY-THROATED TANAGER *Nemosia rourei*



April 16 to 23, 2021 | Virtual Workshop

ORGANIZATION



PARTNERS



REALIZATION

