

PAYNE'S CREEK NATIONAL PARK ANNUAL REPORT



*Submitted to the Forest Department
Belmopan*



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EXECUTIVE SUMMARY

Words from TIDE's Terrestrial Manager: Mr. Mario Muschamp.

The year 2019 was very busy for the staff of Payne's Creek National Park (PCNP). Staff were engaged in fire management, law enforcement, research and monitoring, and capacity building for both staff and communities. With funding from Protect Areas Conservation Trust (PACT), the staff conducted prescribed burns in Deep River Forest Reserve burning approximately 4000 acres to meet specific objectives. Training basic fire management was provided for Southern Belize Fire Working Group members', which included staff from protected areas co-managed by TIDE, Ya'axche Conservation Trust, Belize Audubon Society, and the Belize Forest Department. The team also lead training for 16 of The Nature Conservancy's U.S.A based fire fighters, which focused on fire suppression which enabled the participants to advance their capacity and move up in the fire management. Park staff also provided Basic Fire training via the Key Biodiversity Areas project for community residents from the Belize River Valley Area, and at Monkey Bay Wildlife Sanctuary, where the training also included some fire effects monitoring training. These trainings built capacity in other parts of the country.

The use of SMART to collect enforcement data continues and the information is being used to target more focused patrols especially in the dry season when the access road is in good condition and people are entering into neighboring Deep River Forest Reserve (DRFR) to conduct activities that can have some negative impacts on the park, such as hunting and lighting of fires.

Research and monitoring activities included ongoing monitoring and some new activities in 2019. Biodiversity monitoring with camera traps for monitoring of mammals focused on Jaguar and Jaguar prey. Fire effects monitoring was conducted at 28 plots scattered over PCNP, DRFR and Swasey Bladen Forest Reserve, and focused on pine and palmetto. Six transects were also done with University of Belize Environmental Research Institute Students, that focused on fire effects on vegetation cover. Yellow-headed parrot nest success monitoring was conducted with assistance from Jamal Andrewin-Bohn from Belize Bird Conservancy and his team. Chick health assessments of YHP took place with assistance from a vet from Belize Bird Rescue. In partnership with the Crocodile Research Coalition, the team released a tagged American Crocodile in PCNP, the first and only tagged American Crocodile in the region. Finally, in 2019 the team partnered with a PhD Student from the University of Florida to do further research of fire effects on grass species, and to investigate variables on the forest floor that may affect pine and palmetto recruitment.

On behalf of the staff and management of PCNP, I would like to take this opportunity to thank all those who have contributed to the management of PCNP in 2019, as we look forward to your continued support in 2020 and beyond.

Sincerely,

Mario Muschamp

Protected Areas Manager, TIDE

1. SURVEILLANCE, PROTECTION AND SURVEILLANCE:

Under TIDE's resource protection program, the Payne's Creek National Park (PCNP) team continued to conduct surveillance and enforcement patrols throughout the park in 2019. Main threats to the park as identified as wildfire and illegal fires, poaching, and hunting. TIDE's ongoing presence in the park is critical in protecting the species and ecosystems within.

1.1. PATROL SUMMARY

Table 1 highlights the activities undertaken by the Payne's Creek National Park (PCNP) team in and around the park during the period 1st January – 31st December 2019. All patrols carried out by PCNP rangers are recorded using Spatial Monitoring and Reporting Tool (SMART) technology. The nature of the work done in PCNP means that the vast majority of patrols include an aspect of reconnaissance (enforcement), even if that is not the primary objective. Note therefore, that these patrols, which are displayed in Figure 1, are significantly underrepresented in the Patrols by Mandate totals.

Patrol routes taken by the team throughout 2019 are displayed in Figure 2.

Table 1: 2019 Patrol Summary

Mandate	# of Patrols	Distance Travelled (km)	Patrol Hours
Biodiversity	35	1,155.001	162.301
Follow Up	1	45.75	2.583
Reconnaissance	17	827.042	74.087
Ridge 2 Reef	14	790.988	58.94
Routine	123	5,110.56	412.942
Special	53	2,501.782	213.892
Total	243	10431	924

Figure 1: Patrols by mandate in 2019

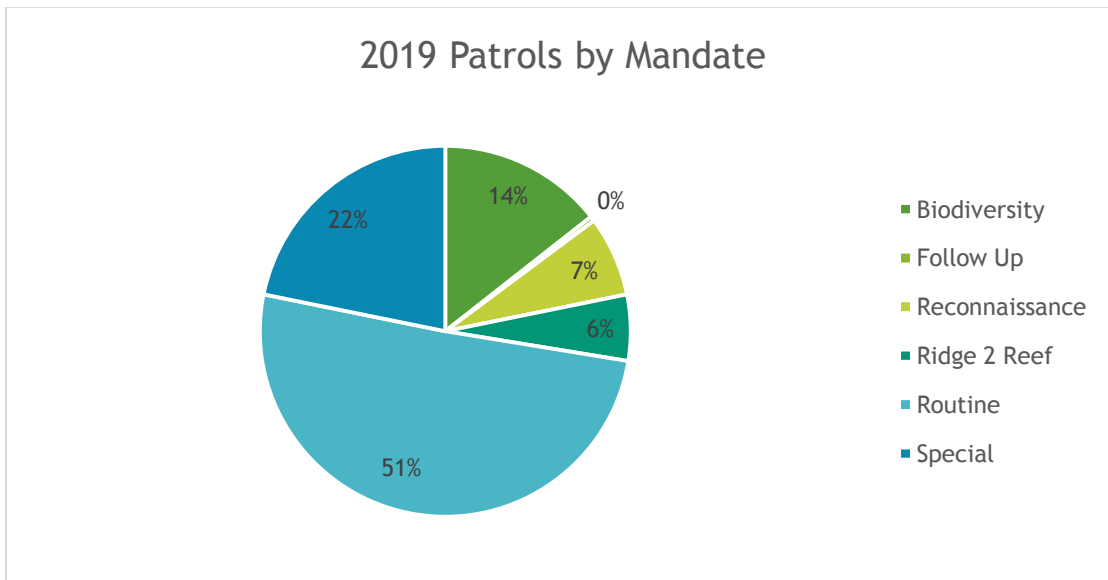
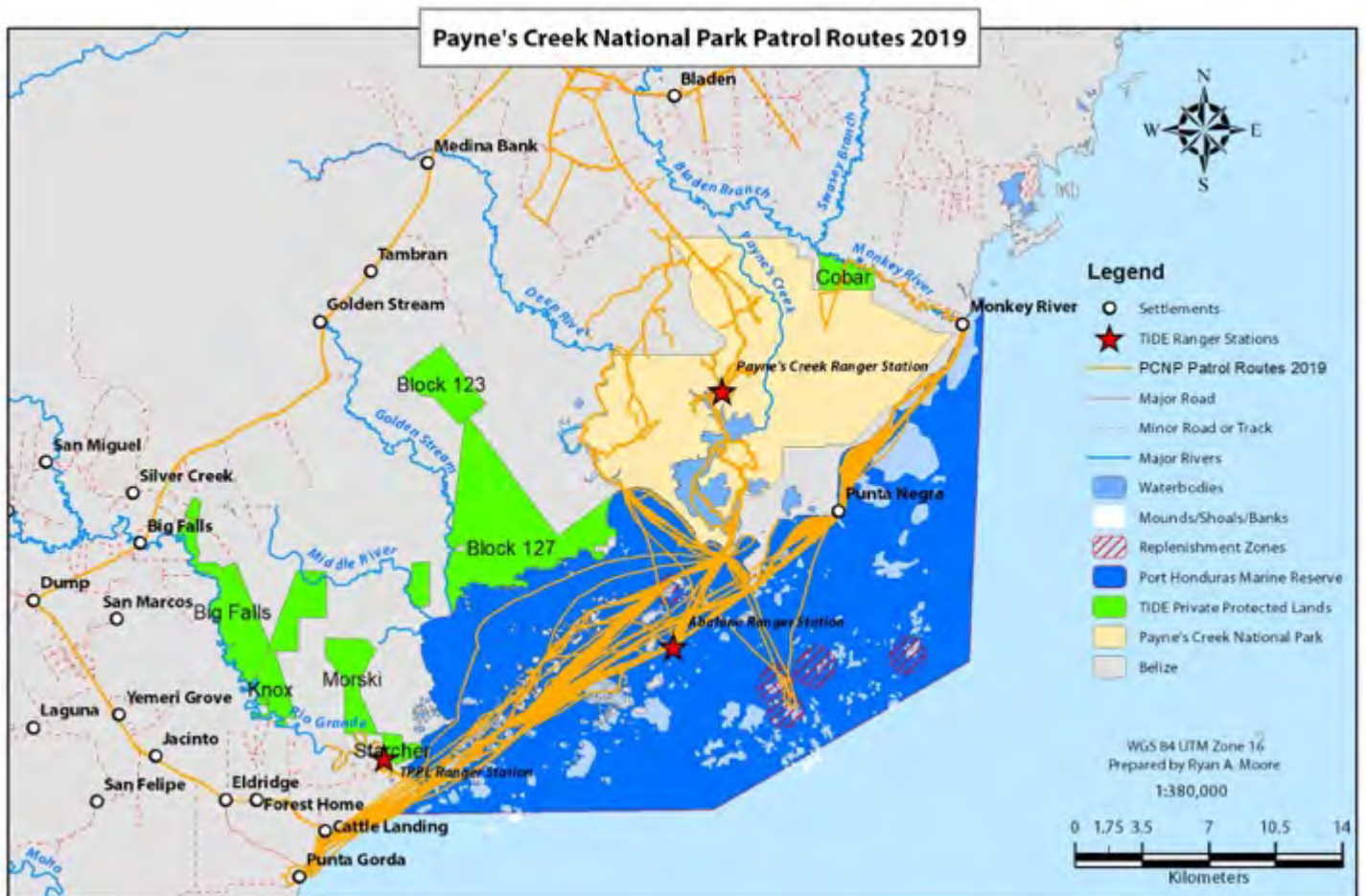


Figure 2: Map of 2019 Patrol Routes

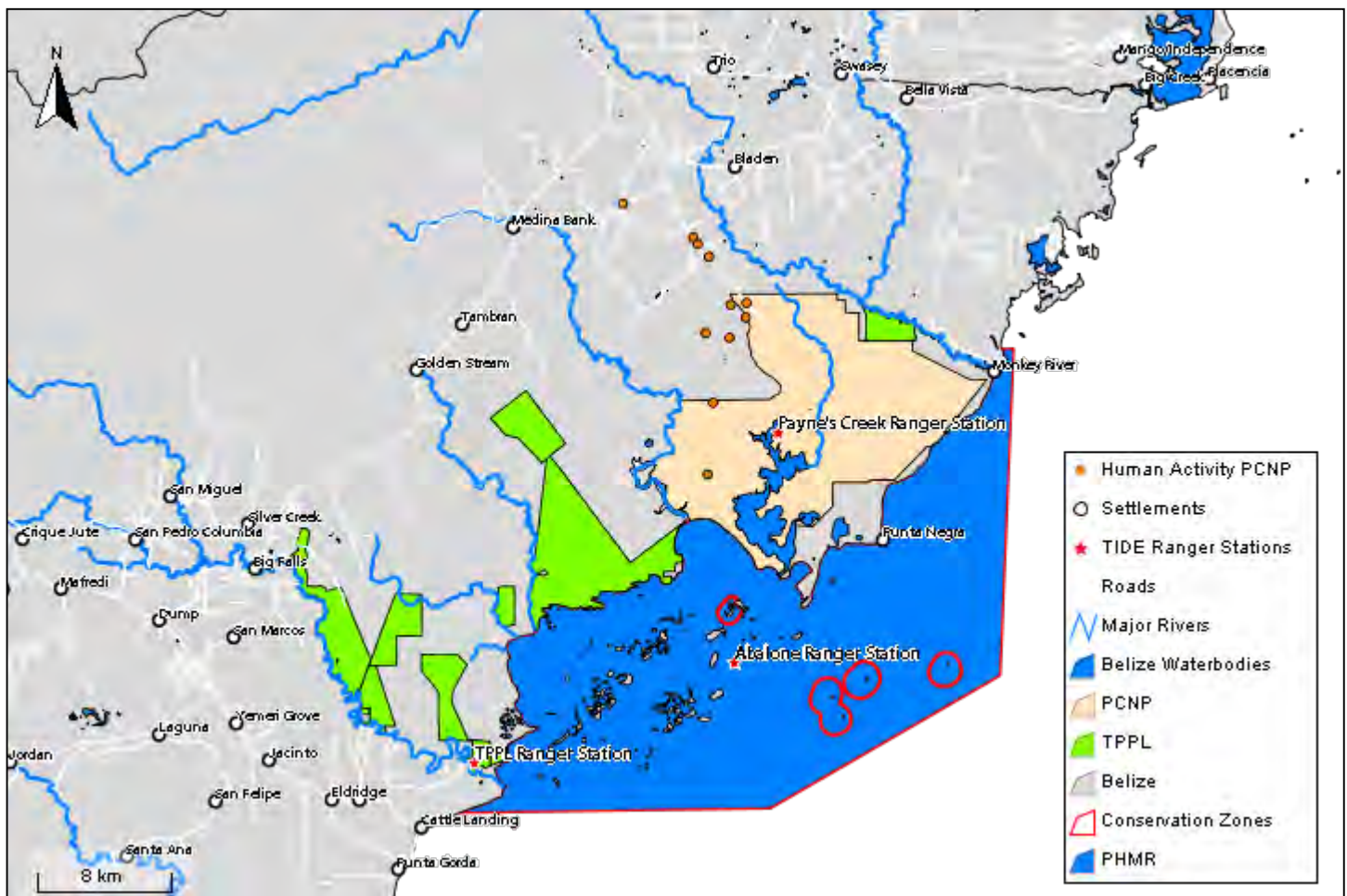


1.2. INFRACTIONS

During any type of patrol, the ranger team observes evidence of human activities within the park and surrounding areas. These observations are classified as “human activity”, and are all infractions of the park regulations. Since tourism is the only public activity allowed in the park, and this takes place mainly in the lagoon area, rangers easily determine if observations are tourism related or infractions.

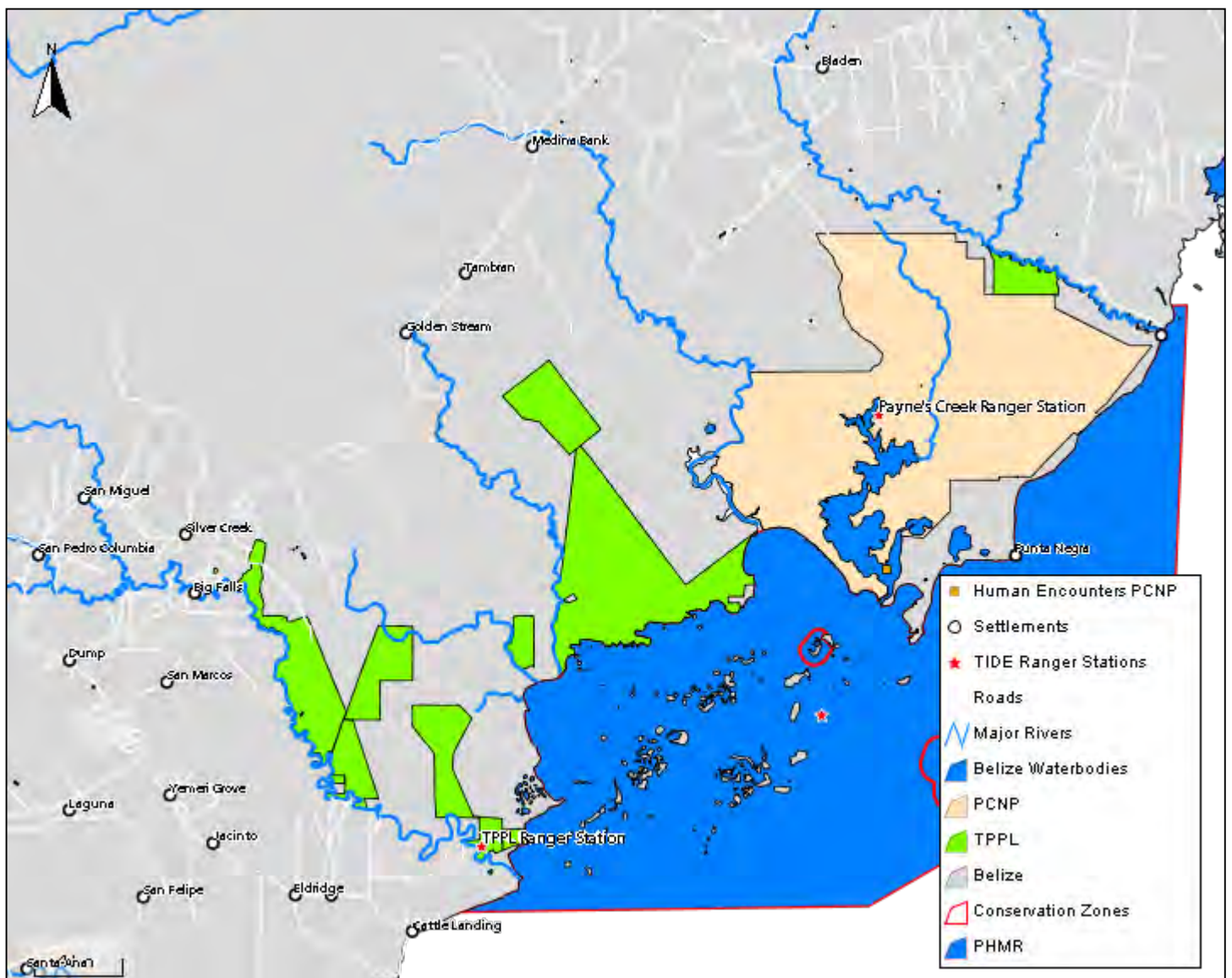
In 2019, eight infractions were recorded in the park and surrounding areas (of the ten recorded in the SMART reporting tool, two were in areas outside of the park boundary). Infractions included two forest fires, poaching of yellow headed parrot chicks from nests, and tracks in areas away from tourism activities, and can be seen in Figure 3.

Figure 3: Map of human activity in 2019



In the same way that rangers record human activity in the park, they also record human encounters – where persons are actually seen within the park carrying out an activity that is not tourism (and is therefore against park regulations). In 2019, rangers only recorded one human encounter, which is shown in Figure 4. They observed a boat conducting what they thought was trolling, but they did not see any actual evidence so no further action was taken.

Figure 4: Map of human encounters in 2019



2. INSTITUTIONAL MANAGEMENT AND STRENGTHENING

2.1 CAPACITY BUILDING

PCNP staff were able to participate in a range of capacity building trainings in 2019. These are important opportunities for rangers to expand their knowledge and skills, and remain flexible and adaptable to new work assignments and conditions.

2.1.1 CUSTOMER SERVICE TRAINING

Park staff participated in a Customer Service Training offered through the Belize Tourism Board and organized by TIDE Tours, for those who work with educational groups visiting TIDE Co-Managed Protected Areas via bookings from TIDE Tours. As TIDE Tours diversifies its catalogue of programs offered, more tourists are visiting TIDE's protected areas and working closely with rangers, most of whom do not have background experience in customer service. The training was held on 16th December at TIDE's conference room. The training was facilitated by Mr. Javier Gutierrez, and focused on topics that included; attitude towards guests, presentation to guests, punctuality, and attire. This training was very helpful for those rangers who deal directly with guests at their respective sites. The session will help in improving services provided to guests, and should improve visitor satisfaction in these areas.

2.1.2 MINDFULNESS SESSION

Park staff participated in a Mindfulness session with other TIDE staff, which was led by Mr. Jerry Enriquez, in November 2019. The session focused on easing the mind and working with what is around you to be productive and happy in and outside of the work place. This session provided the guidance needed to experience deep thought, which can help when determining the right course of action. The training will help rangers to think clearly during planning sessions, and to determine the best course of action in the event that a ranger encounters an offence. The session also helped participants to see and understand things from different perspectives, which will aid with conflict resolution. This session was a valuable experience for those involved.

2.1.3. BIRD MONITORING TRAINING

In order to enhance TIDE's bird monitoring program, the organization is working with the Institute for Bird Populations (IBP) to establish three new MoSI monitoring sites within TIDE protected areas (see Figure 5). MoSI sites are used to monitor neo-tropical migratory birds, and there are over 200 sites in over 14 countries.

In order to operate the MoSI sites, rangers from PCNP and the TIDE Private Protected Lands (TPPL), along with two community representatives and TIDE's Education and Outreach Coordinator, participated in several training sessions. Under the supervision of one of PCNP's rangers, Mr. Liberato Pop who is experienced in these techniques, rangers learned and practiced bird identification and extraction from mist nests. The training was

assessed by Ms. Abidas Ash of the University of Belize's Environmental Research Institute (ERI), who noted that participants showed great improvement during the course of the training.

Figure 5: MoSI Sites in PCNP



Source: *Institute for Bird Populations*¹

More advanced training in Bird Banding was provided to Mr. Liberato Pop and Mr. Junalio Ical (TPPL ranger), who attended training sessions at TREES Belize. The ultimate goal is that TIDE personnel have the capacity to operate the MoSI sites independently. In 2020, Mr. Pop will participate in more training sessions at Cockscomb Basin Wildlife Sanctuary with Ms. Ash, to improve his knowledge and skills in molting and aging. Mr. Pop will then transfer that capacity to other TIDE rangers, so that the MoSI sites can become operational.

¹ <https://www.birdpop.org/pages/mosiMap.php>

2.2. ADMINISTRATION

2.2.1. STAFF APPOINTMENTS

In March 2019, TIDE recruited a new ranger to join the PCNP team. From a shortlist of four qualified applicants, Mr. Liberato Pop from Bladen Village was selected due to his suitability for the role. Mr. Pop has previous experience in bird monitoring, fire effects monitoring, and is one of the burn bosses trained under the Darwin Project implemented by TIDE and the Belize Forest Department two years ago. Mr. Pop is proving to be a valuable member of the PCNP team.

2.2.2. MEETINGS AND REPORTING

On a monthly basis, SMART data was submitted to TIDE personnel at the main office, where it is stored and used to produce reports as necessary.

On a bi-monthly basis, TIDE's Terrestrial Manager attended TIDE management meetings, where the management team is updated on projects being implemented at protected areas. These meetings are a good opportunity to discuss where resources can be pooled to effectively and efficiently implement the different projects across sites. As required, the Terrestrial Manager also attended project review meetings, where the team met to look at updates for the different projects being implemented. These project meetings assisted with the smooth implementation of activities, and in generating reports for donors.

On a quarterly basis, TIDE's Terrestrial Manager and park staff produced quarterly reports that were submitted to TIDE's Board of Directors, to update them on projects and project activities being implemented in the park.

2.2.3. HURRICANE PREPAREDNESS

PCNP staff completed their annual review and revision of the park's Hurricane Preparedness Plan, and submitted changes to management, for inclusion in the organization's Hurricane Preparedness Plan for the 2019 hurricane season. It is important that this plan continues to be revised annually, since there are ongoing developments and changes at the station that need to be taken into account.

2.3. FINANCIAL SUSTAINABILITY INITIATIVES

The financial sustainability of TIDE is something that staff at PCNP are committed to contributing to. It is becoming more and more important for institutions to become less reliant on external sources of funding, and to generate internal funding that is more sustainable in the long term. In 2019, PCNP staff contributed to two of TIDE's financial sustainability mechanisms.

2.3.1. TIDE TOURS/RIDGE TO REEF EXPEDITIONS

TIDE's Ridge to Reef Expeditions program (R2R) was launched in 2014, and is the educational programs arm of TIDE Tours. The program seeks to engage students and travelers in meaningful, purposeful travel and learning opportunities that provide tangible contributions to the areas visited. PCNP rangers assist R2R groups and the TIDE Tours Manager when these groups spend time in the park. The PCNP team assists in site operations and preparations, such as transporting cooks and food supplies to the station prior to the group's arrival. Once at the station, PCNP staff engage with the groups, by giving presentations and leading fieldwork activities such as yellow-headed parrot roost counts.

In 2019, a new partnership between TIDE and Ecology Project International (EPI) meant that more groups were hosted at PCNP than ever before. PCNP staff remain committed to supporting TIDE's financial sustainability program through hosting educational groups at the station.

More information on visitation to the park can be found in Section 3.1.

2.3.2. FIRE MANAGEMENT CONSULTANCIES

TIDE's fire management personnel are regarded as the leaders in fire management in Belize. The team conducts training activities through projects, but also offers training services through national fire management consultancies. In 2019, the team lead training exercises through three such consultancies.

More information on these consultancies can be found in section 5.3.2.

2.4. NETWORKING

2.4.1. NETWORKING WITHIN TIDE

As detailed in section 2.2.2., regular communication between PCNP staff and TIDE's management staff is critical in ensuring successful operations. It is equally important for staff from TIDE's three protected areas to also engage in regular communication and opportunities for knowledge exchange.

Throughout 2019, PCNP supported the other two parks, and received support in return, at times when assistance was required. Assistance is provided for patrols and surveillance, boundary line maintenance, research and monitoring, education and outreach, and riparian reforestation, amongst other activities. The time spent at other sites is beneficial to the entire ranger team, as staff are able to better familiarize themselves with all three protected areas, build healthy working relationships with the staff and communities that buffer the different areas, and allow a deeper understanding and appreciation for the work being done across TIDE's protected areas.

2.4.2 ADVISORY COUNCIL MEETINGS

Payne's Creek National Park Management Committee and the Port Honduras Marine Reserve (PHMR) Advisory Council have merged to form one group to advise TIDE on the ongoing management of both PCNP and PHMR. In 2019, the committee intended to hold three meetings, however due to the busy schedules of committee members, a date for the third meeting was not set. During the two meetings that did take place, committee members discussed the implementation of projects and overall management at both sites. These meetings help in keeping key stakeholders engaged in the management of these areas, and meetings are an opportunity for information sharing and development of new ideas.

2.4.3 SOUTHERN BELIZE FIRE WORKING GROUP

The Southern Belize Fire Working Group (SBFWG) held three meetings in 2019. The primary purpose of these meetings was to look at plans for the upcoming fire season, determine where prescribed burns were needed, and identify training needs.

During the meetings, all members expressed the need to conduct prescribed burns in their respective sites, and for staff training. The committee also discussed the development of a strategic plan for the SBFWG with assistance from the Selva Maya Project (SMP). This is still under discussion at the SMP desk in the Belize Forest Department (BFD), and the committee is hopeful that funding may be available to develop the strategic plan in 2020.

A representative from the Key Biodiversity Areas (KBA) project, a project being implemented by the BFD, attended one of the SBFWG meetings in 2019. During that meeting, members discussed the possibility of supplying three PCNP buffer communities with fire brigade equipment. The three communities selected were Trio, Bladen and Medina Bank, as these villages are well positioned to make good use of the equipment. Unfortunately, the equipment purchased never reached the intended communities due to the project coming to an end before this was possible, and equipment were handed over to the BFD, where they currently remain. The SBFWG leader is working with the newly appointed Fire Management Liaison Officer in the BFD to identify a legal way to redistribute these equipment to the communities.

At the third meeting which was held in November, BFD personnel requested the assistance of TIDE's fire management experts to assess some areas for prescribed burning in the Mountain Pine Ridge (MPR). Assistance was also sought to provide training to BFD personnel. PCNP fire management staff visited MPR in December of 2019 to look at potential sites for prescribed burns, and dates for the training exercise were also discussed.

2.4.4 BELIZE FOREST DEPARTMENT AND PARTNERS

As co-managers of PCNP, TIDE and the Belize Forest Department (BFD) are in continuous communication regarding the management of the park. In addition to this direct communication, there is a large network of partners that are supported by the BFD, and with whom TIDE networks across its range of programs.

2.4.3.1 REDD+ WORKSHOPS

In April 2019, TIDE's Protected Areas Manager represented TIDE at the presentation of Belize's draft REDD+ Strategy in San Ignacio. Information presented included;

- REDD+ Readiness Preparation Project
- Draft REDD+ communications strategy
- Stakeholders engagement and concerns
- Forest Department Strategic Plan 2019-2023
- Monitoring, reporting and verification system for REDD+
- Outcomes from forest reference levels and the Drivers of Deforestation and Forest Degradation
- Draft REDD+ Strategy and Next Steps under the readiness Project.

TIDE's Protected Area Manager also attended the second session of this series, which was held in June 2019 at the same venue. This second meeting focused on the Social, Environmental Strategic Assessment (SESA), and presentations and working sessions was held to engage attendees and generate their input to enrich Belize's SESA process. Presentations during this session included REDD+ and Safeguards, SESA Work plan, and next steps for the SESA process. These sessions were very informative and provided TIDE with a better understanding of

REDD+ and what Belize as a country needs to implement to accomplish the goals and objectives. TIDE will continue to support the development and implementation of REDD+ in 2020, with the collective goal of conserving and managing Belize's forests so they can continue to provide the goods and services that the Belizean population depends upon for survival.

2.4.3.2 MORELET'S CROCODILE CONSERVATION AND MANAGEMENT ACTION PLAN MEETING

Three TIDE staff attended a meeting held on June 25th at Belize Ocean Club in Placencia, organized by the Crocodile Research Coalition (CRC), along with support from the BFD. Also in attendance at this meeting was the Belize Audubon Society (BAS) and the Coastal Zone Management Authority & Institute (CZMAI). During the meeting, presentations showed both the survey methods used, and findings of, past and present crocodile monitoring in Belize. Only one area in the country has a long-term monitoring program taking place. Interesting information was shared on the hybridization taking place between the two-species found in Belize, and on the success of the crocodile hunting ban in allowing species recovery. Ideas were discussed on the best way forward to manage the species in Belize, and it was agreed that it is an opportune time for management interventions that will ensure populations do not drop to the levels they were prior to the hunting ban.

2.4.3.3 NATIONAL WILDLAND FIRE WORKING GROUP MEETINGS

Mr. Mario Muschamp, TIDE's Terrestrial Manager and SBFWG Leader, is representing the SBFWG on the National Wildland Fire Working Group (NFWFG) set up by the Belize Forest Department (BFD) as part of the implementation of the National Wildland Fire Management Policy and Strategy. The purpose of the NFWFG is to advise the Minister responsible for Forestry on wildland fire management Issues, standardized capacity building for fire management, and regulations and legislations as it relates to wildland fire management in Belize. Mr. Muschamp attended two meetings in 2019, at which the group discussed the terms of reference for the NFWFG, and looked at ways in which the group can start to collaborate in order to become operational and functioning. Finally, the group discussed fire management needs at the national level.



Figure 6: NFWFG meeting in 2020

3.0. TOURISM

Payne's Creek offers tourists spectacular wildlife experiences in both the lagoon and inland areas, but receives low visitor numbers due to its geographic location in Belize. The Toledo District receives a small number of tourists compared to other destinations, and many use Punta Gorda as a gateway to Guatemala or northern Belize. Currently, there is no visitor fee structure in place to visit the park. One of the most popular activities in PCNP is fly-fishing in the lagoon areas, with fishers returning year after year to catch permit, tarpon, and bonefish in the area.

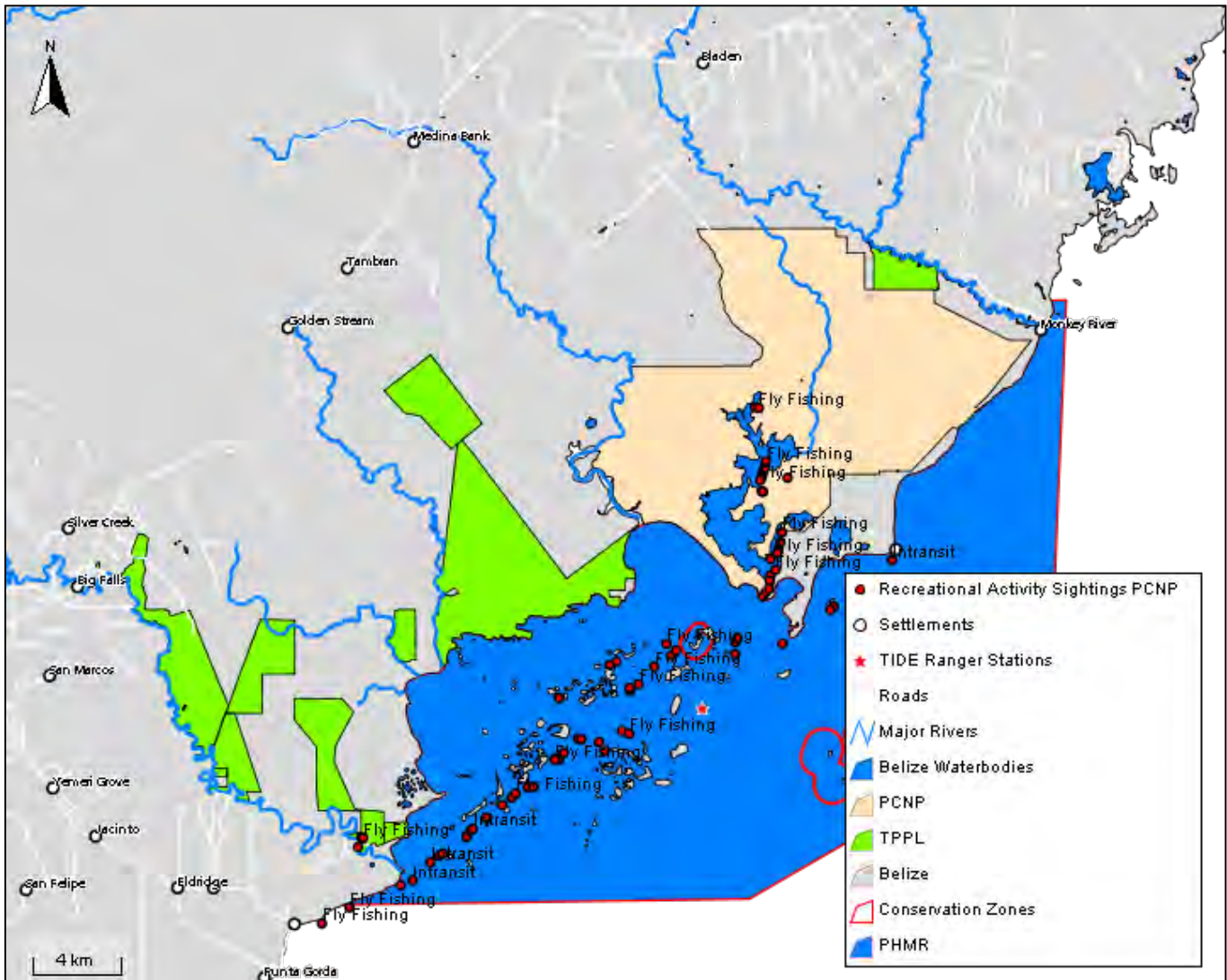
3.1. VISITATION IN 2019

At present, it is challenging to generate accurate data on visitation to PCNP, due to the park's different access points and lack of constant presence at those areas. Some data is collected using the SMART patrol log but this cannot account for all recreational users of the park.

In 2019, rangers recorded a total of 80 recreational boats during 70 encounters, but only 39 of these, with 64 guests, were actually in the park at the time (see Figure 7). The remaining vessels were in transit to or from PCNP when intercepted by TIDE's rangers. Whilst fly-fishing is the primary reason guests visit the park, some also travel from Punta Gorda, Monkey River, and Placencia for manatee watching in the lagoon area.

Overnight guests at the park totaled 86 in 2019, all of whom booked through Ridge to Reef Expeditions/TIDE Tours. This was an increase on previous years, thanks to TIDE's new partnership with Ecology Project International, who sent nine groups of students to the park for educational field tours. PCNP also hosted guests from Discover Corps and POD Volunteer in 2019, international travel companies that TIDE Tours has been working with for a number of years.

Figure 7: Map of tourism vessels within or in transit to/from PCNP in 2019



3.2. UPGRADES TO VISITOR FACILITIES AND INFRASTRUCTURE

With continued increases in overnight visitation to the park, and a desire to attract more day tourists to the park from Punta Gorda, Monkey River, and Placencia, TIDE continues to invest in upgrades to tourism infrastructure.

With funding from the Overbrook Foundation and Mass Audubon, new signs were designed and installed at strategic access points into the park and at the park's main facilities. In addition to welcome signs, signs with information on park rules and regulations were installed (see Figure 8). These signs are already proving popular with visiting groups who take photos in front of the signs, creating a lasting memory of the park.

With more educational visits to the park, TIDE also saw a need to enhance the facilities and create a more engaging learning space in which classes and group discussions could take place. A local artist was hired to develop and create new displays inside the classroom area. These displays include information on the park's wildlife, rules and regulations, and the many recreational activities that are available in the area.

TIDE Tours has recruited two international interns to further assist with tourism development in TIDE's protected areas, who will arrive early in 2020 for a period of six months. Part of their mandate will be to develop a visitor trail system in PCNP.

Figure 8: New signage installed in PCNP



4.0. COMMUNITY ENGAGEMENT

Engagement and development of communities buffering TIDE’s protected areas is a vital in ensuring the long-term sustainability of TIDE’s work. With children and youth being the most influential group in terms of behavioral change, much of TIDE’s Education and Outreach program focusses on youth programs. TIDE also engages communities through development programs, livelihood projects, and capacity building, which seek to reduce the pressure on natural resources from local communities.

4.1. EDUCATION AND OUTREACH

4.1.1 TIDE FRESHWATER CUP PROGRAM

The 2019 TIDE Freshwater Cup (FWC) program was funded by the International Community Foundation & Protected Areas Conservation Trust, and activities focused around the theme “Beat Plastic Pollution”. The program engaged 19 schools from buffer communities around TIDE’s protected areas. Each of these communities have plastics introduced into the local environment via vehicles traveling along highways or by poor waste disposal in the villages. Many of the schools involved are situated along river ways and coastal communities that also contribute to the issue of marine debris and can be key actors to a unified solution.

School children are contributing to a cleaner, brighter future. To properly understand the issue of plastic pollution, TIDE partnered with JIKA and OCEANA to sensitize all 19 schools on plastics, marine litter, and their impacts on the environment. Schools designed and implemented their own projects that tackled this theme. For schools to be eligible to take part in the football completion, completion of these projects was essential.

Figure 9: FWC projects and tournament



4.1.2. TIDE SUMMER CAMP

TIDE continues to engage communities buffering its three protected areas in Summer Camp activities, and in 2019 the camp took place in Punta Gorda, Big Falls, Medina Bank and Monkey River with a total of 105 young stakeholders between the ages of 10 and 13. Medina Bank and Monkey River are both important buffer communities of PCNP, and a total of 59 children took part from those two communities. Volunteer organizers from JIKA and POD Volunteer (through TIDE Tours) helped TIDE's Education & Outreach Coordinator to ensure the camp was a success.



This year's camp focused on the theme, "Be the Solution to Plastic Pollution". During each camp, participants were taught the effects of plastics on marine animals and their long-term impacts on the environment. Activities engaged participants in reducing, recycling, reusing, removing and refusing single use plastics, to create healthy marine and terrestrial ecosystems.

The youth were engaged in fun indoor and outdoor activities that built their self-esteem and knowledge. The participants also had the opportunity to share fun games, and used their creativity to construct and showcase their views on plastic pollution through art pieces. Participants pledged to be keepers and protectors of their environment through plastic free snacks, and will extend this to their families and friends.

Figure 10: TIDE Summer Camp in Monkey River and Medina Bank



4.1.3. MEDIA OUTREACH

4.1.3.1. SOCIAL MEDIA

TIDE's Facebook page is used to share information with the public on a variety of pertinent topics. The PCNP team shared stories and photographs throughout the year to inform the public of activities being carried out within the park (see Figure 11). This is a good way for both the local and international community to learn about the activities being carried out in the park, and their importance.

Figure 11: Selection of PCNP Facebook posts



4.1.3.2. RADIO

On a monthly basis between March and December 2019, The Rising TIDE Talk show aired on Sunshine Raydio 100.9FM, to share TIDE's work with the wider community. The show was hosted by Mr. Federico Caal, TIDE's Education and Outreach Coordinator, and Mr. Allen Genus, TIDE's Program Manager. Each show highlighted a different conservation theme, and was aimed at sharing important information with stakeholders and buffer communities. TIDE's Terrestrial Manager, Mr. Mario Muschamp, featured on the show in April 2019, to discuss the importance of fire management. This was an opportunity to communicate important information on this topic with communities who are not as connected to social media and other sources of information.

Figure 12: The Rising TIDE Talk Show



4.2. COMMUNITY DEVELOPMENT

TIDE continues to work closely with buffer communities to reduce impacts on protected areas by enhancing livelihood opportunities and assisting with developmental programs to increase resiliency.

4.2.1 COASTAL EROSION AND CLIMATE CHANGE

The coastal villages of Monkey River and Punta Negra lie adjacent to PCNP, and have seen devastating loss of land from coastal erosion in recent years.

TIDE continued to support the Monkey River Watershed Association (MRWA) in 2019 by facilitating the attendance of TIDE's Terrestrial Manager, Mr. Mario Muschamp, at the MRWA's meetings, where he serves as the association's president. Mr. Muschamp was able to support the association's activities, which included installing five geo-tubes in Monkey River with other members of the PCNP team. The installation of these geotubes has allowed the beach to grow by 18 feet, protecting residents and properties from future erosion. More geotubes are required to protect the entire village. The MRWA was also able to develop a Roadmap for the Monkey River watershed, to restore its functionality as a conveyor of sediment, nutrients and clean water to the Port Honduras Marine Reserve and adjacent coastlines, which rely on sediments for beach replenishment. Monkey River, with the leadership of the MRWA, has made significant first steps in addressing coastal erosion.

The population in Punta Negra is much smaller, and a community profiling exercise carried out in 2019 revealed that coastal erosion is currently the biggest challenge the village is facing. Residents wish to relocate homes away from the shoreline, further inland, and will be seeking assistance to facilitate this process.

Four meetings were held in 2019 with teachers from the communities, and the output from these meetings was a Local Early Adaptation Plans (LEAP) for each village. The Monkey River LEAP is sufficient at this time, but will need review in around two years' time, whereas the Punta Negra LEAP requires more tangible solutions.

Figure 13: Community documents



4.2.2. SUSTAINABLE LIVELIHOOD DEVELOPMENT

A project chosen through the Power to Grow (PtG) Innovation Challenge, and funded by the World Environment Centre, helped communities in Toledo enhance their small businesses. Four of these groups are located adjacent to PCNP, and had previously received assistance from a Darwin Initiative project implemented by TIDE.

4.2.2.1. MEDINA BANK

Adventures in the Last Corridor is a community group in Medina Bank who offer tourism products such as river tubing, village tours, and traditional cuisine. Through the PtG program, the group received tools to start a gardening project, to home grow foods that can be served to guests. Unfortunately, the drought in 2019 meant that the first crops planted failed, but the group was still able to benefit from training opportunities provided through the year which will help them to continue improving their tourism services and business.

4.2.2.2. SAN ISIDRO

The San Isidro Farming Agroforestry Association (SIFAA) demonstrated excellent engagement in the PtG program, and received materials to establish a cacao nursery and to prepare 10 acres of land for their cacao farm. Whilst the first harvest will not be for at least three years, the group remained engaged in the program, and trainings provided. SIFAA has plans to expand the program and engage more farmers from the community.

The Xibe Women's Group received training to assist them in the promotion of their small restaurant. During the PtG project timeframe, the restaurant ceased operations, but the group members attended the trainings and have shifted focus into making crafts products to sell to the tourist market.

4.2.2.3. BLADEN

United Hands is a farming association and were to be engaged in the cacao nursery project alongside SIFAA. The group was very engaged at the start of the PtG project, but unfortunately the untimely death of the association's leader led to the group becoming disengaged. TIDE intends to reengage United Hands through future projects.

Figure 14: Community livelihood programs



5.0. FIRE MANAGEMENT

Under TIDE's Natural Resource Management, the PCNP team continues to lead the way in fire management in Belize. With new research leading adaptive management, TIDE is improving resilience and reducing impacts of wildfire in PCNP.

5.1 INTEGRATED FIRE MANAGEMENT

Integrated Fire Management is a management tool used in the management of fire dependent ecosystems across the world, and in the park's largest and fire dependent ecosystem, its pine savannas. It is a tool that brings together all stakeholders and incorporates local knowledge, science and technology, to conduct safe fire operations.

5.1.1 PRESCRIBED BURNS

Prescribed burns for the 2019 fire season were done in February as part of the Fire Suppression training done with The Nature Conservancy, and with assistance of students from the University of Belize's Environmental Research Institute (UB/ERI).

Prescribed burn plans for five units in Deep River Forest Reserve were developed and submitted to the Belize Forest Department (BFD) for approval; which were granted by Mr. Lisbey. The five units, which were in the concession held by Thomas Gomes and Sons, and covered approximately 4,000 acres, were burnt to meet the desired management objectives. The burns were carried out by experienced burn bosses and members of the Southern Belize Fire Working Group (SBFWG).

5.1.2 WILDFIRE SUPPRESSION

It is believed that 2019 was the busiest year for wildfires in the Maya Mountain Marine Corridor (MMMC) since 2007, with wildfires in Swasey Bladen Forest Reserve (SBFR), Deep River Forest Reserve (DRFR) and PCNP.

Wildfires were observed in SRFR from January through May, burning almost the entire pine savannah of the reserve. In DRFR, wildfires occurred from February to May, burning approximately 5000 acres. Fortunately, in DRFR all the fires were started late in the afternoon, and went out during the night. In PCNP there were four wildfires started by hunters accessing the area via Deep River and Monkey River. These hunters were burning grassland on the eastern banks of Deep River, and burnt approximately 2500 acres of pine savannah and 550 acres of the wetlands in the eastern section of the park. PCNP park staff, with assistance from Thomas Gomez and Sons Lumber Limited and Rangers from TIDE Private Protected Lands, were able to contain the fires to limit their extent and damage.

5.2 FIRE EFFECTS MONITORING

In February 2019, PCNP hosted students from UB/ERI to benefit from their assistance with fire effects monitoring. The students were trained in the new methodology using permanent sample plots, and conducted data collection at eight permanent sample plots. The new pine and palmetto monitoring protocol was developed under the Darwin Initiative project. TIDE's remaining six plots were surveyed by park staff at later date with assistance from Ms. Fanny Tricone, a volunteer biologist at TIDE, and Mr. Liberato Pop, a community researcher from Bladen Village. Data collected using the newly developed protocol is already revealing that an increased number of lower intensity burns are required in order to achieve pine regeneration in areas currently dominated by open grassland. Moving forward, more burns in the wet season will help to achieve this objective.

Park staff also assisted in research that commenced in 2019 by a PhD student from the University of Florida. The research will focus primarily on the ground cover of grasses, but will also investigate pine seed fertility and competition on the forest floor, to determine what conditions are required for pine seedlings to establish successfully. This research is ongoing and will continue in 2020.

5.3. FIRE TRAINING

5.3.1. SOUTHERN BELIZE FIRE WORKING GROUP TRAINING

TIDE's Terrestrial Manager, Mr. Mario Muschamp, who is also the leader of the SBFWG, lead a Basic Fire Training course to six SBFWG members on February 22nd & 23rd 2019. The course included classroom and field practical sessions, that built the capacity of the group members to continue to address fire issues in the MMMC. Furthermore, it increased the number of trained fire management personnel in Southern Belize that can be made available to assist with fire management at the national Level.

5.3.2. FIRE MANAGEMENT CONSULTANCIES

TIDE's terrestrial team, lead by Mr. Mario Muschamp, are considered experts in fire management in Belize. Their expertise is valuable in assisting other teams nationally in learning and mastering best practices. The team therefore leads fire management training on a consultancy basis, which helps national resource protection benefits and also contributes to TIDE's Financial Sustainability program (See section 2.3.2.).

5.3.2.1. THE NATURE CONSERVANCY CONSULTANCY

TIDE's fire management team were instrumental in hosting and providing guidance to 16 firefighters from The Nature Conservancy (TNC) from the United States, in February 2019. The exercise aimed to provide fire suppression training that would enable the fire fighters to increase their professional ranking. All participants were able to complete the required tasks and achieve their next rank. Simultaneously, TIDE's team were able to expand their knowledge and skills from the visiting firefighters, such as an improved ability to analyze a burning

fire, better understanding of the Incident Command System, and air operations during a fire. Overall, the TIDE fire management team found this to be an extremely special training and exchange opportunity, and were proud to have been part of it. Discussions are taking place to organize another session in 2020.

Figure 15: TNC fire training



5.3.2.2. KEY BIODIVERSITY AREAS PROJECT CONSULTANCY

In March 2019 TIDE’s fire management team conducted a training in basic fire management to community residents from the Belize River Valley Area and staff from the Belize Forest Department based in Mountain Pine Ridge. The training was funded by the Key Biodiversity Areas Project (KBA), and built the capacity of participants to address fire issues in those areas in a safe and effective manner. The training included background information on the purpose of fire as a management tool, basic fire behavior concepts, fire weather and wildland fires, fire breaks and ignition techniques, contingencies, safety and suppression techniques, and managing the burn. In addition to classroom sessions, participants learned fire planning, and then conducted a practical fire management and suppression exercise in the field.

Figure 16: KBA Fire Training



5.3.2.3. MONKEY BAY WILDLIFE SANCTUARY CONSULTANCY

In December 2019 TIDE’s fire management team conducted a training in basic fire management at Monkey Bay Wildlife Sanctuary. The training covered the same topics and practical exercises carried out during the KBA training in March (see section 5.3.2.1.). It also included some basic fire effects monitoring training, and the team established two permanent sample plots so that fire effects monitoring can commence at the sanctuary.

Figure 17: Monkey Bay Wildlife Sanctuary fire training



5.4 FIRE AWARENESS

In April 2019, Mr. Mario Muschamp, TIDE’s Terrestrial Manager, appeared on Sunshine Radio in the Toledo District as a special guest on one of TIDE’s monthly segments. During the broadcast, information was shared on the importance of managing fires, which particularly focused on farmers who use fire as a tool for clearing land for farming. Listeners were informed of safe practices and the laws pertaining to agricultural fires. For more information, see section 4.1.3.2.

6.0. RESEARCH AND MONITORING

Payne's Creek is home to many important and endangered species, and the PCNP team carries out research and monitoring throughout the year and with the help of different partners in Belize.

6.1 BIODIVERSITY MONITORING

In 2019, the PCNP team collected data on biodiversity in two main ways. Species recorded through this monitoring are generally mammals and large marine species.

6.1.1. CAMERA TRAPS

Biodiversity monitoring using camera traps continued in 2019, completing the assessment of the first four camera trapping sites in the broadleaf forest of the park. Cameras were at these sites for 3 months and collected valuable data to assist us with establishing baseline for Jaguar and jaguar prey. Jaguars were captured on camera at all four of the sites assessed to date. Moving forward, additional sites in the park will be chosen for camera trapping sites until the entire area is assessed.

Figure 18: Camera trap sightings



6.1.2. BIODIVERSITY RECORDING THROUGH SMART

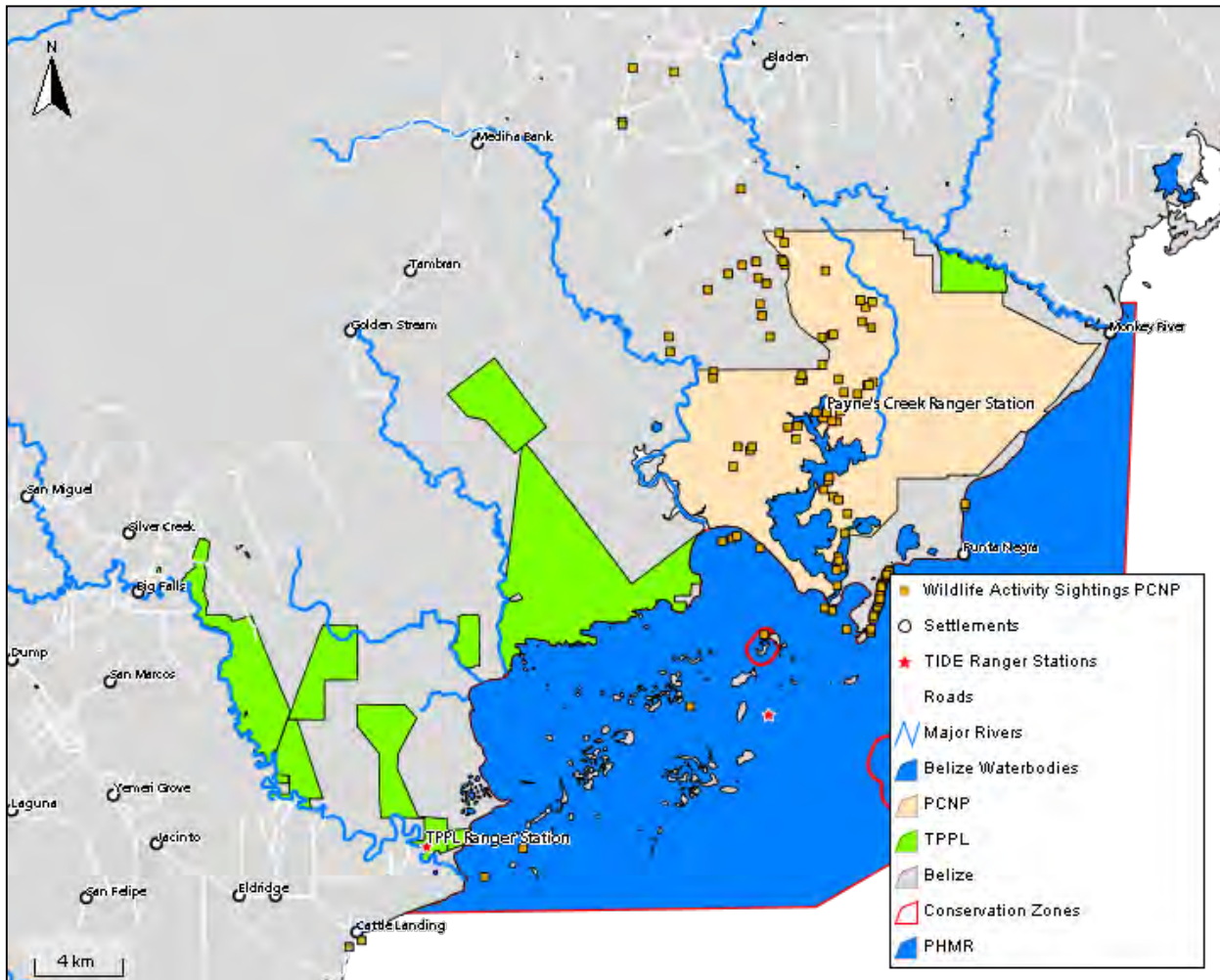
To maximize benefits from their movements during patrols, PCNP rangers also use SMART technology to record wildlife sighted during all patrols. Table 2 shows a summary of these sightings for 2019:

Table 2: Wildlife sightings recorded using SMART

Species	Number of encounters in 2019	Number of individuals sighted in 2019
West-Indian Manatee	22	25
Bottlenose Dolphin	7	28
Yellow Headed parrot (# active nests)	33	33 (active nests)
Hawksbill turtle	32	32
White tailed deer	7	8
Grey fox	3	3
Bat Falcon	1	2
Jaguar	2	2
Armadillo	1	1

The location of encounters recorded in Table 2 are shown in Figure 19. Note that some sightings are recorded outside of the PCNP boundary.

Figure 19: Map of wildlife recorded using SMART



6.2. YELLOW-HEADED PARROTS

Yellow-headed parrots (YHP) are one of the park's most charismatic species, and PCNP is considered a stronghold for the species in Belize and the wider region. TIDE's terrestrial team have been influential in their population increase in the park over the last few years, through ongoing protection measures and monitoring.

6.2.1 YELLOW-HEADED PARROT NEST MONITORING

The TIDE team works alongside national partners for annual YHP nest monitoring. In 2019 monitoring efforts were divided between two teams from Belize Bird Conservancy (BBC), with the YHP Protect Team Leader, Mr. Luis Mai, overseeing field efforts for Northern and Central Belize, and Project Coordinator, Mr. Jamal Andrewin-Bohn, leading the efforts in Southern Belize. Each was assisted in by field technicians Mr. Archie Mai and Mr. Giovanni Quiroz, respectively.

The 2019 monitoring season for the YHP officially began on April 1st, however the teams were able to build on some preliminary assessments conducted in mid-March with the assistance of former Project Coordinator, Mr. Fabio Tarazona. Initial visits to known nests in the different focal areas demonstrated promising activity around the nests by adult parrots; both nest preparation and, in some instances, egg incubation was already underway.

The focal areas included the Rio Bravo Conservation & Management Area (RBCMA) in Northern Belize; The Belize Zoo & Tropical Education Center (TBZ) and neighboring properties in Central Belize; and Payne's Creek National Park and Deep River Forest Reserve (PCNP & DRFR) in Southern Belize. All previously known viable nests were visited at the onset of the monitoring season, and many were found to be inactive despite being in good condition. A total of 72 active nests were recorded countrywide in 2019. Of these 72, 37 active nests were found within PCNP & DRFR. The number of chicks in each nest can be seen in Figure 20.

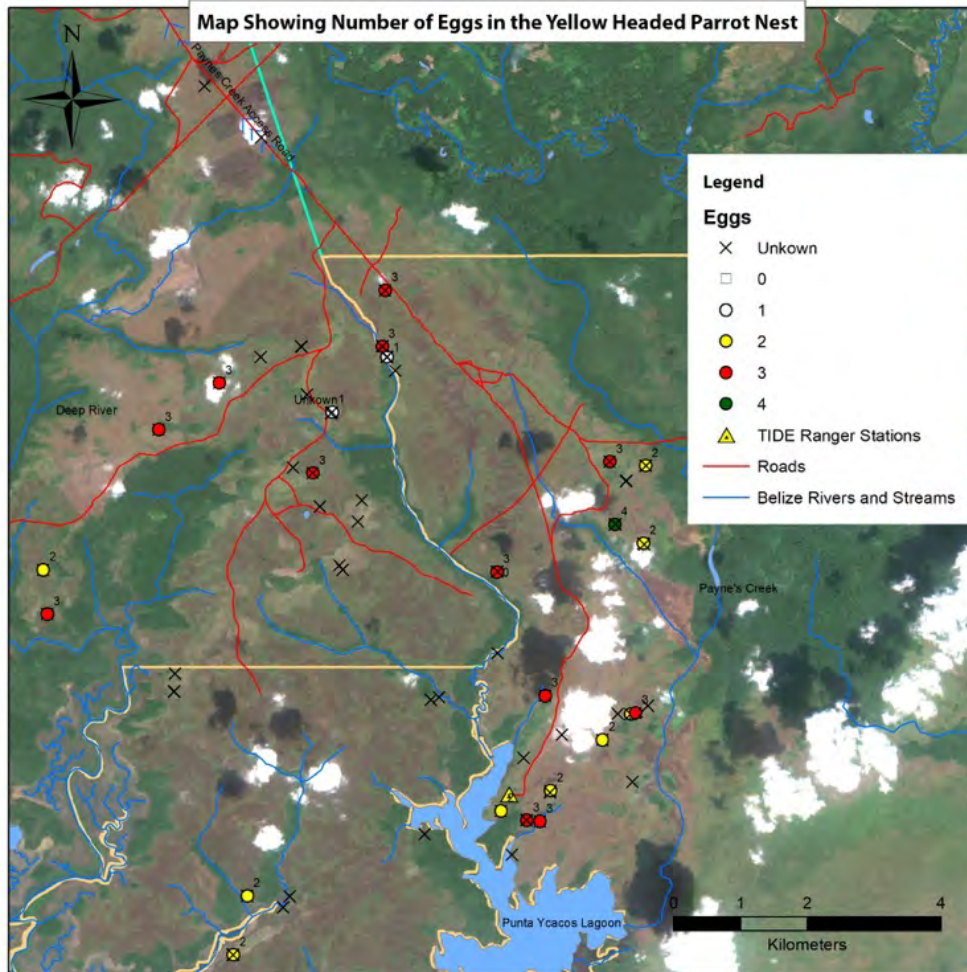
A total of 17 chicks were extracted for the 2019 season from PCNP & DRFR. High poaching risk, or overcrowding in nests (nests with more than two chicks) were reasons for extraction, and done with the recommendation and approval of TIDE's Terrestrial Manager. All chicks were taken to Belize Bird Rescue (BBR) for captive rearing.

Predation was prevalent in PCNP and DRFR, being identified by evidence of feathers and other remnants, and accounted for nest failure in nine nests. Predators of the YHP include owls, hawks, falcons, snakes and iguanas, all of which have been noted in the areas. Abandonment was also recorded in four instances.

Only three incidents of poaching were reported in the area this year. However, the nests that were targeted were much deeper into PCNP than previously noted, which gives cause for concern. In one particular instance on May 28th, the BBC field team encountered the poachers in the act of stealing a chick, after having torn down the nest box. The chick was saved, although the poachers managed to flee the scene. After consultation with TIDE's Terrestrial Manager, the nest box was restored to the respective tree, the chick was returned to the box, and patrols were increased. Due to the chick's advanced age, it was decided that it was not necessary to remove

it for captive rearing. Two days later, the chick fledged and joined its parents, validating the decision to keep it in-situ.

Figure 20: YHP nest locations and egg abundance



As in previous years, the earliest fledgling of the season was from a nest in PCNP; the chicks in Nest Box 28 fledged during the health checks in mid-May. A total of 29 chicks naturally fledged from PCNP & DRFR for 2019, accounting for 60% of the total fledglings monitored countrywide this season. The number of chicks fledging in the area has increased annually since 2017.

Table 3 shows a comparison of YHP data from 2017 – 2019. There has been a consistent increase in the number of active nests each year, and the number of chicks that fledge. Poaching is lower than in 2017 but still occurred at three nests in 2019, so ranger presence in these areas during nesting is critical.

Table 3: YHP nest monitoring data 2107 - 2019

	2017 ²	2018	2019
Number of nests	25	31	37
Number of eggs	52	83	93
Number hatched	39	43	66
Number of chicks fledged	14	21	29
Number of chicks extracted	7	23	17
Number of nests poached	5	2	3
Percent of nest success	32%	32%	43%
Percent of nests predated	24%	32%	24%
Percent of nests abandoned	4%	6%	10%
Percent of nests extracted	20%	23%	13%
Percent of nests poached	20%	6%	8%

Figure 21: YHP nest checks



² Note that in 2017 data included PCNP and DRFR. From 2018, it also includes areas of Bladen Nature Reserve and Swasey Bladen Nature Reserve

6.2.2. REINTRODUCTION OF EXTRACTED CHICKS

Each year, TIDE's terrestrial team extract chicks from nests where they are either at risk from poaching, or where the nest is too crowded and survival of all chicks is unlikely. These chicks are transported to Belize Bird Rescue (BBR) where they are reared in preparation for later release.

In May 2019, 23 parrots were re-introduced into the wild population in PCNP. These were chicks that were extracted during the 2018 nesting season and reared at BBR. These parrots were brought to PCNP in two groups and housed in a soft release enclosure. TIDE staff fed the returned parrots daily with assistance from BBC partners. After ten days, the soft release enclosure was opened to allow the first group to exit and slowly integrate into the wild population in PCNP. The second group was transported to TIDE immediately after and underwent the same process. Their re-introduction was successful overall, particularly when their interactions with the wild parrots in the area were noted.

Figure 22: Release of YHP into PCNP



6.2.3. CHICK HEALTH ASSESSMENT

Health checks were conducted on chicks in May with assistance from a vet from Belize Bird Rescue. All chicks were found to be in excellent condition, except two chicks in nest box 55 that were damaged. It is believed they suffered injury from a predator trying to capture them. The two chicks were extracted from the nest and taken to BBR for treatment, and will be released back into the wild population in 2020 if fully recovered.



Figure 23: Chick health checks

6.3. CHRISTMAS BIRD COUNT FOR THE PUNTA GORDA CIRCUIT

TIDE's terrestrial protected areas staff participated in the annual Christmas Bird Count for the Punta Gorda Circuit, which was held on January 4th 2019. The team was stationed on the Rio Grande River, where a total of 152 species were recorded. That was the same number of species found in the 2018 count.

6.4 AMERICAN CROCODILE RELEASE

In conjunction with the Crocodile Research Coalition (CRC) and Belize Forest Department, park staff assisted with the release of the first tagged adult female American Crocodile in the region. The crocodile was fitted with a satellite tracker to assess rehabilitation success and examine basic ecology and dispersal at PCNP. The release took place on 17th January, and the tracker was transmitting for several weeks before the signal was lost. During that time, the tracker indicated that the crocodile was moving in and out of Payne's Creek Lagoon and going up Deep River, before finally settling in the Y'cacos lagoon area of PCNP, where the tracker stopped transmitting. CRC hopes to visit PCNP again to see if the crocodile can be located and recaptured, to check her health and determine why the tracker stopped transmitting.

6.5 SEA TURTLE NEST MONITORING

Payne's Creek staff were able to assist TIDE's marine research team with conducting monitoring of marine turtle nests on the coastline beaches of the Port Honduras Marine Reserve (PHMR) in Punta Negra and Punta Y'cacos. In total, the team located 25 nests during the monitoring period; 23 on the beach of Punta Y'cacos and two in Punta Negra. Unfortunately, the team were unable to go back to monitor nest success at the scheduled time of hatching. Location of nests was recorded using SMART and can be seen in Figure 19.

7.0. INFRASTRUCTURE MANAGEMENT

Maintenance of infrastructure and equipment at PCNP is an ongoing and critical component of the work carried out by the team.

7.1. MAINTENANCE OF PARK'S INFRASTRUCTURE, SOLAR SYSTEM AND GROUNDS

The TIDE station in PCNP consists of a main ranger station housing, kitchen and dining area, guest bunkhouse with bathrooms, guest cabanas, separate bathroom facilities, storage area, wharf, well and water system, solar system, and surrounding grounds. Park staff are responsible for the maintenance of these facilities to ensure that the station functions at peak efficiency and is always clean for visitors. Minor repairs, such as replacing broken screens, fixing water leaks, and servicing the water pump and solar system are done by the park staff. Regular monitoring of facilities such as checking for water leaks is essential. The station relies upon reliable water and solar supply in order to carry out daily tasks.

During 2019 and with assistance from local contractors, repairs were carried out on the ranger station, bunk house, and cabanas. The kitchen and dining area was extended to accommodate larger visiting groups.

During fire season, the team is vigilant in cleaning the grounds around the facilities and water tower, to protect them from fire damage in the event of a wildfire or during prescribed burn operations.

7.2. MAINTENANCE OF PATROL VESSEL

The PCNP team relies upon marine transportation for patrols and to access areas outside of the park. To ensure that patrols could be carried out as planned, regular maintenance of the patrol vessel's outboard engine was done based on manufacturers' guidelines. This includes routine activities such as engine oil and filter change, gear oil change, and spark plug maintenance. Additionally, the vessel is regularly cleaned ensuring its readiness for water based patrols and other activities such as assisting with research and monitoring or facilitating guest visits to the park.

8.0 FINANCIAL REPORT

Table 4 shows TIDE's income and expenditure report for PCNP between January – December 2019.

Table 4: PCNP Financial Report 2019

Ordinary Income/Expense	BZD	
4001 · Grants	\$200,000.00	
4004 · Other Income	\$0	
Total Income	\$200,000.00	
Expense	\$0	
3001 · Equipment	\$3,587.87	
5001 · Salaries/Wages & Benefits	\$104,360.27	
5002 · Travel & Transportation	\$157.75	
5003 · Cleaning & Sanitation	\$486.28	
5004 · Donations	\$286.47	
5006 · Insurance, Licensing & Permits	\$6,197.84	
5007 · Postage & Delivery	\$451.04	
5008 · Professional Fees	\$2,812.50	
5009 · Public Awareness & Env. Ed.	\$4,128.33	
5010 · Repairs and Maintenance	\$15,431.54	
5011 · Supplies	\$8,682.47	
5012 · Training	\$6,285.09	
5014 · Board/Advisory Board Expense	\$1,754.47	
5015 · Utilities	\$1,007.58	
5016 · Telephone, Comm. & Internet	\$2,072.57	
5017 · Bank Charges	\$2,484.05	
5019 · Reserves & Parks Improvement	\$2,477.12	
5020 · Net Working	\$1,617.99	
5025 · Institutional Strengthening &	\$398.15	
5026 · Research & Monitoring	\$3,196.77	
5035 · Surveillance, Patrol & Enforce	\$31,260.12	
5037 · Community Development	\$124.00	
Total Expense	\$199,260.27	
Net Ordinary Surplus	\$739.73	
Net Income	Surplus	\$739.73