

Case Study:

Establishment and Operationalization of Belize's Safe Capture Jaguar Team (SCJT)



GEF-UNDP project: Enhancing jaguar corridors and strongholds
through improved management and threat reduction



Case Study:
Safe Capture Jaguar Team (SCJT)
Belize



ACRONYMS

CSFI	Corozal Sustainable Future Initiative
FD	Forest Department
GEF	Global Environment Facility
OIC	Officer in Charge
SCJT	Safe Capture Jaguar Team
TAC	Technical Advisory Committee
UNDP	United Nations Development Programme
WVI	World Vets International

Zoe Walker, Wildtracks, 2025.

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Photo Credit (Front Page): Belize Forest Department (Bushnell camera trap)

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Executive Summary

Belize serves as a crucial link in the Mesoamerican Biological Corridor, providing essential habitat for jaguars (*Panthera onca*), recognized as a “national landscape species” that requires large tracks of connected forest for a viable, healthy population. Despite its relatively intact forest cover, the increasing encroachment of agriculture and infrastructure has reduced the natural habitat available for this keystone predator, pushing the population into anthropogenic landscapes and intensifying human-jaguar conflict, especially through livestock predation. These conflicts often lead to retaliatory killings, threatening jaguar conservation efforts in both Belize and across the species range.

To address this, the Safe Capture Jaguar Team (SCJT) was established in Belize as part of a national initiative, supported by the GEF7 project "Enhancing Jaguar Corridors and Strongholds Through Improved Management and Threat Reduction," implemented through the United Nations Development Program (UNDP). This case study evaluates the formation of the SCJT, operationalization and its results in mitigating jaguar-related conflicts through humane interventions.

The multi-agency SCJT successfully completed training and certification of the multi-agency SCJT in capturing and safely relocating conflict jaguars through the engagement of external technical expertise from World Vets International (WVI), resulting in recognition of their expertise by the Belize Forest Department. The SCJT has, since then, played a pivotal role in mitigating human-wildlife conflict through its interventions in capturing, collaring, and relocating jaguars, especially in areas where jaguar predation on livestock has threatened both biodiversity and local livelihoods. By mid-2025, the SCJT had successfully caught, sedated, health-checked, collared, released five jaguars, safely removing the majority from wildlife-conflict situations with no injuries to animals or people. For four of these animals, where relocations to remote protected forests have occurred, post-release tracking has provided key insights into the movements of these animals, and whether they have gravitated back to anthropogenic landscapes.

The project highlighted the importance of multi-stakeholder collaboration (Forest Department, Corozal Sustainable Future Initiative (CSFI), Belize Zoo, Ya'axché Conservation Trust and members of the Technical Advisory Committee (TAC), expert-led training, a collaborative approach to wildlife conflict situations, and use of GPS telemetry to monitor relocated cats. Challenges identified included the need to ensure continued funding and resources for conflict response and prioritization of training and participation for team members in Forest Department. Recommendations focus on institutionalizing the SCJT into national policy, securing sustainable funding, expanding training, and strengthening community-based reporting and livestock-protection measures.

Belize's SCJT represents one of the few capture-relocation-based large cat conflict responses worldwide. When integrated with complementary efforts - particularly those that promote coexistence, increased knowledge of impacts of translocating jaguars into an existing wild population, and telemetry-informed monitoring, - Belize can build a more resilient and scalable model for human-jaguar coexistence. This integrated approach enhances both immediate conflict resolution and long-term landscape-level conservation.

1. Introduction and Background

With over 60% of its landmass covered in forest and nearly 40% under some form of protection, Belize stands as a critical stronghold for biodiversity in Mesoamerica. Jaguars (*Panthera onca*) are considered regionally stable but increasingly threatened by habitat fragmentation and human-wildlife conflict. Belize, as part of the Mesoamerican Biological Corridor and with its relatively intact forest cover and low human population density, is recognized as a critical stronghold for this species, supporting one of the highest

KEY POINTS

- Belize's forests are largely intact, supporting a high density of jaguars.
 - Rural farms border these wilderness areas, creating high possibility of jaguar-livestock conflict.
 - The Project's goal was to "secure jaguar corridors and strengthen the management of jaguar conservation units through reduction of current and emerging threats".
 - A key strategy has been forming a trained capture team to respond to conflict cases, reducing retaliatory killings and relocating conflict jaguars to large, protected tracts of forest.
 - The initial 3 years of the project provided an important opportunity for Belize to learn from experience and strengthen the establishment of its first SCJT.
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densities of jaguars in Central America. Globally, the species is classified as Near Threatened¹ and a recent national assessment of the species rated it as 'Endangered'², based primarily on deforestation, forest fragmentation and the increasing number of jaguars killed as a result of wildlife conflict.

However, Belize's rich ecological landscape often overlaps with human settlements and agricultural areas, particularly within key wildlife corridors. Many farms and communities lie at the forest edge, creating high potential for jaguar–livestock conflicts. This intersection, coupled with weak livestock management, has led to increasing incidents of human-wildlife conflict, particularly involving apex predators such as jaguars, sparking tensions and calls for lethal control measures. These challenges highlighted the urgent need for evidence-based, humane strategies that balance conservation goals with the protection of livelihoods.

The GEF7 Jaguar Corridor Project was launched to secure these corridors and reduce threats (including conflict) via a series of integrated actions. Component 2 of the project explicitly focused on

strengthening 'Belize's capacity to safely capture and relocate individual jaguars threatening human life or property,' thereby promoting coexistence. This case study examines the SCJT initiative within that framework and presents an important opportunity to examine Belize's innovative approach - the establishment of a Safe Capture Jaguar Team - and to assess its impact in mitigating conflict, improving coexistence, and informing national conservation policy.

¹ IUCN 2025: The IUCN Red List of Threatened Species. Version 2025-1.
<https://www.iucnredlist.org/species/15953/123791436>

² Forest Department (2025): National Red List of Threatened Mammals (draft)

2. Objectives of the Case Study

The primary objective of the case study was to document and assess the impact of the Safe Capture Jaguar Team (SCJT), established in Belize under the Jaguar Conservation Project. The Case Study will assist the Forest Department in making informed decisions based on the effectiveness of the SCJT in Belize in management of this iconic species in human wildlife conflict situations. This study further identifies best practices, challenges and lessons learnt during the project timeframe.

Specific Objectives

1. To document the establishment and operationalization of the Jaguar Safe Capture and Response Team
2. To identify the challenges, benefits, and impact of the SCJT in addressing human-wildlife conflict
3. To assess the effectiveness of safe capture, collaring, and relocation efforts
4. To evaluate the ecological, social, and ethical considerations
5. To identify and document best practices and lessons learned
6. To provide actionable recommendations for improving partner engagement and policymaking

3. Methodology

This case study synthesizes evidence from project documents, literature review and focus group meetings with key participants (the Belize Forest Department, Corozal Sustainable Future Initiative (CSFI) and the project Technical Advisory Committee (TAC)), the SCJT, and stakeholder consultations. The analysis combines qualitative data with quantitative capture and tracking records to evaluate outcomes.

Annex One: Focus Group Questions

4. Establishment of a Trained, Equipped Safe Capture Jaguar Team (SCJT)

The GEF7 project was initially focused on the use of external experts coming into Belize for a short window of 60 days to capture and collar jaguars in the North-Eastern Biological Corridor (NEBC), to improve knowledge of this species use of the protected land and adjacent agricultural landscape. In the initial project design, the international jaguar capture experts were to be hosted under Corozal Sustainable Future Initiative (CSFI), with no inclusion of Forest Department, which holds the legal mandate for this activity. With this focus on external experts, there was no budget to build capacity in Belize or equip the team, provided no lasting legacy in country. In recognition of the weaknesses in project design, Component 2 of the project was redesigned to build in-country capacity and long-term sustainability, with the inclusion of the Forest Department and training of a specialized rapid-response team through the third-party partnership with CSFI. CSFI, in agreeing to take on the revised project, also leveraged the necessary co-

financing to fully equip the team and engage external trainers to ensure the team meets international standards, to create a team that can respond under different scenarios.

The SCJT members were selected from the Forest Department, CSFI and the Belize Zoo based on an active selection process that assessed each staff member on their skills, performance record, reliability, trustworthiness and long-term commitment.

“it is always good to learn something new – being part of a great team, with everyone knowing their role... being able to interact with the farmers and help them with their problem”

CSFI SCJT member

Challenge 1: The original project design and budget was designed with no consideration for sustainability, and called for trapping an unrealistic numbers of jaguars (20) without providing funds for in-country training, equipment, and transport.

Challenge 2: Whilst both FD and CSFI team members benefitted from uniforms, equipment and subsistence stipends, CSFI also provided their staff with additional personal gear and staff protections such as accident and life insurance, which were not built into the original project design. This highlighted the institutional commitment and gap-filling support provided by CSFI as a partner, but as the additional support was not available to the Forest Department staff, it also resulted in some FD personnel dropped out. This underscored the importance of a more equitable and comprehensive resourcing strategy in future initiatives.

Challenge 3: The SCJT trainings were not prioritized by all Forest Department OICs (whose primary focus is on management of logging activities) even though the schedule was shared three months in advance, resulting in trainees missing essential trainings and only one Forest Officer being certified. The Belize Zoo participant, too, faced barriers from his organization to attending.

Training for safe capture was delivered by a Belize-based capture expert (O. Figueroa), as well as international veterinarian specialists through World Vets International (WVI). The combined classroom and hands-on workshops covered:

- Jaguar capture (box traps and snares)
- Darting and firearm safety
- Anesthesia, use of adrenalin and recovery
- Clinical examination and clinical sample collection
- Post-mortem examination and sample collection
- VHF telemetry training

- Search and rescue, emergency response and first aid



CSFI and FD SCJT members training with World Vets International (Image credit: CSFI)

This was supplemented by field-based practice sessions and trials, running through and tweaking the capture protocols, gear and medical protocols. All team members were trained in all roles (darting, drugs, vitals and timekeeping), with two also trained in euthanasia protocols.

By early 2025 this training culminated in the certification of seven SCJT members (six from CSFI and one from the Forest Department), with three further participants completing most of the training (two from Forest Department and one from the Belize Zoo). All certified SCJT members successfully met the requirements and were awarded certificates, officially recognizing them as Jaguar Capture Experts by both WVI and the Forest Department. This formal recognition has been key for credibility and ensuring high standards during the project and in the future. The certification guaranteed that, per the revised project design, the team was well-trained and equipped to safely and professionally capture individual jaguars with the least potential risk of harm to jaguars, to team members or the public.



5. Operationalization and Field Activities



Jaguar capture in Belize is always treated as a last resort when addressing human-wildlife conflict. The Forest Department leads a carefully structured process that begins only after a thorough and evidence-based investigation. When a livestock owner or farmer reports an attack, the Forest Department initiates a site visit using a standardized predation investigation survey. The process involves assessing the kill site and reviewing photos or physical evidence to

determine the predator species, conducting interviews with farmers or witnesses, and evaluating the broader conflict situation. Special attention is given to identifying any immediate or future threats to human life, livelihoods, or the jaguar itself. To support this, predator identification guides are used, and initial assessments are made about the possibility of applying deterrent measures.

If the predator is suspected to be a jaguar, the Forest Department proceeds with a monitoring phase, which typically includes installing and operating camera traps for a two-week period to positively identify the predator's species, gender, and individual. During this period, the Forest Department also measures the intensity of the conflict and evaluates the potential for non-lethal mitigation. These mitigation strategies may include improving fencing (e.g., using sheep wire or tighter lines), securing livestock at night, or repositioning pastures away from forest edges to reduce vulnerability to predation.

SCJT Response: Supporting Forest Department in the site visit to the conflict site (Image credits: CSFI)

After gathering data, the Forest Department evaluates all evidence and determines the appropriate response and, if necessary, the method of trapping the jaguar in consultation

with the Technical Advisory Committee (including CSFI). Jaguar capture is only considered under specific conditions:

- if a jaguar is confirmed to be repeatedly killing livestock in a particular area
- if an injured jaguar is found
- if a jaguar has strayed into a village and is too far from the forest to be safely scared back
- if the animal is surrounded by an unmanageable crowd
- if it has already been identified as a conflict jaguar
- or if an injured jaguar has entered a human settlement

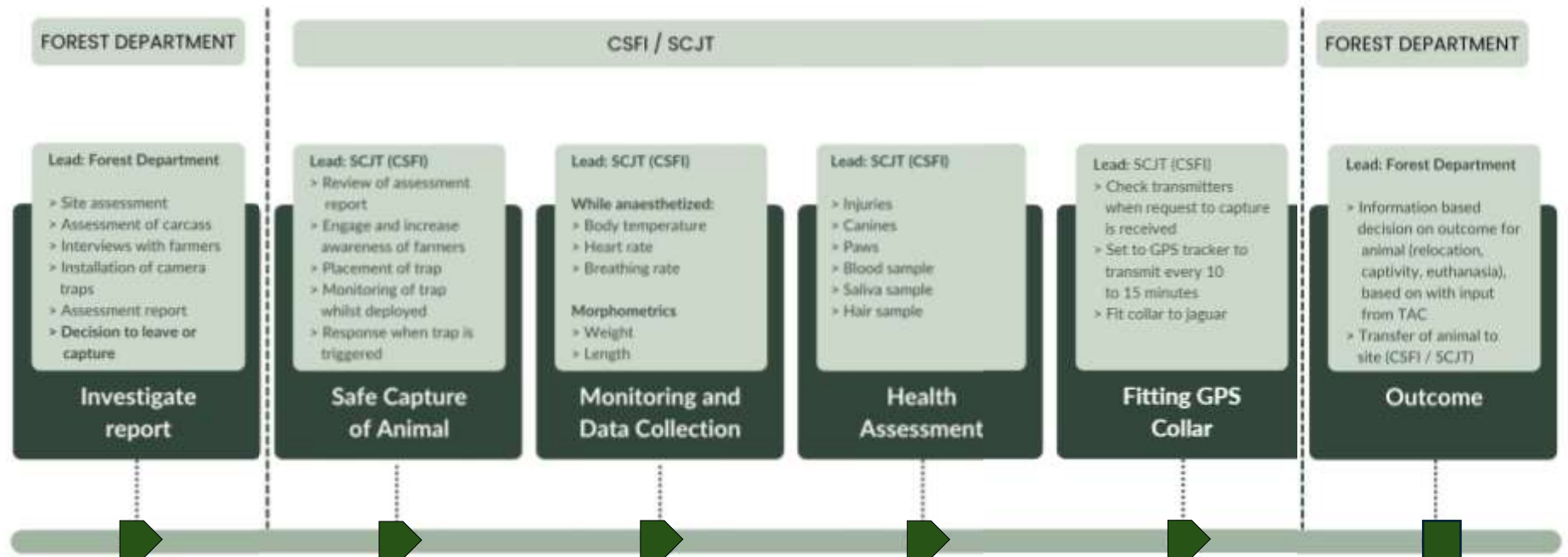
These scenarios require urgent action both to protect the public and to prevent harm to the jaguar.

Throughout the entire process, decisions are guided by a detailed decision tree for conflict response. This ensures that each case is approached systematically, with actions tailored to the specific context - whether

it involves livestock loss, human safety concerns, or the jaguar's condition. The Forest Department prioritizes solutions that reduce suffering for both humans and wildlife, using capture only when all other options have been exhausted or are deemed unfeasible (Figure 1).

The SCJT provides the safe capture required to address these conflict incidents, with the team ready for deployment in northern Belize whenever conflict reports and subsequent assessments result in the decision to capture and remove a jaguar from a conflict situation so it is no longer at risk. The role of the SCJT is to set and bait the trap to catch the conflict animal, sedate it and assess its condition, then assist Forest Department in transfer of the animal to its final destination.

TIMELINE OF STEPS TAKEN FOLLOWING A DECISION TO CAPTURE A CONFLICT ANIMAL



NOTE: Capture of a Problem Jaguar is only considered as the last resort option in a conflict situation

FIGURE 1: TIMELINE FOR DEPLOYMENT OF SAFE CAPTURE JAGUAR TEAM

Key steps in the field:

- Once the SCJT set the trap, it requires 24-hour monitoring until the animal has been caught.
- Whilst the team has eight members, only four are required for a capture. The additional members ensure there can be a rotation of skilled SCJT members throughout the monitoring period, which may last for several days.
- The four team members are assigned specific roles:
 - Darting
 - Drug management
 - Monitoring of vitals of the sedated animal
 - Timekeeping
- Once the conflict animal is trapped, the SCJT needs to be on site within 15 minutes if at all possible, and no longer than one hour.
- The animal is sedated at the site, the health assessment is completed, a microchip is inserted and the collar attached. Optimally, the jaguar should only be sedated once during its capture and relocation, so there is a short time frame in which to complete these actions.
- The Timekeeper ensures that, from the point of capture, all steps of the protocol are followed, and provides a time check every 5 minutes following the animal's capture, through the tranquilizing and health check process.
- When the SCJT is in the field, the team's needs are prioritized by CSFI, with an additional support crew providing backup as needed, including provision of food and logistical support in case of emergencies. This often requires one to two vehicles in addition to the SCJT vehicle, as well as a trailer for transporting the trap and the trapped jaguar.



Once the jaguar has been caught and sedated, a physical health assessment is conducted to determine if it is injured or infirm in any way, blind, or missing teeth (ideally this should also include the results of blood samples) to confirm suitability for release before the animal is transferred to the release site. The scat contents should also be analyzed to identify the prey species, confirming that it has been preying on livestock and does need relocating.

The Forest Department, with input from the Technical Advisory Committee (including CSFI), then makes the final decision on whether the animal:

- should be relocated, and where
- should go to the Belize Zoo for treatment, recovery, reassessment and release or permanent captivity,
- or should be euthanized

***SCJT Response: Conflict Jaguar
Health Check (Image credits: CSFI)***

Operational challenges throughout the project were flagged:

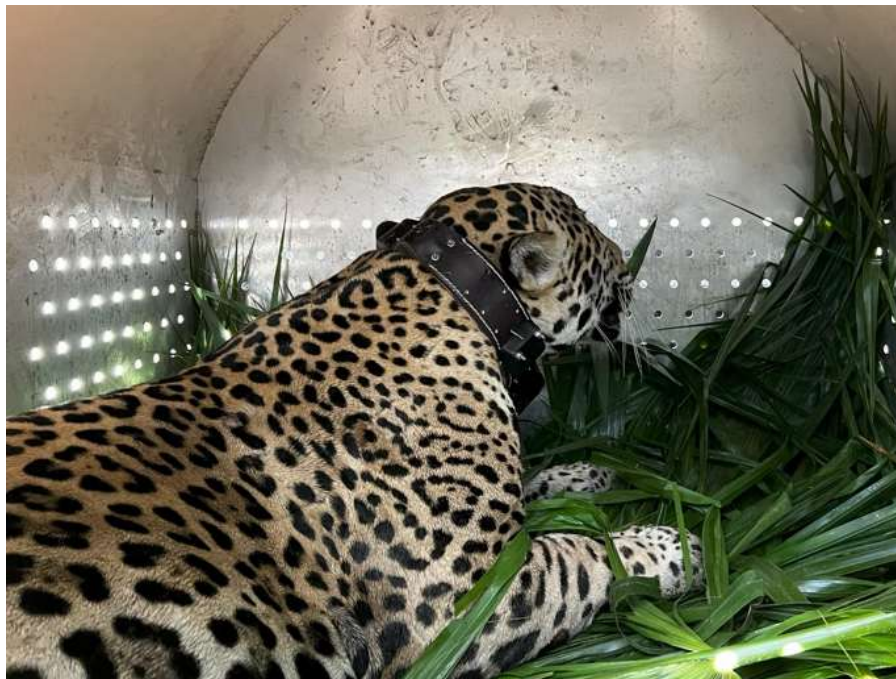
Challenge 4: Not all reports can be addressed through capture of a conflict animal as some sites have no vehicle access for deployment of traps or lie outside of phone range, limiting communication in emergency situations.

Challenge 5: Managing community stakeholders and farmers during a capture event can be difficult, adding noise and stress to the situation when the goal is to keep the animal calm. It also brings the added responsibility of keeping these people safe in a potentially dangerous situation.

Challenge 6: While a delay may be necessary to collect scat samples or wait for results from blood samples, the maximum time to hold a jaguar before release is considered to be four to five days after capture to minimize the risk of stress or injury. A shorter containment period is preferable whenever possible.

Challenge 7: Turnaround time for blood sample results may be too long if the samples are not prioritized in the veterinary clinic, resulting in the decision for jaguar release being made based on the physical assessment, without taking into account information from the blood work.

Once the decision has been made to relocate the jaguar and the release site has been selected, the Forest Department works with other partners (e.g. the relevant protected area partner and Forest Department range staff) to ensure the jaguar is expected, and CSFI / SCJT moves the jaguar to the release site. The preference is for transfer to occur at night when it is cooler, with reduced risk of heat stress, and when there is limited traffic and members of the public to draw attention to / disrupt the transfer process.



SCJT Response: Relocation of the conflict jaguar (Image credits: CSFI)

Communication with the general public is an important component of the conflict jaguar response. All media coverage is coordinated by the Forest Department to ensure the correct information and messaging is delivered.

Challenge 8: When uninformed public see a jaguar being trapped or transported, it is hard to manage the social media coverage, which may have inaccurate messaging.

Throughout operations, the SCJT consults closely with the Forest Department, the FD range offices, the local stakeholders (farmers and rural communities impacted by the conflict animal), and benefitted from recommendations from the project’s Technical Advisory Committee (TAC).

Livestock farmers are often initially frustrated by what they perceive as a lack of timely response to jaguar conflicts. However, when the Forest Department responds within a reasonable timeframe, particularly by deploying camera traps and initiating monitoring efforts, most farmers express appreciation and a willingness to cooperate. While not all are immediately supportive of cage installation, persistent livestock attacks tend to shift attitudes, with farmers increasingly calling for the capture and removal of the jaguar. Importantly, they seek reassurance that the translocated jaguar has been moved far from the site of the conflict and is unlikely to return. Once engaged and supported, farmers tend to show strong collaboration and openness to future communication with the Forest Department and CSFI regarding any ongoing or new incident.

To date, five conflict jaguars have been captured successfully by the SCJT, with no further reports of predated livestock in the conflict areas. Four of these have been translocated to remote release sites in protected areas in the Chiquibul forest (Table 1).

Capture Data Summary: Safe Capture Jaguar Team (SCJT) – Belize

Conflict Response Captures (2023–2025)

Date	Location	Animal ID / Name	Sex / Est. Age	Outcome
May 2023	Sarteneja, Corozal District	BZ-JAG-001 Autumn	Female 2 years	Captured, sedated, relocated
May 2024	Sittee River, Stann Creek District	BZ-JAG-002 Genesis/Daisy	Female 1.5 - 2 years	Monitored via camera trap; captured, collared, relocated and after 1yr the collar was recovered
November 2024	La Democracia, Belize District	BZ-JAG-003 Cannon	Male ~3 years	Captured, collared, released at original site for monitoring
November 2024	Hattieville Belize District	BZ-JAG-004 Hattie	Female ~4 years	Captured due to proximity to village; collared then relocated
April 2025	Old Northern Hwy, Orange Walk	BZ-JAG-005 Toro	Male ~5 years	Monitored via camera trap; Captured, collared, then relocated

TABLE 1: CAPTURE DATA SUMMARY

6. Post Release Monitoring

Once the jaguar is released, it is tracked using a GPS transmitter fitted to the collar, providing information on the movements of the released animal, and an indication of whether the translocation has been successful. Each released jaguar has shown very different movements, with one released individual ranging over 1,000 sq km in the 12 months post release. The post release tracking shows that two of the jaguars released into remote protected forests have graduated back towards human landscapes, one to the Eligio Panti National Park, the other crossed the international border into Guatemala – but there are no reports of either being responsible for further incidents of wildlife conflict. One relocated individual is presumed to have lost its collar or died, as the transmitted location has remained stationary for more than two months. However, the remote location has made it difficult to implement a retrieval.

A fourth individual, ‘Cannon’ (BZ-JAG-006) was initially captured in the Belize Zoo area, where it was attracted to a captive female in estrus. The decision was made to release it at a distance from the zoo but in the same general area to see if it would stay in its original range once the female was no longer on heat. However, the jaguar has become an issue at the zoo, taking zoo stock as easy prey, and tracking suggests that it is also creating a conflict with local communities, and now needs to be recaptured and translocated.

7. Analysis of Effectiveness in Reducing Human–Wildlife Conflict

Early evidence of effectiveness comes from the absence of reported livestock loss recurrences at those sites (to date), and from the GPS tracking data. Continued monitoring will more fully quantify long-term conflict reduction, but the case examples show the model can work. However, measuring “reduced conflict” quantitatively is challenging without extensive pre/post data, and the general consensus is that it is too early to tell - however several indicators suggest positive impact:

- **Safe resolution of conflict incidents:** In the documented incidents, the SCJT’s intervention prevented further livestock losses or retaliatory killing of the jaguar during the post-capture monitoring period. By identifying, capturing and relocating the conflict jaguars, the immediate conflict was neutralized. The captured animals have been in good health (no injuries or diseases), indicating non-lethal outcomes.
- **Data-driven management:** Fitting GPS collars provides data to evaluate outcomes. As the Forest Department noted, “the information gathered from [the telemetry] will provide important data to evaluate the success of the relocations as well as additional information on jaguar ecology in Belize”.
- **Community confidence:** The coordinated response (and subsequent increased community support) builds trust. By publicizing successful captures and relocations in community meetings and media, the SCJT demonstrates that conflicts can be managed without lethal means. The FD’s

consistent public messaging and reminder to keep reporting issues is resulting in a growing awareness and support for this conflict-management approach.

Belize's SCJT is distinctive in its on-the-ground live capture, sedation, collaring, and relocation of conflict jaguars - unlike deterrent-focused programs in Colombia, Panama, or Mexico. The field-capture and non-lethal resolution make Belize, and the SCJT, unique in proactively relocating jaguars back into large, protected forest wilderness areas.

8. Stakeholder Engagement and Partnerships

The establishment of the SCJT exemplifies a successful multi-agency partnership, with Forest Department rangers working side-by-side with CSFI staff and international experts. By formally involving multiple institutions, Belize has been able to leverage complementary strengths (legitimacy, local knowledge, technical skills) to achieve results. Key partners included:

- **Belize Forest Department (FD):** Lead government agency for wildlife management. As the national authority, it provided the legislative framework for the capture of conflict animals. Three FD officers have been trained and one certified as a member of the SCJT.
- **Corozal Sustainable Future Initiative (CSFI):** Belize NGO hosting the project component, leading training efforts and coordinating on-the-ground logistics in northern Belize. CSFI staff make up the core of the SCJT and have been integral in supporting FD in incident response and community outreach. CSFI is also a TAC member.
- **Belize Zoo:** The Belize Zoo provided interim support for initial health assessments and post-capture care and evaluation, acting as the only available temporary holding facility during project implementation, and is also a TAC member.
- **World Vets International (WVI):** Brought international anesthesiology expertise. WVI guided the certification process and ensured global best practices.
- **Technical Advisory Committee (TAC):** The TAC provided recommendations for project implementation, including input on potential release sites. Comprising of ecologists and conservation NGOs (e.g. Panthera, Ya'axché Trust), it provided a mechanism for ensuring people in the jaguar conservation field remained informed and were able to provide informed input into project implementation.

Local Communities: Farmers, ranchers, and communities in conflict zones were engaged through on-site visits and awareness campaigns. Communities reported incidents to the authorities and / or CSFI, enabling timely SCJT responses.

9. Ecological, Social, and Ethical Considerations

- **Ecological:** The relocation strategy ensures that jaguars continue to live in the wild, contributing to ecosystem functions. The use of GPS collars allowed tracking of their movements, yielding insights into habitat use and connectivity. The collars also allowed managers to verify that released cats range across the Chiquibul Forest Reserve rather than returning to their original conflict zones.

What isn't known is whether the jaguars are able to settle into the release area permanently without displacing jaguars already existing within the area, or what impact introducing four additional jaguars into the area will have had. There are questions as to whether there is sufficient prey base to support the additional jaguars, linked to questions on the carrying capacity of the release location – how many jaguars can the Chiquibul area support?

- **Territorial Space:** Without precise data on existing home ranges, released jaguars may cause displacement or stress in resident cats.
- **Prey Competition:** The carrying capacity must be understood in terms of actual prey availability - not just the extent of the forest. Overcrowding could push jaguars to seek livestock or shift ranges.
- **Long-Term Monitoring:** Continued GPS tracking beyond the initial year, combined with prey-base assessments will determine if relocation sites can support sustained jaguar populations.
- **Adaptive Management:** If spatial constraints appear imminent, the program may need to consider alternative release sites with confirmed space and resources – these may not be available in Belize.

While relocation has yielded promising short-term conflict resolution, only rigorous ecological monitoring, including home range mapping, prey surveys, and long-term telemetry, will clarify whether Chiquibul can viably accommodate additional jaguars without negative ecosystem consequences.

- **Social:** By addressing farmers' losses non-lethally, the program is focused on reducing animosity toward jaguars and promoting co-existence. Encouragingly, local stakeholders have viewed the SCJT's work positively and have provided significant assistance in jaguar captures.
- **Ethical:** Overall, the project followed an ethical wildlife-management approach, treating jaguars as valuable native species while protecting human communities and livelihoods. The project stressed minimizing harm, with captures using the "latest techniques with the least possible harm". The SCJT training emphasized the safety of the animal, the team and the local communities. All captured jaguars were thoroughly assessed and found to be "in excellent health", ensuring that animals only lacking dangerous injuries were released. Human safety was also prioritized, with the SCJT members certified in first aid and emergency protocols.

One ethical consideration that has been identified but not yet tackled is that of euthanasia – it has traditionally been assumed that conflict jaguars are those that are weaker and pushed out of forests into human landscapes where livestock provides easier prey. However, the jaguars captured to date have been young, healthy animals that have been cleared for relocation and release. The question arises of what steps should be taken if elderly, sick or injured jaguar is captured that is not releasable, and whether the humane option would be euthanasia over life in captivity.

There has been consistent evolution of the design of the trap used to address potential harm to the animals whilst contained.

- **Contingency Planning for Mortality Risks:** While every effort is made to ensure the safety and wellbeing of jaguars during capture and transportation, questions remain regarding protocols if a jaguar dies during these stages. It is crucial to establish and communicate clear contingency plans that address immediate response actions, post-mortem procedures, and transparent reporting to stakeholders. Understanding the causes of mortality, whether due to capture stress, anaesthesia complications, or transport conditions, will help refine operational protocols to minimize such risks in future interventions.

10. Key Challenges and Mitigation Strategies

Several challenges emerged during the establishment and operationalization of the SCJT:

- **Resource and Coverage Limitations:** The SCJT is a new initiative and was established with the focus on north-eastern Belize. Budget constraints and equipment needs (tranquilizer guns, staff costs, vehicles, collars) not identified in the ProDoc posed significant limits.
Mitigation: Project partners advocated for a reconfigured project and budget. The high-profile success of initial captures helped CSFI justify financial support from their funding partners. Ongoing capacity-building (e.g. training new members) will be focused on expanding geographic coverage, with three teams trained and equipped to cover north, central and southern wildlife conflicts.
- **Short term captivity options:** The reliance on the Belize Zoo in the initial captures for housing and health checks of the jaguars short term reflects an ongoing arrangement but there is a recognized need to expand temporary holding facilities in the other two regions (north and south).
Mitigation: Moving forward within the broader national context, CSFI is planning to develop dedicated holding infrastructure to serve the north for short term holding of captive jaguars for health evaluation and pending decisions on the final dispensation by the Chief Forest Officer.
- **Safety Risks:** Capturing large carnivores is inherently risky. Jaguars under anesthesia can have physiological stress, and personnel face danger from equipment and the animal. The ProDoc explicitly flagged this risk.

Mitigation: The project engaged experienced jaguar trapping and veterinarian support, with the development of strict protocols that guide the SCJT through a capture and health check. This expert guidance has reduced the potential for incidents, and no capture-related injuries have been reported. Continual training refreshers and the use of best-practice equipment (long-range darts, remote monitoring) have also minimized potential harm.

Initial consideration of the use of snare traps, whilst useful for research purposes, was abandoned for use in capturing conflict jaguars as being considered too great a safety risk to both the SCJT and to the local stakeholders, with focus being on the use of box trap, and ensuring that these are safe for both jaguars and the people transporting the animals.

However, despite these protocols, the risk of jaguar mortality during capture or transport remains. Currently, no formal contingency plan exists to guide the response if a jaguar were to die during the process. The development of such a protocol is recommended, and should include emergency veterinary procedures, immediate notification of relevant authorities, communication strategies for informing local stakeholders, post-mortem investigations to determine cause of death, and procedural reviews to refine future protocols. This gap needs to be addressed to strengthen animal welfare safeguards, uphold ethical standards, and maintain transparency and trust among communities and conservation partners.

- There have been concerns on the potential impact collars may have on the released jaguars following a number of incidences of smaller cats being impacted by collar abrasion.

Mitigation: Recapture of one of the released jaguars to assess the condition of the animal and any injuries it has sustained from the collar, or any potential reduction in health to inform future use of collars during releases.

- **Administrative Protocol Flexibility:** While formal procedures are necessary for safety and accountability, the implied expectations around multi-layered approvals and real-time documentation may inadvertently place an administrative burden on implementing partners, particularly CSFI. During time-sensitive conflict responses, rigid compliance with detailed protocols could delay field actions and compromise outcomes.

Mitigation: Review existing procedural frameworks to develop a tiered or situational protocol structure where core safeguards are upheld, but flexibility is allowed for front-line decision-making. This will ensure that field teams can act swiftly while maintaining accountability through post-event reporting rather than in-the-moment administrative compliance.

- **Community Relations:** In wildlife conflict areas, communities often fear jaguars, and the frustration of losing livestock can lead to them responding by trapping or killing the jaguar themselves. Effective communication is needed to explain SCJT actions and discourage retaliatory and indiscriminate killing of jaguars.

Mitigation: This has been addressed by involving impacted farmers, keeping them informed, and by publicizing safe outcomes. After each operation the FD has issued statements thanking locals and reassuring them that the conflict animal had been relocated. Awareness campaigns on

livestock management are included in the discussions with farmers to avoid, or reduce, further conflict situations.

- **Certification and Regulatory Gaps:** Despite the SCJT being supported and trained by internationally recognized veterinarians, there are unresolved issues regarding national certification. In Belize, handling veterinary drugs-particularly tranquilizers used for wildlife requires registration with the Belize Veterinary Surgeons Board (VSB) and certification from an accredited educational institution. At present, some SCJT team members may not meet these Belize-specific legal requirements, raising compliance and oversight concerns. Furthermore, whilst the team's role and legal status is supported under the newly proposed Wildlife Management Bill, there are still areas that remain unclear, particularly in relation to drug use, animal handling, and rehabilitation.

Mitigation: To address these gaps, the project should prioritize alignment with Belizean veterinary standards. Engagement with the VSB is needed to ensure that all SCJT members handling drugs are properly certified under local laws. Additionally, capacity-building through regionally accredited training institutions should be encouraged. Coordination with the Forest Department and Wildlife Advisory Council is essential to clarify SCJT's formal role within the evolving legal framework.

- **Procedural Bottlenecks for Field Implementation Partners:** Where national frameworks for emergency wildlife response and veterinary certification are underdeveloped, it has been a challenge to maintain consistent communication between the SCJT and the Wildlife Program of the Forest Department in emergency situations, without the wish to micro-manage field situations.

Mitigation: There needs to be a protocol for informing the Forest Department during emergency response, integrated into the MoU.

- **Staff Turnover and Institutional Continuity:** A key long-term challenge for the SCJT model is ensuring sustainability in the face of potential staff turnover. Specialized skills in jaguar capture, veterinary sedation, and conflict resolution take time to develop, and loss of trained personnel could disrupt operations. This risk underscores the importance of continuous institutional partnerships and a strong mentorship framework to maintain institutional memory and technical capacity. CSFI's ongoing support and training role has already demonstrated the value of embedding field mentorship into the program.

Mitigation: In order to reduce staff turnover embedding a "train-the trainer" approach and fostering long-term organizational collaboration will be critical for maintaining operational readiness and ensuring knowledge transfer to future team members.

- **Evolving Institutional Roles and Data Ownership:** Post-release monitoring of jaguars is challenged by fragmented data access and ambiguous data ownership and stewardship across partner organizations such as the Forest Department, CSFI, and the Belize Zoo. Without clearly defined data ownership, data handling often occurs in silos, leading to inconsistencies,

duplication, lack of accountability, and reduced trust in datasets. CSFI currently manages all collar movement data, but the Forest Department typically only receives this information upon request or when issues arise, such as in the case of collars that indicate the animal is not moving for multiple days. While transparency and collaboration are essential, it is important to recognize that expectations for real-time or open access to sensitive operational data, such as telemetry, or conflict responses, must align with the principles of co-ownership, as Forest Department needs to be able to access the data to make informed decision in real-time.

Mitigation: There is a need for formal data-sharing agreements between CSFI and the Forest Department (and any future regional partners), with clearly defined roles and responsibilities in the terms set out in any agreed MOU, to enhance coordination. A system for real-time or routine updates should be implemented, supported by a centralized data governance framework. This will ensure more collaborative and evidence-informed real-time decision-making during future wildlife conflict responses.

11. Lessons Learned and Best Practices

- **Expert Training is Crucial:** Hands-on training by specialists was key. Learning-by-doing allowed trainees to practice safe darting and handling in field conditions. Certification provided accountability and confidence.
- **Formal Collaboration Works:** Embedding the SCJT in the Forest Department's framework, with official recognition, ensured stability and continuity. Successful partnerships between government and the NGO (CSFI) provided both authority and local knowledge. Regular coordination meetings among partners kept protocols aligned.
- **Rapid Response Reduces Escalation:** Quicker capture of conflict animals prevents retaliatory actions, which often occur immediately after an attack. The Forest Department, supported by SCJT, aimed for the same-day or next-day response when an incident was reported. Building local trust in this quick-response model encouraged people to wait for the team rather than attempt poisoning, trapping or shooting jaguars on their own.
- **Use of Data Enhances Credibility:** Equipping captured jaguars with collars made the SCJT's work transparent, and science based. The GPS data served both management (ensuring released cats stayed in safe areas) and public outreach (demonstrating that jaguars survive and roam far from villages). In future, publishing telemetry results can strengthen community buy-in.

12. Policy Implications and Recommendations

- **Institutionalize the SCJT:** Policymakers should formalize the capture team within the Forest Department's mandate, ensuring it remains funded after the project ends. The SCJT's recognition by the government sets a precedent for creating a national Wildlife Conflict Response Unit within the Wildlife Program, with the allocation of specific budget lines and permanent positions for Forest Department officers trained in jaguar response would be critical to securing its future. This should be supported by continued investment in capacity development.
- **Integrate into National Legislation and Policy:** The timing of the project aligns with the revision of the Wildlife Management Act and the development of Belize's Wildlife Policy. The provides the opportunity to ensure the legislative and policy environment support the role of the SCJT in the long term, with species control permits that provide the SCJT with the delegated authority to capture jaguars under MoU with the Forest Department.
- **Expand Coverage and Resources:** Given the identified need for more resources, the government should identify two additional organizations (one central, one southern) willing to host SCJTs, with development of a national protocol (standard operating procedures) for wildlife conflict that institutionalizes best practices. The organizations would need to be trained to the standards of the current SCJT and equipped with conflict-response gear (darting kits, vehicles, traps).
- **Strengthening staff commitment:** There is always the risk of staff turnover in CSFI, the Forest Department and future partners, highlighting the importance of continuous institutional partnerships and mentorship, and the need for 'training a trainer' in Belize to reduce dependence on external technical experts. There also needs to be equal incentives built into funding to ensure all SCJT members feel valued, particularly those in the Forest Department, and are committed to their roles in addressing jaguar conflict response.
- **Strengthening engagement of Forest Officers:** There needs to be a shift in the Forest Department towards strengthened commitment to management of wildlife as part of the Forest Department mission.
- **Strengthen Community Reporting:** The consultations for this case study demonstrate that fast response and active community cooperation contributes to success. Establishing a 24/7 hotline or mobile app for reporting jaguar incidents, coupled with public campaigns, would improve timely responses. The Forest Department should reinforce that all reports need to be responded to promptly by its staff, with increased prioritization of jaguar response.
- **Continue Monitoring and Research:** The GEF7 project created data baselines. Incorporating these into national wildlife databases will guide adaptive management to inform corridor planning and conflict mitigation. Continued support will be required for the collection of long-term telemetry and camera-trap data.

- **Strengthen Data Management and data sharing:** Ensure that data on each individual animal is managed effectively in the FD system, with enhanced data sharing protocols through establishing a formal, real-time data sharing agreement between CSFI (and other SCJT organizations as they are established). Wildlife tracking data, particularly on high-risk animals, should be integrated into national systems and made available to relevant actors through a secure but accessible platform.
- **Standardize Reporting Requirements:** Develop SOPs that mandate regular reporting by SCJTs on animal health, treatment history, and drug use. These should be submitted to both the VSB and the Forest Department for transparency and review.
- **Mandate Local Certification:** Ensure that any individual administering veterinary drugs under the SCJT is registered with the Belize Veterinary Surgeons Board and has valid credentials from an accredited institution. This should be a requirement for any future Wildlife Conflict Response Unit.
- **Clarify Legal Standing under National Law:** As the Wildlife Management Bill advances, the SCJT's legal authority and procedures must be explicitly defined - particularly regarding drug use, data management, and animal care.
- **Reinforce Role Clarity in National Protocols:** To avoid misinterpretation of authority and maintain institutional integrity, all future national protocols and SCJT expansion plans should clearly distinguish between the regulatory entity (the Forest Department) and the operational support (in the case study, CSFI). Whilst the operational supporting organization provides on-the-ground implementation capacity, the technical implementation partner operates under delegated authority, with final decision-making, legal responsibility and regulatory oversight remaining with the government authority – the Forest Department.
- **Clarify Data Governance Protocols:** Establish clearly defined and mutually agreed data governance frameworks that reflect co-ownership of operational data and clear roles and responsibilities. These protocols should define access rights, frequency of data sharing (e.g. of telemetry data), and responsibilities for interpretation and dissemination, in alignment with the terms of the MOU. This will ensure balance between transparency, partner autonomy and the integrity of conflict response operations.
- **Avoid Procedural Bottlenecks for Field Implementation Partners:** The SCJT model has demonstrated that proactive, technically trained partners can operate effectively under broad oversight frameworks. The Wildlife Policy, currently under development, should integrate this model by empowering implementation partners like CSFI to act swiftly in emergencies guided by the communication requirements in the MoU, supporting flexibility without compromising accountability. Until the Policy is finalized to guide this process, a short-term protocol should be developed to guide communication with the Forest Department and keep them informed during field base response and emergency situations, to ensure that they can mitigate any incidents during response and respond to public inquiries with real-time accurate information.

13. Conclusion

The Safe Capture Jaguar Team represents a pioneering model for human-wildlife conflict management in Belize and in the region. Grounded in strong science and partnerships, the SCJT has demonstrated that lethal control is avoidable, and that trained personnel can capture and relocate jaguars with zero fatalities and broad stakeholder support. Early results show conflict resolution without loss of life or injury. Sustaining and scaling this success will require political will and continued resources. By institutionalizing the SCJT and building on its lessons (training, collaboration, community engagement, and monitoring), Belize can serve as a conservation leader in coexisting with this apex predator.

It should be noted that whilst the pilot provides an excellent model for the establishment of two additional SCJT Units in Belize to cover the geographic scope required, recent studies have shown that successful case studies in one location may not be as applicable in a second location, and that if replicated, there needs to be a good understanding of how the protocols made need to be tweaked to align with the local context³.

As part of a multi-agency initiative, the SCJT has effectively “sealed the pipeline” between conflict reports and humane resolution through safe capture of conflict jaguars and relocation to remote release sites followed by post-release monitoring. This joint approach allowed 24/7 readiness in target landscapes in northern Belize and provides a model for replication in central and southern Belize.

³ Zimmermann, A, P. Johnson, A. Eduardo de Barros, C. Inskip, R. Amit, E. Cuellar Soto, C. A. Lopez-Gonzalez, C. Sillero-Zubiri, R. de Paula, S. Marchini, J. Soto-Shoender, P. G. Perovic, S. Earle, C. Julia Quiroga-Pacheco, D. W. Macdonald. Every case is different: Cautionary insights about generalisations in human-wildlife conflict from a range-wide study of people and jaguars, Biological Conservation, Volume 260, 2021.

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(<https://www.sciencedirect.com/science/article/pii/S0006320721002378>)

Annexes

Annex A: Focal Group Meetings

Annex B: Training and Certification Timeline (2023–2025) – Key dates for SCJT establishment (e.g. training workshops, certification, deployments).

Annex C: Jaguar corridors and target protected areas (Wildtracks, 2025)

ANNEX A: Focal Group Consultation Questions

KEY QUESTIONS

Date: 5/6/25

Focal Group: Forest Department

A. ROLES AND RESPONSIBILITIES

- Can you describe the Forest Department's role in the establishment and coordination of the Jaguar Safe Capture and Response Team?
- How are roles divided between the Forest Department and partner organizations in managing human-wildlife conflict?

B. PROCESSES

- What are the standard operating procedures for jaguar capture, collaring, relocation, and monitoring?
- What criteria are used to determine when a jaguar should be relocated?

C. CHALLENGES

- What are the main operational or logistical challenges faced during capture and relocation missions?
- Have there been any community-based challenges or resistance, and how were these addressed?

D. LESSONS LEARNED

- What lessons have emerged in terms of improving coordination, efficiency, or safety during jaguar interventions?
- How have these lessons influenced current or future practices?

E. RECOMMENDATIONS

- What improvements or policy changes would you recommend for the continuity or scaling of this initiative?
- Are there any gaps in resources or capacity that future projects should address?

Date: 7/6/25

Focal Group: Corozal Sustainable Future Initiative (CSFI) / SCJT

A. Implementation

- What is the role of CSFI in the management of problem jaguars?
- What selection process was used to determine which staff should be part of the Safe Capture Jaguar Team?
- What training was provided for the Safe Capture Jaguar Team?
- How is it determined when a jaguar should be relocated, and where to?
- Can you walk us through the process of a typical capture and relocation mission?
- What post-capture care is provided?

B: Operational Challenges

- Are there clear roles and responsibilities within the team...and with partners?
- What technical or logistical challenges are common in the field?
- What challenges are there working with local communities / farmers?
- How do you address communication and response time during emergencies?
- How is safety ensured - for both the animal and the team—during operations?

C: Coordination and Communication

- How effective has coordination with the Forest Department and other partners functioned in the field?
- What role does community engagement play in your operations?
- How effective has coordination with the communities / farmers functioned in the field?

D. Effectiveness and Impact

- From your perspective, how effective has the relocation strategy been in reducing human-jaguar conflict?
- Have you observed behavioural or ecological changes in jaguars' post-relocation?
- Do relocated jaguars return or pose new threats?

Recommendations moving into the future

- How could the programme be strengthened in the future?
- Logistics and Equipment
- Communication and Coordination
- Technical and data management
- How would you like to see the Jaguar Capture initiative develop in the next five years?

Date: 5/6/25

Focal Group: Forest Department

A. Oversight

- What specific guidance or oversight has the TAC provided to the project, particularly regarding jaguar response strategies?
- How is the success or effectiveness of the Safe Capture Team monitored and evaluated?

B: Ethical and Ecological Considerations

- What ethical concerns have arisen related to capture and relocation, and how have they been addressed?
- How is ecological suitability determined for relocation sites?
- How does the TAC ensure that relocation aligns with broader conservation goals?

C: Policy and Planning

- In what ways has the TAC contributed to improving interagency collaboration for human-wildlife conflict resolution?
- Are there policy-level recommendations that have been submitted or implemented as a result of this initiative?
- What recommendations do you have for institutionalizing jaguar conflict response in future national policy?

D. Effectiveness and Impact

- From your perspective, how effective has the relocation strategy been in reducing human-jaguar conflict?

Annex B: Training and Certification Timeline (2023–2025)

Outlines the chronological development of the SCJT, including key workshops, expert inputs, and field-based learning events that built the team's capacity and legitimacy under the GEF7 Jaguar Project.

Date	Milestone	Details / Remarks
Q3 2023	Project Scoping & Partner Consultations	Initial discussions with Forest Department, CSFI, WVI, Belize Zoo; defined scope of SCJT establishment.
October 2023	Selection of Initial Trainees	First cohort selected from FD officers, CSFI field team, and Belize Zoo staff.
November 2023	Training Workshop 1: Safe Capture Protocols & Tranquilization Techniques	Conducted by Belize jaguar capture specialist; included dart gun safety, anesthesia procedures.
December 2023	Field Simulations in Northern Belize	Practice of live trapping (without animals), sedation preparation, and field safety drills.
February 2024	Training Workshop 2: Clinical Sample Collection & First Aid	Led by World Vets International; included wound treatment, post-sedation monitoring, and biosampling.
March 2024	Internal SCJT Dry Runs	Simulation exercises in protected areas using full kits and mock deployments.
May 2024	First Field Deployment – Sittee River, Stann Creek	First real-world deployment; successful jaguar capture, sedation, collaring, and relocation.
August 2024	Workshop 3: Post-Mortem Examination & Ethics of Capture	Focused on animal welfare, decision trees for euthanasia vs. relocation, and tissue sampling.
October 2024	Mid-Term Team Assessment	Joint review by FD, CSFI, and WVI to evaluate technical competencies and logistical readiness.
January 2025	Field Deployment – Northern Belize	Second deployment responding to livestock conflict; successful GPS collaring and translocation.
March 2025	Final Evaluation – Certification Assessment Process	Practical and written evaluation of team members by WVI and Forest Department.
April 2025	Completion of Certification Requirements	All team members met clinical and field performance thresholds.

Date	Milestone	Details / Remarks
May 2025	Official Certification Ceremony	Jaguar Capture Team certified by World Vets International.
Ongoing (2025)	Continued Deployments, Monitoring & Community Outreach	Active responses to new conflicts, data review of GPS collars, stakeholder engagement continues.

ANNEX C: Belize jaguar corridors and target protected areas

