



WCS Belize

A Wildlife Conservation Society Program



Jaguar. © J. Larsen/WCS



Spotted Scorpionfish, GRMR. © A. Navarro/WCS



Tapir. © C. Poot/Belize Zoo



Coral. © A. Tewfik/WCS



WCS Program Report 2019 - 2020



VISION

WCS Belize envisions a country where diverse marine and terrestrial wildlife thrive in healthy lands and waters, are sustainably managed, and provide value for people.

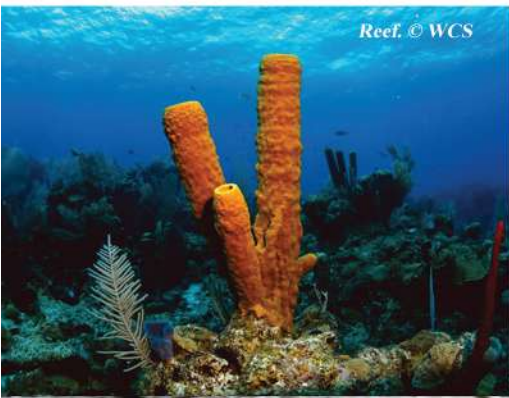
MISSION

WCS Belize conserves and protects the interconnected lands and waters of Belize through science, conservation action, education, and inspiring people to value nature.

Cara Blanca Pools and Maya Forrest Corridor. © T. Rath

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Note from the Belize Country Director



Few places in the world can match Belize with its extraordinary diversity of wildlife and wild places on land and in the sea, and our rich cultural heritage maintained by Indigenous and local citizens. Belize is home to the longest barrier reef in the Western Hemisphere, a World Heritage site; one of the Five Great Forests of Mesoamerica, the Maya Forest; a host of Mayan sites and other cultural treasures; and the most extensive cave structure in Mesoamerica, the Chiquibul Cave System. One hundred and three protected areas make up about 36% and 28% of our land and sea, respectively, hosting various incredible wildlife like jaguars and the Antillean manatee. The Belize Barrier Reef Reserve System is heralded for its array of reef types that includes three atolls and hosts over 500 fish species, from vulnerable apex predators like sharks to mollusks like the queen conch. The reef system supports a thriving small-scale fishing industry, with lobster and conch being significant income generators earning US\$18.6 million in export earnings for 2019. Bridging the marine and terrestrial systems are mangroves, coastal savannas, and wetlands, including two RAMSAR sites as wetlands of international importance. Belize has over 65% of forested land including lowland or broadleaf forests, upland forests that include the pine ridge zone, riparian forests, and connecting freshwater ecosystems. The nation also boasts iconic species such as the tapir, scarlet macaw, Central American river turtle “hicatee”, great hammerhead shark, and the magnificent mahogany tree.

WCS Belize's mission is to conserve and protect the interconnected lands and waters of Belize through science, conservation action, education, and inspiring people to value nature. In 2020, delivering on this mission was particularly tough but crucial. With the rest of the world, Belize experienced traumatic changes of a lifetime due to the COVID-19 pandemic. The country also faced historic drought and high temperatures that enabled hundreds of forest fires across our landscape resulting in poor air quality for many communities. WCS provided relief funds for Government and NGO fire suppression efforts in several protected areas in the Maya Forest, including the Chiquibul National Park and the Community Baboon Sanctuary. Almost

immediately following the fires, the region was hit with heavy rains, flooding, then two major hurricanes. These snowballing situations have impacted human health, economies, communities, as well as natural systems and wild species. We are satisfied that despite these hurdles, WCS Belize celebrated several seminal achievements in the jewel of the Americas.

- A new Fisheries Resources Act was enacted on February 14, 2020, with the primary objective of "promoting long-term conservation management and sustainable use of the fisheries resources of Belize." The legislation commits to transparency, inclusivity, and best practices and applies precautionary and ecosystem-based approaches to conserve natural resources and aquatic ecosystems, while considering the importance of resource users and their livelihoods.
- The Government of Belize expanded the Sapodilla Cayes Marine Reserve, its southernmost marine protected area, to include a vital coral reef complex in the country's exclusive economic zone.
- For the first time, a vessel monitoring system was introduced to track Belize's small-scale fishing vessels through solar-based satellite mobile transceiver units, also providing a new safety feature to protect life at sea.
- Belize's first Trade in Endangered Species (CITES) Bill was finalized and introduced in the House of Representatives in September 2020. This legislation promotes the management, conservation, and protection of threatened and endangered species, a necessary step towards the national implementation of the Convention on the International Trade in Endangered Species (CITES) of Wild Fauna and Flora, to which Belize is a Party. CITES aims to ensure that any trade in wild animals and plants does not threaten their survival.

In the year ahead, we will focus on the following goals:

• Sustainable Natural Resource Management

WCS will continue to ensure that science-based policies protect natural resources and local livelihoods. WCS commits to supporting the implementation of the new Fisheries Resources Act, including through the strengthening of Managed Access, a rights-based fishing program that gives traditional fishermen and women access to fishing grounds; by communicating fisheries regulations and best practices to the public; and by supporting the development of fisheries management plans and policies with government, civil society, and fishers.

To further the breadth of sustainable natural resource management, we completed unbiased, robust data collection and scientific analyses to inform the management of fisheries

resources. We published 15 years of data collected on the queen conch at Glover's Reef Marine Reserve (GRMR) and made recommendations for sustainable conch harvest, suggesting a larger size at harvest, using lip thickness as the determinant size-factor (Tewfik et al. 2019). We will continue to build on this by working with marine protected area co-managers across the country to assess conch data to provide science-based recommendations to the Government of Belize to improve adaptive management for the conch fishery and share findings with stakeholders.

• **Strengthened ridge-to-reef management**

To inform and strengthen land-sea management, we are increasing our scientific understanding of coastal systems, considering interconnected local impacts of climate change and resilience. To meet this goal with partners, we are jointly studying the health impacts of land-based pollution and sediment carried out from watersheds to the Belize Barrier Reef using water quality data and NASA's Earth observation satellites. We will share this study's results and commence training with local institutions and government agencies to ensure reef protection, and recommend appropriate protocols and tactics such as coastal and marine monitoring using remote sensing.

• **Reduced Wildlife Trafficking**

To meet our goal of reducing wildlife trafficking of wild flora and fauna, we continue to strategize for intelligence-based enforcement efforts and compliance. As our research estimates that Belize has lost over US\$30.7 million from the illegal trade of key species organizations, we shall arm customs and other border control officers with innovative forensic tools such as the Xylotron for timber identification and rapid DNA test kits used to identify shark or other fish species, to aid officers in determining CITES-listed species and increase the effectiveness of enforcement efforts. Most importantly, as a mandate for all countries to enact a CITES legislation, we will advocate for passing the Trade in Endangered Species (CITES) Bill in 2021.

• **Improved protected area management**

Our program continues to improve protected area management and advance several global and national strategies. We focus on UN Sustainable Development Goals 14 and 15 by combatting illegal wildlife trafficking and contributing to fisheries and protected areas management. While the Convention on Biological Diversity's Aichi Target 11 is advanced with the expansion of replenishment zones in the Sapodilla Cayes Marine Reserve, we have an exciting opportunity to secure protection of other highly critical marine and terrestrial zones in partnership with the government. We will pursue an additional 672 km² of marine area to be designated as specific replenishment zones within Belize's territorial waters. Additionally, with the close collaboration of a consortium of organizations, we will be steadfast in our work to formalize the Maya Forest Corridor (MFC). In June 2019, the former Cabinet declared

to conserve the MFC as a priority area needed to keep our Maya Forest intact as it is under immediate threat of conversion for large-scale agricultural development. The MFC is the last remaining corridor for jaguars to traverse between the Selva Maya forests and the Maya Mountains. We aim to protect these lands securing travel routes for important species such as Belize's national animal, the Baird's tapir, and jaguars.

WCS Belize is committed to protecting diverse marine and terrestrial wildlife so they may continue to thrive in healthy lands and waters that are managed sustainably and provide various values for people. We have been working in Belize since 1981, advancing protected area creation and management and sustaining science research on the conservation value of and threats to the region's biodiversity. We established a research station on Glover's Reef Atoll in 1997 and a formal country program 14 years ago based in Belize City. Today, we have a dedicated team of 21 locally based personnel with varying topical expertise, including protected area management, wildlife and habitat research, conservation technology, communications, and illegal wildlife trade. This strong capacity enables us to tackle many of Belize's most pressing conservation needs through our science-based and state-of-the-art approaches. We prioritize environmental sustainability and sustainable development efforts, supporting national development strategies, the Belize Horizon 2030, and Belize's Growth and Sustainable Development Strategy.

We hope you enjoy this debut review of our country program's work between 2019 and 2020. We also invite you to take a look at WCS's Global Impact Report and welcome you to contact us to learn more about our initiatives. We look forward to sharing future successes.

The WCS Belize Program is most grateful to the many donors who have supported our work in the country. We are very thankful for the partnerships with many national and international organizations with whom we share these achievements. We also appreciate the volunteers, interns, and those who have joined us on our various social media platforms.

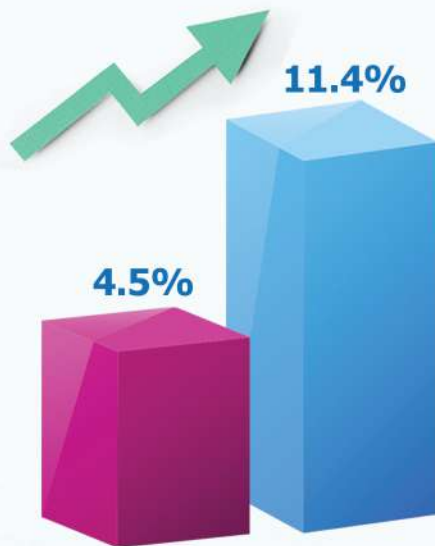
We stand for wildlife. Stand with us!

-Nicole Auil Gomez, Country Director




Protecting Belize's Marine System

Recognized as a global leader in protecting its marine resources, the Government of Belize approved a proposal to **expand replenishment zones**, or strictly protected areas, within its territorial waters in April 2019. This expansion would increase the total size of protected waters from 4.5% to 11.4% in our Territorial Sea when confirmed into law. This inclusive 7-year process sought local fisher's input and verification in the selection and design of this expansion that satisfies conservation targets and ensures that fishers maintain access to their traditional fishing grounds.



Increased area of protected waters since 2019

This expansion will result in Belize achieving international commitments under the United Nations Sustainable Development Goals (SDG), the Food and Agriculture Organization (FAO) Guidelines for Small-Scale Fisheries, the Convention on International Trade of Endangered Species (CITES), and the United Nations Convention on Biological Diversity. Furthermore, it aligns with the country's Horizon 2030 and the Growth and Sustainable Development Strategy by putting in place measures to secure a vital sector for the socio-economic development of Belize.

A portion of the recommendation was legislated in July 2020 with the 108,963-ha expansion of the Sapodilla Cayes Marine Reserve and established Belize's first protected area within the Exclusive Economic Zone. The expansion includes an extensive coral reef complex known as the Corona Reef, located at the Cayman Trench's southwestern terminus. Preliminary studies suggest that the site contains a vast area of healthy and resilient coral reefs and serves as a critical multi-species spawning aggregation site for various commercially-important reef species, including several members of the grouper, snapper, and jack families.

The full proposed expansion occurs within Belize's deep-sea area, with depths ranging from 200 to 3,000 meters. An assessment of Belize's National Protected Areas System in 2013 determined that Belize's deep-sea habitats are the most underrepresented habitat type in the existing protected area system. This national expansion of replenishment zones closes this gap by protecting critical habitats and accompanying functions essential for safeguarding Belize's marine resources plus fishing and tourism industries' viability and long-term sustainability. Preliminary studies conducted by the Belize Fisheries Department have indicated that the open or deep-sea area of Belize serves as essential habitat for deep-slope snapper species and other species of commercially-important fish.

WCS remains committed to supporting the successful signing and implementation of expanded replenishment zones and management interventions led by our key partners, including the Belize Fisheries Department, the Belize National Coast Guard, and co-managers. We support advancing innovative technologies such as a satellite-based vessel monitoring system (VMS) to track fishing vessels and the effort-based reporting software (SMART) to design adaptive intelligence-based enforcement strategies.



Coral. © E. Darling/WCS

Discovering through Marine Research

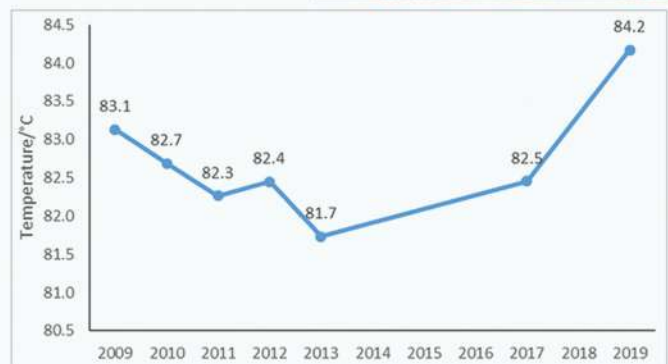
WCS has been engaged in several forms of marine research since the early 2000s and boasts some of the most extended consistent time series of in-situ and fishery-dependent data on reef systems in Belize. We aim to improve protected area management by increasing scientific understanding of marine ecosystems and biodiversity to inform management and policy.

In 2019, we published an article titled, “**Declining size of adults and juvenile harvest threatens sustainability of a tropical gastropod, *Lobatus gigas*, fishery**” (Tewfik et al. 2019¹). The authors recommend that managers consider conch lip-thickness growth pattern rather than shell length to determine the ideal size and associated maturity, considering that other studies have shown that continued harvest of large numbers of juvenile conchs creates the risk of recruitment overfishing, where the number of mature spawning individuals joining the population each year decreases because too many are harvested by the fishery while immature. This ultimately leads to a decrease in the population’s ability to replenish itself, and a decrease in the profitability of the fishery. The authors propose a suitable maximum for conch harvest from GRMR by calculating the size at which 50% of the individual conch in the population has reached maturity (or L_{50}). Ideally, fishers should harvest conch at 10 mm shell lip thickness or 192 grams market-clean mass, which is more than twice the size of the current harvest regulation size of 85 grams market-clean mass. Implementation could be an administrative challenge, but one that Belize should consider in the pursuit of a sustainable fishery for the queen conch. We look forward to learning and sharing more with national and international organizations and authorities to improve this fishery’s sustainability.

We published a second peer-reviewed article titled “**Spiny lobster fisheries status across time and a mosaic of spatial management regimes**” (Tewfik et al. 2020²). Authors examined long-term monthly data collected on lobster within the fished areas of GRMR (2005-2018) and South Water Caye Marine Reserve (SWCMR) (2012-2018) combined with general fisher catches landed at the National Fisherman Producers Cooperative in Belize City (2016-2018). They found that “time series analysis indicated decreasing proportions of mature individuals, decreasing size, and low spawning potential ratios within fishing grounds”. However, indicators of population status within fishing grounds improved with increasing area of replenishment zone; yet overfishing is a widespread problem.

The authors recommend an increase in the legal minimum carapace length to 86 mm (from the current 76 mm) to mitigate these findings and estimated that it would only take about two years for yields to begin to increase due to increased weight of harvested individuals. Adding a maximum size limit and improved enforcement “could have profound effects on maintaining the long-term viability” of the lobster fishery leading to “substantial benefits to many local livelihoods and ecosystem integrity” (Tewfik et al. 2020²).

Coral bleaching surveys were carried out in June, October, and November 2019 using the bar drop method. We observed maximal bleaching rates in November, with divers reporting over 40% of all stony coral colonies either wholly or partially bleached in mean water temperatures of 84.5 degrees Fahrenheit (29.2 degrees Celsius). A time series of data from a temperature logger array monitored from 2008 to 2019 around the atoll suggests that in 2019, the Glover’s Reef Marine Reserve experienced the warmest average water temperature in the last decade (84.2 degrees Fahrenheit/ 29.2 degrees Celsius).

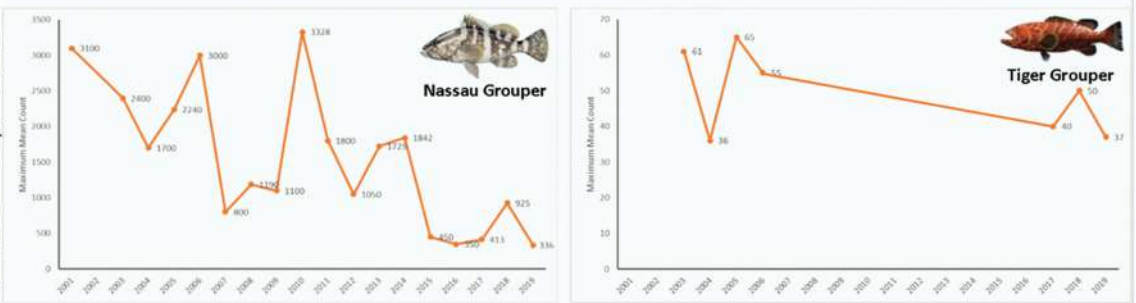


¹ Tewfik A, Babcock EA, Appeldoorn RS, Gibson J. 2019. Declining size of adults and juvenile harvest threatens sustainability of a tropical gastropod, *Lobatus gigas*, fishery. *Aquatic Conserv: Mar Freshw Ecosyst.* 2019;1–21. <https://doi.org/10.1002/aqc.3147>

² Tewfik A, Babcock EA, Phillips M. 2020. “Spiny lobster fisheries status across time and a mosaic of spatial management regimes”. *ICES Journal of Marine Sciences.* Volume 77, Issue 3, May-June 2020, Pages 1002–1016, <https://doi.org/10.1093/icesjms/fsaa008>

Another long-term research interest at WCS has been fish spawning aggregations (FSAs), emphasizing populations of the now Critically Endangered Nassau grouper. A summary of almost 20 years of research on two FSAs at Glover’s Reef was presented at the November 2019 Conference of the Gulf and Caribbean Fisheries Institute. The poster was titled “A Tale of Two Aggregations: Nassau (*Epinephelus striatus*) and Tiger grouper (*Mycteroperca tigris*) at Glover’s Reef Atoll, Belize” (Phillips et al. 2019³) suggested that IUU fishing may yet play a role in the downward trend in abundance of the spatially isolated population of breeding Nassau groupers resident to the atoll.

Figure 2: LEFT- Maximum average counts of Nassau grouper recorded at Northeast Point, Glover’s Reef Marine Reserve during the 2001 to 2019 spawning events. RIGHT- Maximum average counts of Tiger grouper recorded at Tiger Bank during the same period. Counts from 2003-2004 derived from Starr et al. (2018). Starr et al. also noted a maximum count of 111 fish in 2005. Figures after Tewfik et al (2019).



In 2019 we implemented of a project titled "Climate-influenced Nutrient Flows and Threats to the Biodiversity of the Belize Barrier Reef Reserve System", a collaborative initiative with the University of Alabama Huntsville, NASA's Jet Propulsion Laboratory, the University of Georgia, and Belize's Coastal Zone Management Authority and Institute. Fieldwork for this project was carried out in May and November 2019 and 2020, and the results will be used in the calibration of Google Earth Engine Dashboards for the Belize Barrier Reef System. Developed by NASA's DEVELOP Program in consultation with key stakeholders in Belize, these dashboards will allow rapid visualization of marine water quality parameters for natural resource managers using remote sensing technology. The data collected under the BZ-SDG project from 2019-2021 will be used to calibrate these dashboards further, which will be a significant output once the work is finalized. Nutrient flows can have a devastating impact on the Belize Barrier Reef. Our concurrent macroalgal study shows that the nitrogen and phosphorus ratios (N:P) may have at least doubled over three decades. These high ratios can stress corals and exacerbate disease, bleaching, and die-off (Lapointe et al. 2020⁴).

WCS continued a four-year (2017-2020) study on the composition of finfish, lobster, and conch catch at local markets in five key fishing communities across Belize (Tewfik et al. 2020b⁵). This work addresses a significant gap in understanding fishery characteristics and the fishery market chain in communities across Belize. Data were gathered from fish markets in Corozal, Dangriga, Caye Caulker, Belize City, and Placencia by community members using the SMART software. The snappers (Lutjanidae) dominated (44%) landings followed by mojarras (Gerridae), while traditionally used groupers (Serranidae) (2%) ranked very low. A significant concern is a trend that larger-bodied (based on maximum reported total length) fish species tend to be the most overfished; in contrast, smaller-bodied species are less overfished. Although overfishing is seen across most taxa examined, this trend is consistent regardless of taxa groupings or gear.

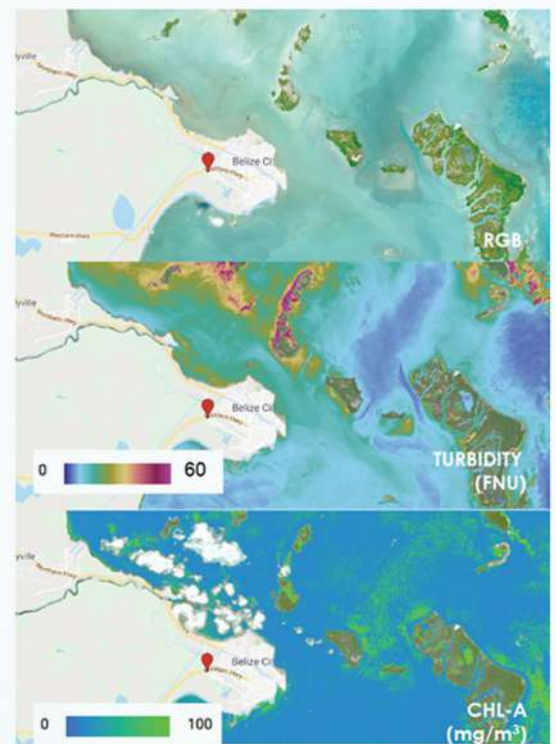


Figure 3: Screenshots of the Google Earth Engine Dashboard produced by the NASA-DEVELOP Program. (Credit: NASA, 2019)

³ Phillips M. & A. Tewfik. 2019. A Tale of Two Aggregations: Nassau (*Epinephelus striatus*) and Tiger Grouper (*Mycteroperca tigris*) at Glovers Reef Atoll, Belize. Poster presentation: Proceedings of the 72nd Gulf and Caribbean Fisheries Institute. November 4-8, 2019. Punta Cana, Dominican Republic.

⁴ Lapointe, B. A. Tewfik, M. Phillips. 2020. Macroalgae Tissue Analysis Reveals Nutrient Flows and Threats to the Biodiversity of the Belize Barrier Reef Reserve System (BZ-SDG). Report: WCS Belize Program.

⁵ Tewfik, A., M. Phillips, J. Maaz, & J. Ramnarace. 2020. A SMARTer approach to collection of catch data for conservation and sustainability. Report: WCS Belize Program.



A Fresh Catch of Snappers at a Local Fish Market. © WCS

Protecting Wildlife and Supporting Resource Management

Counter Wildlife Trafficking

Wildlife trafficking or illegal wildlife trade (IWT) is an expanding environmental crisis threatening global biodiversity, triggering species extinctions and extirpation, ecosystem and livelihood disruption, and lost revenue for local economies. Global wildlife trafficking has been estimated at US\$7-\$23 billion, excluding illegal fishing and logging, valued at US\$30-\$100 billion and US\$23.5 billion, respectively.⁶ WCS is expanding efforts worldwide to foster action and awareness to stem this threat and tackle this serious and growing challenge. Like many other biodiverse countries in this region, Belize's wildlife is in high demand, with many engaging in the illegal trade to supply this demand. But how much is this trade worth? The clandestine nature of the trafficking and few studies on Belize make it difficult to quantify. WCS made what we believe is the first attempt to gather scattered and incomplete data on the volume and value of IWT in Belize. Through desk-based reviews, WCS compiled and analyzed open-source information and raw data, reports, and papers from national experts and officials to estimate the value of IWT in Belize, published in an IWT trade report (WCS 2020⁷). The results show that Belize loses millions of dollars from IWT. Based on available data between the years 2012-2018, Belize has lost from this illicit trade dollar values approximated at US\$18,200,000 in timber, US\$11,314,457 in game species, US\$992,421 in sharks, US\$587,500 in parrots, US\$36,168 in conch, and US\$30,093 in lobster.⁸

CITES was created to regulate or ban international trade in species under threat. This Convention is considered one of the cornerstones of international conservation and one of the best tools to regulate legal trade in endangered species and address transnational wildlife crime. Belize has been a signatory of CITES since its inception in 1973. As a signatory, Belize is bound to implement the Convention as part of a collaborative effort to ensure that the international trade in wild animals and plants' specimens does not threaten their survival. A CITES Task Force, supported by WCS, developed a Trade in Endangered Species (CITES) Bill that awaits enactment.

A WCS-led assessment titled '**CITES Implementation in Belize: Investment and Revenue Generation Assessment**' shows that the Government has invested over US\$100,000 in 2019 in the Convention. Several government departments are directly involved in the Convention and contributing a portion of their annual budget towards implementation; namely the Forest Department, Fisheries Department, Belize Agricultural Health Authority, Supplies Control Unit, and Customs Department. The assessment also highlights that the income generated from the export of CITES listed species (rosewood, mahogany, conch) was over US\$80,000,000 between 2011 and 2018. This figure is considered a minimum estimate due to gaps in data. What does this mean? Disruption of trade in any of these species could impact Belize's economy and would likely have severe negative effects on the livelihoods of 2,500 fishermen and at least 1,500 working directly in the logging industry, many of whom reside in some of Belize's poorest rural regions.

Capacity Building

Based on national needs assessment data, WCS designed and implemented three training workshops for key government personnel from the Belize Coast Guard, Belize Defence Force (BDF), the Forest, Fisheries, Customs, and Police departments, and conservation NGOs. These workshops provided a space for frontline officers to develop international and national networks to increase dialogue across government departments, fostering an environment for collaboration and information sharing on IWT. The workshops focused on case file preparation, intelligence and investigation, and approaches to tackle wildlife trafficking.

⁶ UNODC (United Nations Office on Drugs and Crime). 2016. World wildlife crime report: trafficking in protected species, 2016. UNODC, New York.

⁷ WCS. 2020. Illegal Wildlife Trade in Belize. Retrieved from: <https://belize.wcs.org/Initiatives/Illegal-Wildlife-Trafficking-IWT.aspx>

⁸ WCS. 2019. CITES Implementation in Belize: Investment and Revenue Generation.



Scarlet Macaws. © J. Larsen/WCS



CITES Task Force. © WCS

Spatial Monitoring and Reporting Tool, SMART

Belize continues to be a pioneer in implementing SMART as a mechanism for reducing local and international IWT. The first country to use SMART in marine protected areas, WCS has trained over 100 rangers and managers to support their management of protected areas in Belize. In 2019, Hol Chan Marine Reserve committed to implementing SMART at its managed sites, so in 2020 WCS would have had 100% of Belize's marine protected areas using SMART if not for the training delays caused by the COVID-19 pandemic. The year 2019 also saw an increase in SMART use in terrestrial protected areas at five sites managed by the Belize Audubon Society. Their staff was trained in SMART use through support from a Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH project, "Implementing the SMART approach in the Selva Maya." Furthermore, the Belize Program's regional impact with SMART extended to Honduras, specifically at Cayos Cochinos and Roatan Marine Parks, Cuba, and Jamaica, supported by our national experts.

Safeguarding Timber

Illegal wildlife trafficking is multi-dimensional, and our efforts to tackle it reflect this. Partnering with the Forest Department, we developed and piloted a timber traceability system for a short-term logging licensing system to trace timber from 'stump to sawmill' utilizing SMART as a low-tech and cost-effective solution. This system also increases individual accountability and is inclusive of anti-corruption auditing. The system uses unique bar code tags applied by a special hammer to each end of every cut log. GPS points are used to identify stumps, and a standardized data model created in SMART is used to scan and collect measurement and license information using an Android-compatible device. This traceability system addresses the gaps in the short-term licensing system. When implemented countrywide, it can significantly decrease the illegal trade of timber. Additionally, through a partnership with the US Forest Service, University of Wisconsin, University of Belize Environmental Research Institute (UB ERI), and the Belize Forest Department, WCS introduced the XyloTron to Belize. The XyloTron is an automated wood identification device that uses open-source machine-vision technology. WCS has acquired two systems for the country and, with partners, will ensure its use in management. By mid-2021, we anticipate that key frontline officers working to address IWT will have been trained, and the XyloTron will be stationed and utilized at strategic locations across the country.

Community Collaboration

The participation of communities is imperative in combatting wildlife trafficking and ensuring sustainable resource management. They are usually the primary users and benefactors of wildlife targeted for wildlife trafficking. Over the past year, WCS has supported our partner, the Maya Leaders Alliance, to strengthen community forest management and address the threatened rosewood's illegal

trade within Maya communal lands. Through our support, the Maya Leaders Alliance conducted a series of consultations to update a Personal Use Permit mechanism, which will guide the management of their forest and forest products. We anticipate a full revision and its implementation piloted in early 2021.

Jaguar Trafficking and Improved Regional Alignment

A prohibition on the trade of the endangered jaguar and its parts exists in most countries. However, this hasn't deterred people from engaging in the trafficking of the species and its parts. New evidence, as detailed by 2019 WCS-funded research, indicates that after four decades of the "jaguar craze," international trade in jaguar body parts is resurging (Arias and Milner-Gulland 2019)⁹. This trend has been quite evident in Central and South America. To further investigate this illegal trade, WCS conducted online research across the region. The results, highlighted in WCS's "Jaguar Trafficking Dynamics in Latin America - Analysis Report," (Arias & Lambert 2019)¹⁰ will be used to inform strategic approaches to address jaguar trafficking, including through CITES.

⁹ Arias, M., and Milner-Gulland, E. J. 2019. Drivers, Enabling Factors, and Dynamics of Illegal Jaguar Trade and other Illegal Wildlife Trade in Belize and Guatemala. WCS: New York.

¹⁰ Arias, M., and Lambert A. E. 2019. Jaguar trafficking dynamics in Latin America: Analysis Report. WCS: New York.



Protecting Fisheries Resources through Innovation



In 2010, WCS with the Belize Fisheries Department commenced a project to draft legislation to replace the 1948 Fisheries Act. We persisted with this initiative for close to a decade. In 2019, WCS worked with the Fisheries Department, civil society, and fisher groups to advocate for the Bill's passage through dialogue with parliamentarians, direct community engagement, and broad conservation communication. Along with a few Fisheries Bill Task Force members, we were honored to witness former Prime Minister Hon. Barrow introduce the Bill at the House of Representatives meeting on December 20, 2019. After that, WCS presented strong support for the Bill at the Government's House Committee hearing. We were very excited about the bipartisan support for the legislation, reflected in both the upper and lower chambers of the National Assembly. The Fisheries Resources Act of 2020 was signed into law on February 14, 2020. WCS will continue to support efforts that ensure sustainable fisheries in Belize, including those required to realize this new Act's implementation.

The Fisheries Act of 2020 includes provisions for developing regulations to use mobile transceiver units on fishing vessels. To support this, WCS launched a vessel monitoring system (VMS) for Belize's small-scale fisheries in May 2020 in collaboration with the Belize Fisheries Department, the Belize Port Authority, and the Belize Coast Guard. This initiative aims to strengthen the use of data for monitoring fisheries management efficacy and improve fishers' safety at sea. We equipped seventy-one fishing vessels with VMS units tracked in real-time and can send alerts of distress at sea. A 24-hour central monitoring center operated by the Belize Port Authority receives the alerts and data. This information is to be processed using algorithms to determine what the fishing vessel is doing within the specific date, time, and location. The information is relayed to the nearest ranger station or outpost for emergency response, as protected areas co-managers are also a part of the collaboration. The system complements a lobster Fishery Improvement Project + Fishery Development Model (FIP+) led by the National Fishermen Cooperative who operates a processing plant traceability system that allows them to document the catch landed per vessel, per fisher, and by fishing area for onward exportation. As a collaborative FIP+ for the spiny lobster, these combined measures provide for the establishment of a fishery management chain, with a vital link to this chain being the VMS. The VMS technology will help establish a full traceability system from the point of issuance of a fishing license to the exportation of harvest. Fisheries resources managers are also using data acquired from the fishing vessels to ensure they are within assigned Managed Access areas and zones authorized to fish, and VMS data help ranger stations to better plan their patrol routes. Patrols are planned, executed, and analyzed using SMART technology by almost all MPA managers. SMART has been integrated by the management of Belize's marine protected areas in their daily operations as a way to maximize their allocation of resources. In 2020, over 2800 patrols were conducted, and 84 infractions were documented with SMART.

Building with Women in Fisheries

Women's broad and pervasive role and contributions to Belize's fisheries are often undocumented and overlooked. For the most part, since women make up a marginal percentage of licensed fishers, approximately 3%, they are often poorly represented in management-related discussions. Recognizing the need to highlight the important and varied roles women play, several organizations partnered to create an annual Women in Fisheries Forum (WIFF), which emerged in 2017. In June of each year, during the commemoration of Fisherfolk Month, the WIFF is organized by WCS and the Marine Conservation and Climate Adaptation Project (MCCAP) of the Belize Fisheries Department.

The theme for 2019 was "Gender and the Ocean." It included a 2-day forum at the Pelican Beach Resort in the beautiful fishing community of Dangriga in June 2019. The WIFF3 focused on climate change and its impact on the ocean and, ultimately, livelihoods. The presentations and discussions looked at climate adaptation measures as a means of dealing with climate change. Specialists introduced the women to alternative or, for some, complementary fishing-based livelihoods, namely seaweed cultivation and deep slope fishing with upgraded equipment. This WIFF was the first held in the 'office' of fishers, and the women showed how they enjoyed being in their natural environment.

Over 35 women came together from 11 marine and inland fishing committees. They traveled from Sarteneja, Chunux, Caye Caulker, Belize City, Lemonal, Dangriga, Hopkins, Riversdale, Seine Bight, Punta Negra, and Punta Gorda. The women in attendance represented various roles in the fisheries value chain, namely management, boat-based fishing, in-plant processing, fish cleaning, fish vendors, and operation management support. As feedback, the women were interested in learning more about how science and research help to inform the management of Belize's small-scale fisheries. Unfortunately, the annual WIFF could not occur in 2020, given COVID-19 restrictions regarding social gatherings. As such, for 2021, the planning committee will be organizing a WIFF that falls within the country's COVID-19 guidelines focused on broadening women's understanding and involvement in fisheries science and research.



Women in Fisheries Forum in Dangriga. © D. Arzu/WCS



MCCAP Director Making Presentation at WIFF. © D. Arzu/WCS



Training. © D. Arzu/WCS



Seaweed Training and Tying Nets. © D. Arzu/WCS



Women going to Train in Deep Sea Fishing. © D. Arzu/WCS

Protecting the Critically Endangered River Turtle

Tremendous momentum was built in 2019 for work on the Central American River Turtle, locally known as Hicatee. We focused on two projects: a social survey investigating the consumption and perception of Hicatee within the Belize River Valley and participation in field surveys investigating the population of Hicatee within the same area. The social survey results indicated 79% of the community members interviewed consumed Hicatee, and 84% of those associated the consumption to special occasions - primarily for Easter and birthdays.

The field survey was also fruitful as there were 193 individual turtles captured from three locations and returned after physical examination. From those caught, three were tagged with GPS devices to monitor movements. Juveniles dominated two of the sites located within public access areas; adults dominated the third site located in a private protected area. We aim to conduct future surveys within these sites to understand better the species' status. Additionally, we will work with the communities to find meaningful solutions to protect the species and update them on our findings. The field survey was a collaborative effort with biologists from Missouri State University, Belize Foundation for Research and Environmental Education (BFREE), and WCS. The fieldwork received financial and logistical support from the Protected Areas Conservation Trust (PACT), Belize Foundation for Research and Environmental Education (BFREE), the Delta Foundation, and the Turtle Survival Alliance.



Measuring Hicatee in River Valley. © D. B. Ligony



Hicatee Field Work. © D. B. Ligony



Central American River Turtle. © J. Larsen/WCS

Leveraging Glover’s Reef Research Station

WCS’s Research Station at Middle Caye is a flagship facility for marine education and training. The 10-acre island is a part of the Glover’s Reef Marine Reserve, included in Belize’s UNESCO World Heritage Site. We opened our doors in 1997 to researchers and students interested in discovering the wonders of Belize’s reef with associated habitat and wildlife. We also execute pilot conservation initiatives and facilitate training management solutions on site. The station also hosts frontline workers from the Belize Fisheries Department (BFD) and the Belize Coast Guard, whose primary role is to enforce maritime laws.

Our facilities include a wet and a dry lab for processing samples. One of the station’s newest attractions is the interpretive center, designed to provide information on the Glover’s Reef Marine Reserve’s flora and fauna and includes a replica of the atoll.

Belizean and international students had the opportunity to learn about marine ecology in the beauty and comfort of the island from 2019 until March 2020. Such visits included Ecologic Project International bringing eighteen students and two lecturers from Georgetown Technical High School in the Stann Creek District in 2019. The two-night trip allowed students to observe up close critical coastal ecosystems, including pristine littoral forest, mangrove, seagrass, and patch reefs. The students also learn about the fisheries and conservation research efforts conducted by WCS and BFD at Glover’s Reef and across Belize. International visitors to the Glover’s Reef Research Station (GRRS) in 2019 included students from:

- Sparhawk High School – Boston, Massachusetts, USA*
- Moraine Valley – Palos Hills, Illinois, USA*
- Barrie High School – Ontario, Canada*
- New Hampshire High School – Nasha, New Hampshire, USA*
- Rice University – Houston, Texas, USA*
- Jenna Albers Group – Woodbury, Minnesota, USA*
- St Louis Zoo – St Louis, Missouri, USA*
- National Geographic Student Expedition – Putney, Vermont, USA*

The GRRS was also the venue for an enforcement training conducted in June 2019. The primary purpose of bringing together MPA staff from all over the country was to familiarize them with new and improved aspects of the SMART system. WCS provided new SMART data collection devices, specifically phones and GPS units to the GRMR and SWCMR participants. GRRS provided appropriate space for the theoretical classes and an ideal location for the practical sessions conducted around the atoll.

The GRRS staff was proud to travel across Belize in 2019, sharing with high schools and junior colleges the unique and cherished values of Glover’s Reef Marine Reserve. We had the pleasure of visiting nine schools in the north and 11 schools in the southern part of Belize. We invite you to visit GRMR and Middle Caye to see for yourself one of Belize’s natural attractions.



Glover’s Reef Research Station. © K. Gale/WCS



Participants at Enforcement Training, Glover’s Reef. © K. Gale/WCS



Students and Teachers at Providence Day Adventist High School with WCS Reps. © D. Arzu/WCS



Interpretive Center at Glover’s Reef Research Station. © K. Gale/WCS

Inspiring Others to Action



Punta Fuego Radio Drama Cast at Benguche Day in Dangriga. © D. Arzu/WCS

Highlighting the Impacts of Climate Change Through Drama

The impacts of climate change are far-reaching and can include loss of vital ecosystems and physical damage from flooding and storms, among other threats. Belize is particularly vulnerable to climate change due to its susceptibility to storms and hurricanes. These were topics covered in the drama performance during Season 3 of Belize radio's hottest drama, the two-time award-winning Punta Fuego Radio Show.

There have been three seasons of Punta Fuego, with a total of 66 episodes. As a complement to the drama, WCS held the final of three roadshows in November 2019 in Dangriga, one of the four fishing communities with whom WCS works. The roadshows aim to promote the benefits of sustainable fishing and the adverse effects of over-fishing on marine resources. WCS also collaborated with MCCAP for Benguche Day in Dangriga to highlight climate change issues during a live on-stage performance of Punta Fuego. Based on information from an independent evaluation of the three seasons of Punta Fuego and Talking Fuego, the show has led to a positive change in attitudes by fishers toward replenishment zones. 76% of fishers confirmed they respect the closed seasons and catch limits for seafood; 82% employed responsible fishing practices; 85% verified that they respect fishing area laws. The post-season survey of fishers revealed that most fishers (97%) understand the effects of climate change and agree that it impacts their livelihood (89%).



Guests on Talking Fuego on Love FM. © J. Sanchez/WCS

Garnering Support for Sustainable Fishing Practices

Meanwhile, outreach and certification efforts continued for Fish Right Eat Right, the voluntary certification program that promotes responsible seafood consumption and sourcing, especially for restaurateurs. WCS participated in several outreach activities, including the Bi-Annual Meeting and the 34th Annual General Meeting for the Belize Tourism Industry Association in December, where they announced support for the Fish Right Eat Right initiative. Over 30 restaurants and seafood outlets/supermarkets have received certification stickers and have committed to sustaining Belize's seafood industry. These include two of the first restaurants to sign on, Elvi's Kitchen and Wild Mangos in San Pedro. Several middlemen, mainly from the north of the country, have pledged to practice sustainable fishing habits and use the OurFish App for recording sales and catch of seafood. We invite interested restaurants and seafood vendors to contact us to join the certification initiative.

Recognizing Fishers Efforts to Protect the Sea

Fisherfolk Month is celebrated annually in June to recognize fishers' efforts, those fishermen and fisherwomen who are serious about protecting Belize's marine resources. It coincides with the opening of the annual lobster season and starts with a Blessing of Boats before fishermen and women head out to sea in mid-June. Other events are radio talk shows, a rebroadcast of Punta Fuego Season 3, a Women in Fisheries Forum, and a Fisher of the Year Award ceremony.

In 2019, the month was celebrated with the theme: "Gender Equity and Ocean Health: Supporting Access to Markets for Small-Scale Fishers." Elmer Rodriguez, an active fisherman from Sarteneja Village and the National Fishermen Producers Society Limited chairperson, received the Fisher of the Year award. In 2020, the planning committee organized new and safe ways to celebrate the month because of COVID-19 restrictions on mass gatherings. A series of virtual discussions regarding the theme "Maximizing Fisheries Value Chains - The Core of the Blue Economy" was a highlight of the month. There was also a virtual award ceremony to recognize the Fisher of the Year, Mr. John Thomas, a veteran fisherman from Dangriga Town.



Fisher of Year 2019, Mr. Rodriguez



Fisher of the Year 2020, Mr. Thomas

Representatives from several organizations helped to plan fisherfolk month each year. These include the Caribbean Regional Fisheries Mechanism; the Caribbean Network of Fisherfolk Organizations; the Belize Fisheries Department and their Marine Climate Change Adaptation Project team, and WCS.

Some participants of the Fish Right Eat Right Certification Program. (First - Nahil Mayab, Orange Walk ; Second - Wild Mango's, San Pedro; Third - Naia Resort, Placencia; Fourth - Elvi's Kitchen, San Pedro) Photos by D. Arzu/WCS





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