

Darwin Initiative Main and Post Project Annual Report

To be completed with reference to the “Writing a Darwin Report” guidance: (<http://www.darwininitiative.org.uk/resources-for-projects/reporting-forms>). It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

Submission Deadline: 30th April 2020

Darwin Project Information

Project reference	23-104 ref 3206
Project title	Improving livestock management for economic-environmental stability in Mesoamerica’s Mosquitia
Territory(ies)	Nicaragua, Honduras
Lead organisation	Wildlife Conservation Society
Partner institutions	The National University of Agriculture, Honduras during the initial project period.
Grant value	£299,700
Start/end dates of project	1 April 2016 – 31 October 2020
Reporting period (e.g. Apr 2019-Mar 2020) and number (e.g. Annual Report 1, 2)	1 April 2019 – 31 March 2020 Annual Report 4
Project Leader name	John Polisar
Project website/blog/social media	
Report author(s) and date	John Polisar

1. Project summary

Spanning 22,568km² the bi-national “Heart of the Mesoamerican Biological Corridor” of Nicaragua and Honduras is the second largest wild area in Central America, harbouring intact forests, high biological diversity, and regionally at-risk wildlife including jaguar, harpy eagle, green and scarlet macaw, white-lipped peccary, and migratory birds. This remote area is occupied by indigenous groups (Miskitu, Mayangna, Tawahka, and Pech) and ladino settlers whose subsistence lifestyle has been transitioning into the cash economy and increasingly involves domestic livestock. While much of the area’s difficult mountainous terrain is still wild, this complex of protected areas and indigenous territories has experienced increasingly rapid forest loss (the highest in Central America) and forest degradation due to unsustainable cattle ranching. Deforestation for low-productivity pastures is the region’s primary threat to biological diversity. Poverty and malnutrition create incentives for raising cattle. However, malnourished and weak cattle do not optimally alleviate poverty and poor cattle management is a threat to the environment. Recognizing the desire and right of local people to raise beef and dairy cattle for local consumption and even sale in sections of protected areas where it’s permitted, we aim to improve livestock management and production, including silvopastoral systems, improved pastures, and better animal health, directly linked to forest, wildlife, and biological diversity conservation through conservation agreements. We partner with territories that are sincerely

interested in ecosystem conservation, providing technical expertise in environmentally responsible and productive livestock management techniques, and developing conservation agreements. This project intends to reduce deforestation in specific project areas, maintain existing wild forest blocks, and help communities elevate their standard of living while protecting biodiversity and conserving the ecosystems they inhabit.

The primary project areas are communities along main rivers of Nicaragua and Honduras. This includes 15 communities along the Coco, Bocay, Amak, and Lakus rivers in Nicaragua's Bosawas Biosphere Reserve, and 5 communities along the Rio Patuca in the Tawahka Asangni and Rio Platano Biosphere Reserves in Honduras, for a total of 20. These areas are centrally located in the map that constitutes Figure 1. This project concludes October 31, 2020.



Figure 1. Map of project location.

2. Project partnerships

The project area in Nicaragua lies in the Bosawas Biosphere Reserve, where we have been working closely with the Territorial Indigenous Government (GTI) of the Region of the Upper Rio Coco and Bocay (Region Especial de Alto Wangki Bocay), which is comprised of three separate indigenous territories, Mayangna Sauni Bu (MSB), Kipla Sait Tasbaika (KST), and Miskitu Indian Tasbaika Kum (MITK). We also work with the environmental protection arm of the Nicaraguan military (the Batallón Ecologico) and National Police in territorial patrols. We originally planned to work through the Nicaraguan National University of Agriculture, but found it more efficient to work directly with the territories. Our activities and progress in Nicaragua have been planned and executed in collaboration with the three indigenous territories, with the Presidents of the GTIs and the individual farmers, and this project includes indigenous field coordinators and parabiologists, some of whom we have worked with for 14 years. The territories are intrinsically linked with project execution, and communication with them occurs nearly every month. Effective SMART-based patrols in Nicaragua's Bosawas Biosphere Reserve enabled the recuperation of core habitat from more than 45 illegal invaders, seizure of weapons and equipment, including chainsaws and machetes, protection of approximately 800 km² of titled Indigenous territories in a key refuge and source site for endangered species, and making an important step towards securing critical bi-national connectivity.

In Honduras, our formal partner was the National Agricultural University (UNAG) until mid-way during this year. Administrative delays within the university (some up to 6-8 months) meant that we had to switch to direct execution by our own rapidly strengthening institutional and administrative presence in Honduras. We alerted Darwin to this transition and the change request was approved. The Project Leader and wider WCS Nicaragua-Honduras team spent significant time in the capital city to advancing administrative, financial, and political foundations, as well as in the project site, advancing partnerships, field research, and other activities to ensure successful project execution. We are linked with the Federación Indígena Tawahka of Honduras (FITH) based in the community of Krausirpe in the Tawahka Asangni Biosphere Reserve, a ladino community in Nueva Esperanza, Miskitu farmers in Tukrun and Kurhpa, and a Miskitu cattlemen's association in Wampusirpe. The latter three areas are within the Miskitu territorial council Butuka Awayala Mayaralwi Idianka Asla Takanka (Organización de los Indígenas de Patuca Medio/Middle Patuca Indigenous Organization – BAKINASTA) and in and near the Rio Platano Biosphere Reserve.

During Year 4 we were in close coordination with Institute of Forest, Protected Area and Wildlife Conservation (ICF) staff that oversee the section of the Rio Platano Biosphere Reserve in which the project is located. WCS staff conducted additional meetings with key actors, such as ICF field personnel, FITH leadership, and leaders of the regional Miskitu indigenous organization Miskitu Asla Takanka (MASTA), which is the umbrella Miskitu political organization within which BAKINASTA falls – to discuss conservation issues in the project area. Thus far, we have not engaged directly with the Network of Management of Broadleaf Forests/Red de Manejo de Bosques Latifoliada de Honduras (REMBLAH). Execution took place primarily first through a linkage of UNAG faculty, alumni technicians (some are indigenous youth from the project area) and local community members; and then was led by the rapidly growing WCS Honduras program (that works with the same network and has also expanded integration with local and national institutions).

Our initial partner in Honduras, UNAG had~ 20 years of experience in the Honduran Mosquitia and provided satisfactory links with communities, and, field capacity for execution, but also had recurrent external and internal challenges. There were a series of delays in the first three years, due to student strikes and national turbulence associated with a contested election, among other issues, which resulted in administrative and field delays. In Year 4, these delays continued without societal turbulence, and it became obvious we needed greater agility to execute on our own. We had incorporated personnel with deep experience in the project area, which has facilitated the transition. We are grateful to Darwin for the approval of: 1) that transition which is explained in Half Year Report 4 (HYR4) and accompanied by Change Request Form #6 (CRF#6); and 2) since this required considerable catch up, and the COVID19 crisis froze travel in Honduras in March 2020, the approval of the no-cost extension until October 31 (CRF#7) to enable us to effectively and adequately complete the proposed tasks. In addition to the above institutions, personnel from the Pan American School of Agriculture

Zamorano, the National Autonomous University of Honduras (UNAH), the Honduran Society of Ornithologists (ASHO), ICF, and the Direction of Biodiversity in the Secretary of Natural Resources and Environment (DIBIO/SERNA) participated in additional avian sampling in the project area in February 2020. Teams in both countries integrate deeply with local institutions for impacts in the field. During Year 4, our field lead in Nicaragua, Fabricio Diaz Santos, received a Disney Conservation Hero Award for his dedication. The below pasted blog he wrote attests to how we integrate with local communities and priorities in project execution:

<https://medium.com/communities-for-conservation/conserving-biological-and-cultural-diversity-in-nicaragua-6d3763c90a6f>

3. Project progress

3.1 Progress in carrying out project Activities

Output 1: Improved livestock management and community conservation techniques adopted by at least 130 families in 19 communities across four ethnic groups in four protected areas and two countries. When WCS assumed responsibility of the field work from UNAG, following the Darwin-approved change request, we undertook field reconnaissance to measure and evaluate the status and progress. As part of this, we identified that the 66 conservation agreements in Honduras represents 66 families, not the 83 initially indicated by partner, UNAG. The current total, all field verified, is 109 families: 66 in Honduras (across 5 communities) and 43 in Nicaragua (originally 47) across 15 communities, for a total of 20 communities in the bi-national project. The four that left the project in Nicaragua did so because the families found that they did not have the personnel to complete the additional tasks.

We are now working with 15 communities in Nicaragua, 5 in Honduras, for a total of 20 communities of four ethnic groups, in three protected areas, and two countries.

Activity 1.1: In Nicaragua's Bosawas Biosphere Reserve, our indigenous coordinators in each territory conducted project questionnaires in Year 1. In Year 2, rigorously analysed the results of the participatory diagnostic of livelihoods, standards of living, economic priorities, and livestock management of 75 families in 19 communities. In Honduras, similar questionnaires were delivered to 72 farmers in Year 2 and summarized and analysed in a socio-economic report. These questionnaires were repeated in Nicaragua in Year 4, and have been in progress in Honduras (initiated in three of five communities). The final detailed socio-economic analyses pend.

Activity 1.2: During Year 1 in Nicaragua, we reviewed the specific challenges in managing livestock (questionnaire results) and tailored interventions to the highest priorities. We delivered training on how to conduct livestock health diagnoses and treatments, During Year 2, we reviewed the performance of 45 individual systems of installed fences, live fences, improved pastures, and nurseries and transplanted forage producing trees, taking photographs of each beneficiary, their installed system of improvements and recording locations with GPS coordinates. We repeated some of that in Year 3, and in Year 4. The silvopastoral systems have progressed well with high success rates. Visual evidence is presented in **Annex 4**, accompanied by detailed commentary about the relative performance of the tree species used in the silvopastoral systems. By year 3, 43 beneficiaries in Nicaragua had maintained active functioning and growing silvopastoral systems, building ownership and continuity. The performances of the three different tree species differ depending on local micro-site conditions in pastures.

In year 2, we assessed progress in five annual meetings held across six communities, involving 79 people, 42% female, 58% male. In year 3 we assessed progress in annual meetings held across three communities, attended by 82 people, of which 62 % were female.

The final Year 4 community meetings to share experiences and evaluate the performance of silvopastoral systems and the conservation agreements in Nicaragua were conducted in five communities in December 2019. The meetings included a total 160 participants, of which 78 (49%) were women, and 82 (51%) men. Broken down by community there were 28 participants in San Andres (16 women and 12 men, all Miskitu), 50 participants in Walakitang (11 women and 39 men, all Miskitu), 21 participants in Raiti (15 women and 6 men, all Miskitu), 22

participants in Siksiyari (12 women and 10 men, all Miskitu) and 39 participants (24 women and 15 men) all Mayangna in Amak (**Annex 5**).

In general, participants were quite pleased with the way the project integrated “development” and conservation, through improved livestock management and conservation commitments. The changes in attitudes about jaguars, from distrust and antipathy related to potential livestock losses, to appreciation as a result of the project was notable. The energetic and collaborative efforts to improve livestock management and engage farmers in camera trapping efforts, showcasing photos of jaguars and white-lipped peccaries near their production systems were both critical elements for success.

In Honduras, in Year 2, we had delivered training in silvopastoral systems in August to 67 people in the following five communities: Krausirpe (18 people - Tawahka), Nueva Esperanza (8 - Mestizo), Tukrun (12 - Miskitu), Kurhpa (14 - Miskitu), and Wampusirpe (15 - Miskitu). A five-member project committee was formed in each community to ensure continuity. In August of Year 2, materials for improvements were delivered to 66 farms (previously reported by UNAG as being managed by 83 families), and conservation agreements signed for all. In Year 3, we accomplished biological evaluations for Honduras with more than twice as many avian sampling stations than Year 2, and repeated 3 of those sites in Year 4. The results of the avian evaluations pend and will be complete by project end. During Year 4 in Honduras, there were 12 more meetings in the project area, which included additional veterinarian training and the delivery of veterinarian and farm improvement materials.

Activity 1.3: Three workshops to share experiences in the management of silvopastoral systems in Nicaragua were organized by territory and conducted in February 2020. They involved a total of 79 people, 26 in Mayangna Sauni Bu (84% women and 16% men), 26 in Kipla Sait Tasbaika (27% women and 73% men), and 22 in Miskitu Indian Tasbaika Kum (40% women and 60% men) with lists and photographs presented in **Annex 5**. Due to the funds processing delays experienced with UNAG, individual farm evaluations and annual meetings are still underway in Honduras and will be complete by project end.

Output 2: Explicit agreements through which project beneficiaries commit to conservation outcomes adopted by at least 130 families in seven communities across four ethnic groups, four protected areas, and two countries.

Activity 2.1: In Year 1 in Nicaragua, prior to delivering training and materials, we obtained conservation agreements at two levels; 1) territorial agreements (3 territories totalling approximately 2,800km²) and 2) agreements with individual project beneficiaries (47 total). The technical assistance in livestock production has been conditioned upon commitments by communities to control deforestation and ensure the following rules are abided by: zoning (including agriculture, hunting, and conservation zones), no hunting of white-lipped peccaries and spider monkeys, reduced hunting of slow-reproducing specialist species (versus fast reproducing generalist species), restriction of tapir hunting for purposes of crop damage control only, and managing livestock to reduce human-jaguar conflicts. In Year 2 in Honduras, similar agreements were signed by participating farmers, albeit now that we have transitioned from UNAG to WCS and carefully reviewed the agreements, there are less families involved initially estimated by the project partner: 18 in Wampusirpe, 10 in Kurhpa, 12 in Tukrun, 9 in Nueva Esperanza, and 11 in Krausirpe, plus another six in more remote tributaries, for 66 agreements involving 66 families in Honduras, with now 43 in Nicaragua, a total of 109 in 20 communities between the two countries.

Activity 2.2: In Year 1 in Nicaragua, obtaining the conservation agreements and planning the interventions entailed 12 meetings in the capital with indigenous leaders, and was reinforced during 12 meetings in the territories, for a total of 24 meetings. The efficacy of those Conservation Agreements was reviewed during annual meetings held in six communities in Nicaragua in Year 2. In Year 3, and Year 4 efficacy was reviewed in 5 meetings each that indicated that silvopastoral systems were proceeding well and the participants were appreciative of the advancements made integrating agricultural improvements and conservation objectives (**Annex 5**). Defense of the indigenous-designated “conservation zone” was one of the commitments in the territory level agreements we signed with leaders in Nicaragua during Year 1. During Year 4 of Darwin 23-014, collaborative SMART-based patrols

enabled the recuperation of core habitat from more than 45 illegal invaders, seizure of weapons and equipment, including chainsaws and machetes, and protection of approximately 80,000 ha of titled Indigenous territories in a key refuge and source site for endangered species, an important step towards securing critical bi-national connectivity.

In Honduras, we obtained conservation agreements and planned conservation interventions over the course of 17 meetings held between Years 1 and 2. In Year 4, there were a total of 12 meetings in the project area. The seven conducted by WCS particularly focused on the alignment of livestock management improvements and adherence to the conservation agreements. Compliance with the agreements and conservation achievements will be discussed in greater detail in the final report October 2020.

Output 3: Report on the impacts of improved livestock management practices, evaluating and comparing forest cover, biodiversity, and poverty reduction impacts across the spectrum of cultural contexts. Dissemination of methods and lessons learned to nearby communities, agricultural and protected area agencies, and across the entire NGO, Multilateral, and government community.

Below we describe some of the biological baselines and evaluations:

Activity 3.1:

All biological data collection has been conducted according to standardized protocols, including a specific data sheet for camera traps, and specific sampling instructions for avian sampling. The seven avian stations in Nicaragua and nine in Honduras mean that birds were evaluated in a total of sixteen areas of contrasting vegetative cover, in proximity to the farming systems that were being improved.

In Year 3, we conducted evaluations of mammals in both countries that followed the same lines as the initial baseline. This included sampling lines traversing three distinct bands: 1) within and nearby the edge of areas with direct livestock management improvements (200-2,200m); 2) between 2,200 and 4,200 m from interventions; 3) between 4,200 and 6,000 m from the interventions. This provided a comparison between the direct project impact area and more natural forest in both pre- and post-sampling periods, providing a way to assess trends in time across anthropogenic gradients in relation to the conservation agreements. A total of 12 such lines, involving 34 camera traps, radiated out from farming systems during the baseline. The same lines were used for the Year 3 evaluation, adding 1 in Honduras and 2 in Nicaragua for a total of 15 camera trap lines across a gradient of near-system to far-from-system/natural forest gradients (**Annex 7**, maps of communities, camera traps, maps and photos of species). Preliminary mammal analyses were completed for both countries in Year 4 (**Annex 8 and Annex 9**). A list of bird species recorded during 2017-2019 sampling is presented in **Annex 10**.

The data from both countries including 18 mammal species has received preliminary examinations using multivariate analyses and conventional statistical tests. In Nicaragua, there were relatively few strongly significant differences for most species between the three areas of different disturbance. That is noteworthy, because on a global level, game is usually depleted near villages and large mammals are scarce in proximity to communities. Subtle exceptions include the following: four game species (brocket deer, white-tailed deer, paca, and agouti) and four non-game species (jaguar, ocelot, jaguarundi, and giant anteaters) were more common close to communities/interventions. There were a total of eight jaguar observations, all relatively close to interventions. The species for which there were no significant project impacts on spatial distribution included the following: tapir, white-lipped peccary, collared peccary, and puma. All three were more common farther from systems and communities, and stable between the two temporally spaced sampling periods, although puma became more frequent farther from the interventions. The preliminary analyses of Honduran camera trap data suggest that wild carnivores became more diverse and large herbivores more abundant farther from the communities and livestock management systems.

The avian data analyses and interpretation is more complex (248 species of birds compared to 18 mammals) and will be summarized in the final report in October 2020.

In Year 2, using remote sensing we determined the baseline 2005/6 – 2016 deforestation rate between the two countries. Another series of remote sensing and detailed questionnaires will be analysed to assess impacts before the project's conclusion October 31, 2020.

Activity 3.2: We are committed to a working paper evaluating all aspects of the project and making recommendations for continued impact and replication elsewhere - before the project ends on October 31, 2020. Some preliminary results have been included in this report. There is a chance that submissions to international refereed publications will extend beyond the project period, but every aspect of this project – economic, animal husbandry, tree propagation, social benefits, livestock health, distributions of mammals and birds, performance of the conservation agreements, changes in deforestation rates, and lessons learned – for local, national, and extra-regional benefit, will be completed before end of the project.

Activity 3.3: The four presentations of the above referenced written report to relevant actors at local and national levels will take place near the end of the project, and before October 31, 2020.

3.2 Progress towards project Outputs

Output 1. Improved livestock management:

We have delivered training on how to establish silvopastoral systems, improve pastures, and diagnose and treat cattle health issues – all conditioned on beneficiaries signing conservation agreements across four ethnic groups (as promised), 20 communities (compared to our commitment to engage 7), 130 families (exactly per change requested and approved), in three protected areas in two countries. As part of the baseline we conducted 147 questionnaires across both countries. We analysed the questionnaires, and the results guided our technical assistance for better cattle nutrition, better cattle health, and fencing to contain cattle. We tailored the interventions to those priorities, initiating silvopastoral systems for better forage, live fences, improved pastures, and veterinarian training. A complete analysis of the impact of these improvements on participants' standards of living will be analysed and presented in the final report, however, preliminary results are positive. In Nicaragua, 74% of the participants have *Brosimum* saplings in the pastures, 100% have *Erythrina* saplings, there has been a three-fold reduction in letting cattle run loose, livestock has become a more reliable source of support for three times as many of the project participants, and investments in pigs and poultry reflect earnings (and savings) (**Annex 1**).

Additional project baselines to measure conservation impact of the improvements and agreements included avian surveys (completed), data from camera traps (completed), and forest cover trends (baseline completed, final analysis pending). The mammal and avian sampling was directly related to areas of project interventions. Mammal trends in space and time have been evaluated for both countries (**Annexes 7 & 8**). Avian trends will be complete for Nicaragua in time for AR4 (**Annex 9**) with analyses of the Honduran data pending.

Output 2. Community Conservation Agreements:

During the first two years we developed and signed explicit conservation agreements with 109 families, 21 communities (now 20), three protected areas, four ethnic groups, and two countries (**Annexes 8,9,10**). These agreements include conditions on forest clearing, strict conditions on human-wildlife conflict, specifically with jaguars and tapirs, and include complete bans on hunting white-lipped peccaries and spider monkeys, making it clear that livestock production is being improved not only for economic benefits, but also to facilitate and ensure conservation. A focused assessment of compliance will be produced for the final report.

Output 3. Learning and outreach

During the last three years, we completed the pre-intervention measurements of livestock management, knowledge, attitudes, and practices, productivity, biodiversity, wildlife conflict, and livelihoods at the household and community level. In Nicaragua, we have conducted a total of 36 meetings with leaders and communities, most of them in the territories planning the project activities, and we delivered veterinarian training workshops to at least 58 people. Three indigenous field coordinators and three members of an indigenous logistics crew received intensive on-the-job training in project logistics, conducting interviews, and coordinating river logistics under supervision until they were fully trained and qualified to lead independently. Five

indigenous parabiologists who had previous experience mist-netting birds and setting camera traps were engaged in systematic cross-gradient biological sampling. Three territories pulled together to execute a logistically challenging project in Nicaragua. This project has had an enormous effect on building capacity in the territories in Nicaragua.

In Honduras, alumni and students of the National University of Agriculture in Honduras, mostly of local origin, including the project area, were key in the execution of 21 meetings and workshops to deliver expertise in agroforestry/silvopastoral systems, materials for improvements, discuss advancements and conservation agreements. Project beneficiaries (farmers) assisted with placement and protection of camera traps for biological baselines. Since WCS assumed the role of field coordination, an additional five meetings and workshops have been executed and additional engagements and collaborations have occurred (BAKINASTA, ICF, Zamorano, UNAH, ASHO, and DIBIO/SERNA), expanding the project's impact and long-term sustainability.

The local Miskitu, Mayangna, and Tawahka associations across the two countries have been intimately involved in project development and execution. In Year 3, six additional local indigenous youth worked as parabiologists and in Nicaragua an additional student from that country's National Agricultural University was trained and participated in bird sampling methods. In Nicaragua, results of livestock management modifications and biological baselines and compliance with conservation agreements were reviewed in the first annual meetings, which were held in six communities with participation by 79 people, 42% female, 58% male. The second round of annual reviews included 82 people, with 62% participation female, the final reviews involved 160 people across five communities with 49% participation by women. By the end of year two this project had been included in presentations to the government of Nicaragua on 3 occasions, to universities in Nicaragua on 2 occasions, and in a regional Congress on saving Mesoamerica's largest remaining forests and their inhabitants.

In year 3, the Darwin project was included in presentations to a jaguar range-wide (Mexico to Argentina) review and strategic planning event in Bogota, Colombia, a symposium of transboundary mammal research and conservation in the North American Chapter of the Society for Conservation Biology Congress in Toronto, the Secretariat of the United Nations Development Program (UNDP) core staff in New York, a National University of Agriculture, Catacamas, Honduras biodiversity course, officials of the Honduran Institute of Forest Conservation, Protected Areas and Wildlife (ICF) and the Honduran Secretaria de Recursos Naturales y Ambiente (MiAmbiente), Tegucigalpa, Honduras, and the Honduran Monitoring Round Table, Tegucigalpa, and in recognition of Biodiversity Day, in Tegucigalpa. There was extreme socio-political turbulence in Nicaragua from April through July 2018, which resulted in significant casualties, problems in the city, armed conflict, and inhibited presentations in Nicaragua during Year 3 though field work continued to progress as planned

In year 4, the Darwin-supported work (impacts, images, conservation tools, and logo) were included in jaguar conservation-focused presentations delivered at the IUCN Latin America and Caribbean Protected Area Congress in Lima, Peru in October. These include the following: 1) a 30-minute presentation on jaguar conservation tools during a PI moderated 2-hour expert panel composed of UNDP, Panthera, WCS, WWF, and two government representatives (Mexico and Costa Rica); 2) a 30-minute keynote speech; and 3) a 15-minute presentation that was part of a symposium on Biological Connectivity. Conservation personnel from a dozen countries participated in these three events. In addition, we published the record of a harpy eagle in the direct area of project influence in Spanish (**Annex 11**) and English in *Spizaetus* (**Annex 12**), and a range extension of Swainson's warbler in the area of project influence was published in *Zeledonia* (**Annex 13**). Darwin received credit in all presentations and publications. During Year 4, our field lead in Nicaragua, Fabricio Diaz Santos, received a Disney Conservation Hero Award for his dedication (**Annex 14**). The below pasted blog he wrote attests to how we integrate with local communities and priorities in project execution:

<https://medium.com/communities-for-conservation/conserving-biological-and-cultural-diversity-in-nicaragua-6d3763c90a6f>

3.3 Progress towards the project Outcome

Outcome: Improved livestock management techniques are successfully implemented in ladino and indigenous farms in Mosquitia, leading to rigorously documented improved welfare of vulnerable communities, conservation of biological diversity, and forest cover

0.1 Forest cover: Rate of forest clearing in 40,000 hectares of target communities and household farms is reduced by 30% as compared to the 10-year historical average.

The baseline was established for 41,000ha of forest across the two countries, analysed over a 10.75-year period. Between 2005/06 and 2016, the annual rate of forest loss was 667 ha. In order to reduce that rate by 30% the annual forest loss in the 41,000 ha cannot exceed 467ha during the project period. At a slightly larger scale, of 136,000 ha surrounding target communities the annual rate of 1,350 ha forest lost per year would have to be reduced to 945ha. Progress towards those goals will be evaluated before the final report October 2020.

0.2 Biodiversity: After three years, avian alpha diversity/ species richness in livestock systems and frequency of medium-sized and large mammals adjacent to livestock systems has increased, and species composition between specific livestock production systems and nearby intact forests have become significantly more similar according to the Sorenson quantitative /Bray-Curtis index.

We established the baseline for avian diversity/species richness and mammal frequencies sampling across gradients from our interventions into the forest. This provides a comparison between the direct project impact area and more natural forest in both pre- and post-sampling periods, and a way to assess trends in time across the gradients in relation to the conservation agreements. With the Nicaragua data we conducted multivariate analyses to distinguish bird communities in open areas, second growth and intact forest to identify indicator species of each. The avian analyses identified 9 bird species as indicators of forest conservation and recovery. The final avian analyses pend. We have conducted multivariate analyses that distinguish mammal communities at varying distances from livestock management systems. Spatial trends across gradients with most mammals were not distinct in Nicaragua, although there were exceptions. Some target species of mammals were more common close to communities (brocket deer, paca, jaguars) but for some no project impact was noticeable (tapir, white-lipped peccary, collared peccary), with neither increase nor decline. Gradients in mammal diversity and abundance were slightly more notable in Honduras, with diversity and abundance increasing with distance from interventions. In general, a complete assemblage of native species is found within the project's area of influence in Nicaragua. In a subtle manner, trends across spatial gradients were more observable in Honduras.

Nine species of birds were selected as indicators of recovery, six via mist nets, three via point counts. Although the mammal and bird analyses were recently completed (**Annexes 7,8,9,10**) and summarized here, production of a more refined summarization, including diversity and similarity indices pends the final report.

0.3 Human-wildlife conflict: Retaliatory killing of carnivores, particularly jaguars, reduced by 50% across project farms, households and communities.

We established the baseline for general human-wildlife conflict and specifically human-jaguar conflict through the 144 detailed questionnaires. Baseline attack rates are generally low. In Honduras 20% of respondents lost calves to jaguar and puma in the last five years. In Nicaragua only 6% has lost calves to large cats in the last five years, with rates for pigs and dogs being higher. The final evaluation pends completion by October 2020, but in Nicaragua we have ascertained that tolerance and appreciation of large cats among project participants has increased markedly, and attack rates (and lethal responses) were zero during the project. In Honduras, additional research and support will be included following collaboration with a Master's student who conducted 50 interviews in the project area inquiring about human-jaguar conflict. Results pend (October 2020).

0.4 Local Livelihoods: At least 130 families will experience a 50% increase in livestock productivity due to integrated livestock management (including market value and availability for local consumption and subsistence).

It is still too early to completely summarize the overall trends in livestock productivity, but in the baseline we delivered, collected, summarized, and analysed 144 questionnaires that included the following: family profiles, economic activities and priorities, monthly income and costs, health issues, basic necessity surveys, use of forest products, general human-wildlife conflicts, farming/ranching practices and challenges, knowledge and practices in cattle ranching and type and level of production and economic gains from cattle, frequency of losses to large cats, and perspectives on jaguars. In the baseline, approximately 80% and 92% of Honduran and Nicaraguan participants had less than 25 cattle. Hondurans lost 32% cattle to diseases, and 17% to poor nutrition. In Nicaragua the ratio was 61% to sickness and 24% to nutrition. Despite low numbers of livestock per participant, mortality (lost production) was high. The 75 Nicaragua questionnaire respondents indicated the following level of losses per year: 3 lost 5-10 and 48 lost 1-3. The baseline was followed by an equally ambitious re-evaluation in 2019. The data rich analyses will be summarized before October 2020, but a few summary points that demonstrate the positive impact from the project in Nicaragua are presented below.

Cattle as the primary source of “income”/support/sustenance among beneficiaries increased from 33% in 2017 to 73% in 2019. The presence of Ojoche (*Brosimum spp.* (essentially the same as the nutrient rich ramon tree used by the ancient Maya and still used as forage and protein in Guatemala’s Petén)) in the pastures of project participants increased from 51% in 2017 to 74% in 2019. Helequeme (*Erythrina spp.*) is now present in 100% of the participant’s livestock areas and operations. The percentage of farmers that allowed their cattle to run loose changed from 28% to 8%. Investments in pigs and poultry increased, a reflection of earnings (and savings). The percentage of participants capable of training and supporting additional people increased from 74% to 95%, a testimony to capacity building and relevant for any post Darwin project 23-014 expansion of similar approaches in adjacent areas.

3.4 Monitoring of assumptions

0.1 Forest cover: *Cloud-free and current scenes of project areas are available for remote sensing analysis.*

There were considerable issues with cloud cover in the 2006 scenes and it was necessary to pool 2005 and 2006 scenes but that has been done and we have established the baseline rates. By extending project end until October 2020 we can use clear scenes from dry-season 2020.

0.2 Biodiversity: *Relative frequency data reflect true population trends. Fluctuations due to weather, seasons, disease, and wildlife population dynamics remain within normal parameters, allowing detection of the effects of improved agriculture and reduced deforestation (To mitigate this risk we will standardize sampling and use robust experimental designs).*

Baseline biological sampling started first in Nicaragua, setting the stage for protocols to use across both countries. In order to minimize sampling error, a standardized camera trapping design and data sheet was deployed for every station/camera. The avian sampling and data collection protocol used in Nicaragua was shared with the Honduran field teams. In Nicaragua, avian sampling was executed by an MS-level ornithologist with 20 years of experience who is also a MoSI coordinator. This was assisted by a university level biologist with abundant experience and local indigenous crews with previous experience in avian inventories, linear foot transects, and MoSI migratory bird monitoring. The camera trapping was supervised by a Nicaraguan field coordinator with 12 years of experience and an indigenous para-biologist who worked on the first jaguar camera trap survey in Nicaragua. The Project Leader ensured adherence to the camera trap sampling design in Honduras. During the first survey in 2017, a camera trapping specialist with 13 years’ experience accompanied field crews and trained them. During the last avian survey in Honduras in Year 4, WCS organized a team composed of some of the country’s top ornithologists. With rigorous robust sampling and strict quality control, we have mostly reduced variance due to observer and sampling error.

0.3 Human-wildlife conflict: *Honest pre- and post- reporting by project participants.*

In Nicaragua, local trusted coordinators distributed the questionnaires about human-wildlife conflict, which was likely to generate honest results. In Honduras, we also integrated with local institutions and families, our main technicians are Miskitu and Ladino local graduates from

UNAG, and similar dynamics prevailed. During a series of additional interviews in Honduras conducted by an MS candidate, she noted differences in responses based upon who accompanied her (conservation personnel or not) and the time allocated for the interview, which suggests that having interviews delivered by trusted local people who live in the area (which is what we have done) will obtain good results.

0.4. Local livelihoods: *Changes due to improved livestock management are measurable and observable within the 3-year time period.*

Given delays in Honduras, we requested a no-cost extension to ensure we could still effectively execute the project and measure livelihoods improvements. We expect to share the analyses by project end.

3.5 Impact: achievement of positive impact on biodiversity and poverty alleviation

The project areas are the most underserved, neglected, and remote areas in Mesoamerica. However, the foundation that Darwin 23-014 established has enabled numerous benefits to this region. In both countries, the project's momentum enabled us to secure additional, complementary funding for critical on-the-ground needs, including patrols along territorial boundaries (through a Department of State (DoS) Central American Free Trade Agreement (CAFTA-DR) grant, a DoS International Narcotics and Legal Affairs (INL) grant, and funds through a U.S. Fish and Wildlife Service Cooperative Agreement. Darwin 23-014 also leveraged additional funds for camera trapping surveys from the Liz Claiborne and Art Ortenberg Foundation. We directly leveraged the work in Darwin 23-014 to expand our impact on migratory bird conservation, cacao agroforestry, cattle management, forest conservation and additional protected area law enforcement efforts through a joint project with American Bird Conservancy using U.S. Fish and Wildlife Service Neotropical Migratory Bird Funds. Using the platform of Darwin 23-014, we developed a collaboration with the Yale Environmental Protection Clinic to collect data on forest trends, threats, opportunities, actors, and mechanisms to strengthen bi-national forest connectivity in the project area. The latter resulted in a joint White Paper that we publicized in news releases. During 23-014, the Project Leader joined Conservation International Coordinated Rapid Ecological Appraisal Program expedition into a high-profile archaeological site, alternatively known as the White City/Lost City of the Monkey God/Lost City of the Jaguar, which albeit remote, is also quite near our project area in Honduras (22 miles from Krausirpe) and in the same watershed. The results of the WCS Yale White Paper (which was enabled by Darwin 23-014) were combined with knowledge gained during the Lost City expedition for synthetic large-scale perspectives on conservation needs in the bi-national Mosquitia that were communicated to inform decision makers (**Annex 14**).

In addition to the above, the Lost City archaeological site (within the Río Plátano Biosphere Reserve and 22 miles from Darwin 23-014), generated high-profile publicity and captured the personal interest of the President of Honduras. WCS, in collaboration with key partners, supported the creation of the Kaha Kamasa Foundation (White City in local Pech indigenous language), an alliance of government, indigenous, and nongovernmental institutions, to raise visibility and funds for archaeological exploration and restoration, forest protection, and local economic development. The Honduran government has initiated steps to preserve archaeological sites (one lays within an area Darwin 23-014 sampled with camera traps) and the forests that surround them. Darwin 23-014 facilitated WCS's participation in the Lost City focused momentums which have potential for the alleviation of poverty by job creation through increased tourism and more park guards.

Darwin 23-014 also enabled us to identify additional opportunities to promote livelihoods that are compatible with conservation. In the project area in Honduras, farmers produce cacao grown in complex agroforestry systems. In one section, cacao is purchased and processed by a business in Wampusirpe (Cacao Direct) and used by chocolate producers in Honduras, Switzerland, and the United States, with bean-to-bar products that win prestigious international awards. In another section, the Miskitu farmers have a cooperative that sells to Chocolate HALBA in Switzerland. Following the lead of one of the Yale students, WCS started exploring the potentials to better promote the Cacao Direct products from agroforestry cacao systems as

an economic alternative to deforestation. We have forged an innovative partnership with Roatan Chocolate Factory, which sources its cacao from Cacao Direct. They will produce a conservation chocolate bar line that will support an indigenous ranger team in the BAKINASTA Miskitu Indigenous territory.

We are also launching an innovative collaboration with the WCS Business Operations team to profile these chocolate bars and our conservation work in WCS zoo concessions and stores. We remain committed to also establishing a more comprehensive farm to market strategy of jaguar friendly and bird friendly cacao, with the goals of 1) expanding markets through verified labelling as an incentive to expand impacts; 2) ensuring farm level practices that provide safe passage for jaguars and prey, and optimize migratory bird habitat. The cacao based sustainable livelihood work we deployed through the Darwin 23-014 project has significant potential, working from the farm level up, for larger scale environmental and economic impacts. Darwin 23-014 also served as a springboard for several additional projects focused on indigenous territorial protection both in the area and in adjacent territories in Honduras.

Beyond publicizing the project in range wide jaguar meetings, international congresses, with the Secretariat of UNDP, in press releases and blogs, we will be generating international refereed publications. In the works are the following: 1) manuscript examining mammal distribution and abundance across time and space in Nicaragua; 2) manuscript presenting avian species that indicate forest status and recovery in Nicaragua, and analyses of Darwin project 23-014 impacts; 3) a manuscript examining patterns of mammal distribution and abundance across both countries – core reserve zones through riverside community edges, three biosphere reserves, three river valleys, four ethnic groups, using 19,993 camera trap images for analyses from 2006 to 2019. We will initiate that analysis, of which Darwin provided the final and essential part, with data from near communities and associated with agricultural initiatives.

Over the past few years, WCS and our partners have made strong progress on positioning Mesoamerica's Five Great Forests (of which the bi-national Mosquitia is one) in key international policy and funding discussions, as well as international media. At the UN Framework Convention on Climate Change Conference (UNFCCC [COP25](#)), WCS organized two events on behalf of the initiative, and supported the eight countries of Central America in presenting their regional climate action plan, which commits to protecting Mesoamerica's five great forests and achieving carbon neutrality in the agricultural and forest sector by 2040.

While higher-level publicity, political advances, and scientific impact may seem remote to local human well-being, the core of this project is an improved synthesis of how to achieve sustainable livelihoods and conservation in a socially sensitive local context. That is expressed well in a blog by team member and Disney Conservation Hero, Fabricio Diaz Santos: <https://medium.com/communities-for-conservation/conserving-biological-and-cultural-diversity-in-nicaragua-6d3763c90a6f>

4. Contribution to the Global Goals for Sustainable Development (SDGs)

Goal 1: End poverty in all its forms everywhere

Our program seeks to sustain natural ecosystems and the stocks of flows of goods and services that provide the basic necessities for people's lives. The project is working to ensure that poor and vulnerable forest-dwelling and riverine indigenous populations have formal access to and management authority over the land, waters, and natural resources on which they depend, including those that provide food, shelter, and medicine. Conserving natural systems and the ecosystem services they generate is necessary to protect the livelihood security and resilience to environmental shocks of these isolated, politically marginalized populations.

Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

Our program works to promote sustainable agriculture as a way to provide nutrition and relieve pressure on forests, while conserving terrestrial wildlife and freshwater fisheries. These

resources, if well managed, are essential for food security and can act as insurance to smooth consumption during economic, health and climatic shocks, helping to ensure year-round food security, as well as profit.

Goal 3: Ensure healthy lives and promote well-being for all at all ages

Recognizing that public health can be a benefit provided by relatively unmodified ecosystems, we help avoid potential public health costs associated with ecosystem alteration and degradation by working with both local communities and national agencies, to protect such natural ecosystems.

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

The unsustainable use of natural resources undercuts the livelihoods and job security of people who depend on those natural resources, and the illegal trade in wildlife, timber, forest products and fish resources corrupts the staff of public and private organizations and ultimately undermines the jobs that depend on the long term management and conservation of natural resources. This project promotes sustainability and legitimate use of natural resources, and seek to create and shift jobs into legal occupations that conserve nature over the long-term.

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

This project works diligently to conserve wildlife, wild places, biodiversity and ecosystem services in conjunction with governments, indigenous peoples and local communities. Our core focus is to conserve the full complement of native wildlife species and the vital ecological roles they play in maintaining healthy, productive and resilient ecosystems

5. Project support to the Conventions, Treaties or Agreements

This project addresses Aichi targets 1,2,3,4,5,7,12,14,15, and 19 and all five goals of the CBD. In particular, we will reduce direct pressures on biodiversity and promote sustainable resource use, strengthen local capacity for territorial planning and management, and enhance the benefits of water provision services for vulnerable rural livelihoods. Through pending conservation agreements, we aim to provide technical assistance that will reduce pressures on biodiversity and promote sustainable use. The project has already had a positive impact on territorial management. The goals of forest conservation and improved livestock management will help preserve clean and consistent water for communities. This project has made advances at the local level, and also informed higher level initiatives. The Mosquitia and the Five Forests of Mesoamerica are now included within the region's formal climate strategy (before UNFCCC) with an aim towards decarbonization of the region's agricultural and forestry sectors by 2040. <https://news.mongabay.com/2019/12/central-american-countries-pledge-to-protect-mesoamericas-5-great-forests/> <https://dujour.com/culture/global-wildlife-conservation-5-great-forests-of-mesoamerica-initiative/>. In addition the project leader and the International Policy Team in WCS played a significant role in having the jaguar listed in Appendix 1 and 2 of the Convention on Migratory Species (CMS) in February 2020 (during Year 4) (<https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/13835/Jaguars-Receive-Further-Protection-Under-Convention-of-Migratory-Species.aspx>, <https://www.unenvironment.org/news-and-stories/story/maximum-protection-across-borders-emblematic-jaguar>). Honduras is a signatory to the CMS and likely the inclusion of this wide ranging species in Appendix 1 of CMS will help transboundary conservation in the bi-national Mosquitia.

6. Project support to poverty alleviation

WCS has recently signed a sub agreement under a GWC (Global Wildlife Conservation) grant, for the protection and conservation actions over 168,000 ha of legally titled indigenous territory known as BAKINASTA. WCS will support the BAKINASTA territorial council in the creation of a forest guard corps, train and equip them, and also support coordination with national authorities for the protection of the territory.

In the Tawakha Asangni Biosphere Reserve, WCS has reached an agreement with Tawakha indigenous leadership to build a protection post that will allow ICF and Armed Forces to place an inter-institutional detachment for improving territorial control over the remaining forest in Tawakha territory.

Thus, we are now, in addition to helping three indigenous territories/areas/organizations (Miskitu and Mayangna) defend their natural resources in Nicaragua, we are also actively engaged in supporting (including through capacity building), two additional areas in Honduras (Miskitu and Tawahka)

We are benefitting 109 families from 20 communities in two countries with improved livestock management, such as conducting health diagnoses and treatments and constructing fences, and secured community conservation agreements. The technical assistance has the objective of sustainable economic gains in harmony with the conservation of ecosystem services. To ensure deforestation is reduced and rules are followed, livestock production assistance is provided only upon agreement of these conditions. Among notable achievements are that 43 farmers in Nicaragua have maintained active, functioning and growing silvopastoral systems. Visual demonstrations of the progress made with a subset can be seen in **Annex 4**. The ramifications of this project extend well beyond the individual farms. The empowerment that the project enabled in Nicaragua facilitated unprecedented successes in territorial defense of natural resources and biodiversity. In addition, the within-WCS personnel development that took place during Darwin 23-014 has played a role in considerable empowerment of the collaborating indigenous organizations in Honduras, including defense of natural resources and biodiversity,

7. Consideration of gender equality issues

Despite our goal of 40% women involvement in the project, in relation to Indicator 1.1, Year 1 saw only ~15% women involvement in the field.

Vowing to work on greater inclusion in Year 2 in Nicaragua we achieved 42% participation by women in project evaluation meetings and human-wildlife conflict reduction trainings.

In year 3, we continued to focus on this critical issue of addressing gender equality and obtained further increases with 62% participation by women in the annual project evaluation meetings in Nicaragua.

In year 4, women represented 49% of the 160 the participants in the five final meetings in Nicaragua.

8. Monitoring and evaluation

Detailed baseline diagnostics were conducted in both countries, (expert driven avian and mammal sampling, locally conducted socio-economic-livelihood % perspectives questionnaires) then summarized, and analysed, providing a solid baseline to measure project impacts. All three types of this complete baseline were driven by a team that ranged from PhD level participants with decades of experience to local residents of indigenous territories with deep knowledge of the area. In total we had 16 bird sampling stations across the bi-national area, 15 lines of camera traps radiating out from communities, and socio-economic/cattle management diagnostics completed by 144 people, which is a solid baseline upon which we can measure project impact.

Apart from the detailed diagnostic tools we have employed, and the detailed biological baseline that we have established, in Nicaragua our indigenous coordinators visited 45 systems to verify progress made, taking photographs, linked with GPS coordinates, to serve as metrics of progress made. Project progress and commitments as far as farming systems and conservation agreements have been reviewed in annual meetings in Nicaragua attended by 79 people in year 2, 82 people in year 3, and 160 people in year 4, and things are going well. We accompany this report with: 1) photographs of silvopastoral systems (**Annex 4**) results and photographs of annual meetings (**Annex 5**), a report on avian sampling in Honduras (**Annex 6**), maps of all biological sampling and photographs of indicator species (**Annex 7**), preliminary analyses mammal distributions pre-and post-project (**Annexes 8, 9**), a list of bird species recorded during sampling (**Annex 10**), publications of noteworthy bird records in the area of

project influence (**Annexes 11,12, and 13**), and some summary elements of monitoring results in this Darwin 23-014 AR 4 template. Many more details will come in October 2020.

9. Lessons learnt

There have been many challenges in Honduras including the following: Year One a student strike paralyzed our partner UNAG for months; Year 2-our partner the National University of Agriculture experienced administrative delays associated with a contested national election in Honduras and civic unrest that followed; in Year 3, the University initiated new administrative pathways that meant that funds were held up for even longer, inhibiting field work. Despite significant attention to institutional bottlenecks, developing relationships with key administrative personnel, troubleshooting, and significant support, ultimately the institutional inefficiencies were unresolvable. In Year 4, with Darwin's approval, we switched funding pathways and project field execution to our rapidly growing, albeit still small, WCS Honduras program. That was proceeding well until mid-March 2020 when the Honduran government issued complete restrictions on movement to control the spread of COVID 19. Those strict and enforced regulations meant field work came to an end, though desk-based activities and virtual collaboration with partners continue. Currently WCS is exploring the possibility to resume key field work in areas where COVID19 has not been reported in project area, in consultation with authorities, but there is a high level of uncertainty.

On the Nicaraguan side, Year 3 saw some of the most violent social political disturbances in the last decade in the Western Hemisphere. Between April and July 2018 hundreds of people lost their lives in street protests, vehicle traffic was impeded by small walls erected as primitive forts on the streets, and altercations between authorities and protesters meant that our field teams needed to avoid Managua-to-river port travel May through August. Eventually armed authorities subdued the protests and the highways became safe for travel again. The social political situation did limit 1) presentations at universities and in government offices; 2) presentations at Congresses (the November Congress of the Mesoamerican Society of Biology and Conservation was switched to another country); 3) student engagements (youth were both heavily involved in the protests and also heavily targeted by authorities); and 4) meetings in general. Despite the tumultuous environment and safety concerns, our Nicaragua crew switched to data reduction and analyses, and was able to make significant progress. Things are stable now, even if underlying issues remain.

These two turbulent countries are among the most challenging in the Western Hemisphere. Despite the challenges, we have continued to advance the project, and have made substantial progress, including the Darwin 23-014 enabled WCS-Yale expedition and White Paper, and the large mammal evaluations in the Lost City site. During this project, and facilitated by it, we have made significant advances with collaborations in both countries, especially with Indigenous communities. We have improved our and others' in-country capacities, to ensure that we and they elevate conservation impacts,

10. Actions taken in response to previous reviews (if applicable)

From ARR3: Have any silvopastoral systems been maintained in Honduras since the training of 67 people in this discipline in Year 2? In the final report please disaggregate all achievements by country and gender.

Response: There are currently 66 active participants in Honduras, of whom 18% farmers are female. There was project follow up with 60/66 in Year 4, that included meetings, materials, and reviews of conservation agreements. The final six were meant to be revisited but were not because of strict travel restrictions related to COVID19.

From ARR3: The project is reporting against output level indicators however, some indicators under output 1 are not specific and therefore do not adequately capture livestock management improvement. It is still not possible to quantify progress towards the outcome. All baselines are established and, during 4, impacts on forest cover change, biodiversity, human-wildlife conflict and local livelihoods will be measured. It is noteworthy that, anecdotally, the project reports a change in attitude towards large cats, with beneficiaries demonstrating more tolerance and appreciation for the animals. The project is reporting against outcome level indicators and has reviewed its assumptions. Assumptions 0.1-0.3 have held true. Assumption 4: *"Changes due to improved livestock management are measurable and observable within the 3-year time period"*

has not held true. However, following an agreed one-year no cost extension, the project is confident that these changes will be measurable before the end of the grant.

Response: Please see additional information in Section 3.1, Output 1, Activity 1.2, Output 2, Activity 2.2, Output 3, Activity 3.1, Section 3.2, Output 1, Section 3.3, 0.2, 0.3, and Annexes 1,4,5,7,8,9,10.

11. Other comments on progress not covered elsewhere

In **Annex 3**. Standard Measures. Regarding 4a,4b and 6a,6b. Slight short falls in undergraduate involvement have some easily explained circumstances. During 2018 in Nicaragua the country convulsed in a 4-month street war with >325 dead, a high proportion of them students. We did not seek out students in Year 3 in Nicaragua, as they were either in conflict, in hiding, or recovering, the entire year. In Honduras, an accumulative effect of the UNAG administrative delays was a restricted number of expeditions, separated by long intervals that reduced student involvement (which was one of the points of coordinating with a university). The project had substantial impacts in all other standards.

In Nicaragua the project solidified a fast-moving execution-focused chain of indigenous coordinators. As we exit Year 4, silvopastoral systems are underway (**Annex 4**) and the team could easily execute similar projects in additional areas.

In Honduras, recurrent and seemingly unsurpassable administrative issues with the original partner, UNAG, generated delays that extended into Year 4. WCS Honduras assumed responsibility for funding pathways, and execution, and after contracting local staff started a well-organized execution. Unfortunately, starting mid-March 2019, the Honduran response to COVID19 has been a complete 24-hour curfew, which is slowing down an ambitious “catch-up”.

The latter is a source of some concern. As this is written, Honduras is in week six of the “lock down”, currently with no end in sight. Nicaragua’s response has been far less rigid, but if the number of cases escalate that could change. In summary, for both countries, Activities 3.2 and 3.3 require delivery of project results (and with the aim of some of that being in the riverside communities), and for Honduras, a substantial amount of field activities remain to execute. There is some uncertainty as to how the pandemic will affect that.

That said, in both countries Darwin 23-014 has played a huge role in WCS scaling up its field impacts. The project enabled us to leverage funds from the American Bird Conservancy/NMBCF, CAFTA, USFWS WWB, DOS INL, and, more, all of which will translate to benefits for biodiversity and people in the project area.

12. Sustainability and legacy

A key piece of his project is collaboration with local partners to ensure they are integral members of the team, which will help ensure sustainability and build long term capacity. It merits mention that in Nicaragua our field efforts are executed by indigenous coordinators. That direct capacity building will contribute to sustainability. Similarly, in Honduras, our field activities are coordinated with local territorial leaders and a Miskitu ranching association. Interest is high, the projects base actually is local people, boat operators, respected elders, presidents of associations, all of which may contribute to sustainability.

In addition, the foundation provided by this bi-national project enabled us to secure complementary funding from USFWS Neotropical Migratory Bird Conservation Funds in a joint proposal submitted with the American Bird Conservancy (ABC), jaguar and prey focused funding from the Liz Claiborne and Art Ortenberg Foundation, substantial continued wildlife law enforcement funding for territorial patrols through Central America Free Trade Agreement and International Narcotics and Law Enforcement funds managed by the U.S. Department of State, additional funds from the USFWS for territorial patrols and defence of forests and wildlife. In Nicaragua, we met with MARENA, indigenous leaders, and presented the project on five occasions. In Honduras we have discussed our activities with ICF national and local staff, MiAmbiente national staff, and colleagues working in NGOs focused on Mosquitia.

During Year 3 and 4, WCS hired a Nicaragua-Honduras bi-national director, a Financial Manager, additional administrative support, a very experienced, knowledgeable Mosquitia field coordinator, as well as consultants focused on Indigenous communities and control and protection capacity building. These new staff have been critical for overcoming administrative bottlenecks encountered in the National University of Agriculture and increasing field execution efficacy. We now have office space inside the national ICF compound in Tegucigalpa. The national team has met with relevant indigenous leaders, as well as other partners on multiple occasions to plan joint activities. These national commitments on the part of Honduras, and the coordination between WCS and local and national institutions in both countries will facilitate our sustainable impacts and long-term presence and dedication in both countries.

WCS also leveraged political interest in the White City to create additional momentum for conservation and ensure long-term sustainability (**Annex 14**). By supporting the creation of the Kaha Kamasa Foundation, an alliance of government, indigenous, and nongovernmental institutions, WCS worked with the Honduran government to raise visibility and funds for forest protection, and local economic development in the Honduran Mosquitia.

In addition to all the advances at the local level, this project also informed higher level initiatives. The bi-national Mosquitia and the Five Forests of Mesoamerica are now included in the region's formal climate strategy (before UNFCCC) with an aim towards decarbonization of the region's agricultural and forestry sectors by 2040.

<https://news.mongabay.com/2019/12/central-american-countries-pledge-to-protect-mesoamericas-5-great-forests/> <https://dujour.com/culture/global-wildlife-conservation-5-great-forests-of-mesoamerica-initiative/>

Funding from the Darwin project was a contributing factor that enabled WCS to engage these expanded and multiplicative impacts that will enhance sustainability.

13. Darwin identity

In Year 3, Project Leader Polisar gave an interview for an article in the American Bird Conservancy's magazine, and drafted an article for the Darwin Newsletter. Also in Year 3, findings and material from this project with credit given to Darwin was given in the following venues: 1) Range wide multi-institutional strategic planning workshop jaguar conservation, Bogota, Colombia; 2) Final presentation in a symposium of transboundary carnivore research and conservation, Society for Conservation Biology's North American Congress, Toronto; 3) presentation to lead staff of United Nations Development Program Secretariat, New York; 4) presentations to several courses at the National University of Agriculture, Catacamas; and 5) staff and technicians ICF in Honduras and Secretariat Natural Resources and Environment (MiAmbiente) Tegucigalpa. In addition, our partners from the National University of Agriculture presented at the Honduran Monitoring Round Table, Tegucigalpa, and a student involved in camera trapping and bird sampling presented at a National Biodiversity Day event in Tegucigalpa, and a University hosted half day event with the Center for Tropical Agricultural Research and Training (CATIE).

During Year 4, the Project Leader included portions of the Darwin-supported work (images and conservation tools) in jaguar conservation-focused presentations delivered at the IUCN Latin America and Caribbean Protected Area Congress in Lima, Peru in October. These include the following: 1) a 30-minute presentation on jaguar conservation tools during an expert panel composed of UNDP, Panthera, WCS, WWF, and two government representatives (Mexico and Costa Rica); 2) a 30-minute keynote speech; 3) a 15-minute presentation that was part of a symposium on Biological Connectivity. Conservation personnel from a dozen countries participated in these three events. Also in Year 4, publications about harpy eagles and Swainson's warbler in the project area were published in international refereed journals, acknowledging support from Darwin.

14. Safeguarding

WCS's policies and procedures are framed by the organization's Code of Conduct, a revised and updated version of which was formally adopted in February 2019. This provides explicit guidance as to how WCS personnel must comport themselves during their work, and applies to all staff at WCS as well as those that act on behalf of WCS. The Code of Conduct covers

diverse issues such as conflicts of interest, safeguarding human rights, combatting human trafficking, sexual harassment, protection of whistle-blowers and many others. Under the Code of Conduct WCS, personnel are accountable for their actions and the actions of others under their management authority, and for ensuring compliance with the Code of Conduct. The Code of Conduct prohibits bullying, harassment and sexual exploitation and abuse, and child abuse as well as documents WCS's organizational commitment to comply with human rights standards and human subjects' protections as it undertakes its conservation work. WCS follows established national and global standards for safeguarding human rights including the World Bank Social Framework, the UN Declaration on the Rights of Indigenous Peoples, and the Belmont Report that outlines the ethical principles and guidelines for the protection of human subjects of research. WCS has also established a Global Grievance Redress Mechanism to ensure that we respond in a consistent and timely way across the organization to investigate, document and take appropriate action to address complaints of alleged human rights abuses by WCS staff, partners, consultants or anyone working on our behalf.

15. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2019 – 31 March 2020)

Project spend (indicative) since last annual report	2019/20 Grant (£)	2019/20 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Monitoring & Evaluation (M&E)				
Others (see below)				
TOTAL				

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2019-2020 – if applicable

Project summary	Measurable Indicators	Progress and Achievements April 2019 - March 2020	Actions required/planned for next period
<p>Impact Environmentally sustainable livestock management practices are successfully adopted across the bi-national Heart of the Mesoamerican Biological Corridor, leading to biodiversity protection and improved welfare of vulnerable communities.</p>		<p>Pre-and post-project diagnostics completed (questionnaires, biological metrics, community meetings), with final analyses socio-economic factors, avian metrics, and changes in forest cover loss rates ready before October 2020. Completion of questionnaires, individual farm visits, final community meetings, and a full synthesis avian data pends for Honduras. Training and livestock improvements were initiated with ~ 145 families spanning 21 communities, four ethnic groups, three reserves, two countries, continues with 109 families. Live fence and pasture improvements were assessed and documented in 43 farms in Nicaragua, with evidence of improvements. The five final community meetings already completed in Nicaragua suggest solid uptake and potentials for continuity.</p>	
<p>Outcome Improved livestock management techniques are successfully implemented in ladino and indigenous farms in Mosquitia, leading to rigorously documented improved welfare of vulnerable communities, conservation of biological diversity, and forest cover.</p>	<p>0.1 Forest cover: Rate of forest clearing in 40,000 hectares of target communities and household farms is reduced by 30% as compared to the 10-year historical average.</p> <p>0.2 Biodiversity: After three years, avian alpha diversity/ species richness in livestock systems and frequency of medium-sized and large mammals adjacent to livestock systems has increased, and species composition between specific livestock production systems and nearby intact forests have</p>	<p>0.1 Forest cover change 2005/06 to 2016 was 667 ha of forest lost each year over 10.75-year period in the targeted 41,000 ha bi-national area. Pends dry season 2020 images (in process). To achieve a reduction of 30% the rate cannot be more than 467ha per year 2017-2020.</p> <p>0.2 Avian baseline originally established across gradients in the two countries with ten before and after stations of mist nets and point</p>	<p>0.1 2016/17-2020 forest cover change rates will be calculated and compared to 2005/06 to 2016.</p> <p>0.2 Trends in avian communities and indicator species will be analysed and summarized. Preliminary mammal analyses will be refined.</p> <p>0.3 The “socio-economic” (which are also livestock husbandry and wildlife management) questionnaires will be completed in Honduras, and the results from both countries analysed jointly and pooled. These include data</p>

	<p>become significantly more similar according to the Sorenson quantitative /Bray-Curtis index.</p> <p>0.3 Human-wildlife conflict: Retaliatory killing of carnivores, particularly jaguars, reduced by 50% across project farms, households and communities.</p> <p>0.4 Local Livelihoods: At least 200 (originally, but updated to 130 via an approved Change Request Form) families will experience a 50% increase in livestock productivity due to integrated livestock management (including market value and availability for local consumption and subsistence</p>	<p>counts. The mammal base line was started with 12 lines and 24 camera trap stations. Subsequent avian sampling included 16 stations and 15 lines of camera traps in 45 stations. Preliminary mammal analyses are done. Avian data will be summarized and analysed before projects conclusion. Distinct camera trap lines radiating along gradients from interventions into natural forest. The baselines document species composition, distribution, abundance along the intervention sites to natural forest gradients. Preliminary analyses show no decline in mammal diversity or abundance during project, and four game and four non-game species (including jaguar) are more common closer to the interventions. Another three species are more common farther from the interventions.</p> <p>.</p> <p>0.3 Baseline for human-wildlife conflicts, human-jaguar conflicts, livestock losses due to jaguars, and control of jaguars was established through detailed questionnaires executed by local coordinators with 144 people responding. Based on repeat questionnaires and open community meetings, attacks by jaguars on livestock (and lethal responses) have been zero in</p>	<p>about human-jaguar conflict. The results from the graduate student's interviews will be ready before October 2020. The project's final meetings in Honduras will provide another opportunity to assess trends in human-jaguar conflict.</p> <p>0.4. We need to collect all the remaining socio-economic/livestock husbandry/wildlife management questionnaires from Honduras, and analyse the two bodies of data separately and jointly to fully assess project impacts on productivity and standards of living.</p>
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		<p>Nicaragua, during the project, a greater than 200% improvement.</p> <p>0.4 Goal was changed to 130 families through a request change form, then 26 due to some farmers being over-extended, and when we examined INAG records in detail, the total became 109 families that we have engaged with training and farm improvements. In Nicaragua, 74% of the participants have <i>Brosium</i> saplings in the pastures, 100% have <i>Erythrina</i> saplings, there has been a three-fold reduction in letting cattle run loose, livestock has become a more reliable source of support for three times as many of the project participants, and investments in pigs and poultry reflect earnings (and savings). However, the final analyses of increased production and improved livelihoods pend, will be delivered before October 31,2020.</p>	
<p>Output 1.</p> <p>Improved livestock management and community conservation techniques adopted by at least 200 families in seven communities across four ethnic groups in four protected areas and two countries.</p> <p>Please note, we submitted an approved change request form to reduce the number of families to 130. We are now working with 15 communities in Nicaragua, 5 in Honduras, for a total of 20</p>	<p>1.1 At least 130 Miskitu, Mayangna, Sumo, and campesino families identified and trained in management techniques (with >40% of participants' women) by year 1.</p> <p>1.2 Improved management techniques adopted and established in seven target communities by year 3.</p> <p>1.3 At least 50 farmers from nearby communities are invited to tour farms with improved techniques, exposing them to the concepts and practices in a participatory fashion with challenges</p>	<p>1.1 We encountered external obstacles in Honduras during Year 1, and secured approved change requests to use Year 1 funds for Year 2 and to reduce the number of families to 130. Between Year 2-3, we trained up to 145 families and obtained 42% participation of women in Nicaragua. In Year 3, we obtained 62% participation by women in Nicaragua and in Year 4 49%. However, continuous Year 2-4 totals are 109 families, the reduction from 130 to 109 originating in unprofessional communication on the part of our original partner in Honduras, UNAG.</p> <p>1.2 We are now have working directly with 20 target communities. This represents a 3x expansion over the indicator. From Nicaragua we report substantial advances in silvopastoral systems (see Annex 4), less cattle left to run wild, increased reliability of ingress from livestock, and high participant satisfaction (Annex 5). While we have documented progress in</p>	

<p>communities, of four ethnic groups, in three protected areas, and two countries.</p>	<p>and successes openly discussed by year 3</p>	<p>improved management techniques, and some within this report, the comprehensive assessment of improved practices will come in October 2020.</p> <p>1.3 From Nicaragua, during Year 4, a total of 79 farmers toured farms with improved techniques. Honduras pends and will be completed before October 2020.</p>
<p>Activity 1.1 <i>Conduct participatory diagnostics of livestock management and forest conservation challenges</i> in each community and determine interventions tailored to each target community/household, ensuring at least 40% participants women. Participatory diagnostic of livestock and farm management challenges, will include questionnaires and meetings to assess knowledge, attitudes and practices regarding livestock condition, livestock management, forest clearing, human-jaguar conflicts, sources of livestock losses, nutritional status in households, hunting practices and locations.</p>	<p>Comprehensive participatory diagnostics of livestock and farm management challenges, including questionnaires and meetings to assess knowledge, attitudes and practices regarding livestock condition, livestock management, forest clearing, human-jaguar conflicts, sources of livestock losses, nutritional status in households, hunting practices and locations – were completed, summarized, analysed with information from 147 respondents in Year 1-2. Respondents were not 40% women, but recognizing that deficiency, we improved. The first annual reviews held in Nicaragua included 42% women, the second 62% women, and the third and final 49%. In Nicaragua the post-project diagnostic data has been collected. Data collection is in process in Honduras.</p>	<p>The post-project diagnostics need to be collected in Honduras, then both sets can be analysed separately and jointly. As of present, project participation in Honduras is 18% women. Given the goals of 40% participation by women, outlined in the 2015 Log Frame, we need to ensure greater participation by women in Honduras. The annual meetings have been a great place for that, and by including women/mothers/aunts/grandmothers it's also a way of ensuring more complete community understanding of the project objectives and goals.</p>
<p>Activity 1.2 <i>Deliver capacity-building training in participatory livestock management improvements</i>. Initiate expert delivery of hands-on participation training in field schools, generating a cohort of future leaders in each target community, working in site specific increasing productivity in target farms, diversification of food sources for livestock sites, elevating nutritional status, effecting protection of water sources, and training in diagnosis of diseases and basic veterinary medicine, as well as education on methods to reduce human-carnivore conflicts.</p>	<p>In Nicaragua we delivered veterinarian and improved pasture management training to 58 people. In Honduras we delivered silvopastoral and agroforestry and animal health training to people representing 83 farms., then followed up with additional training to people representing 87 farms. During annual meetings and outreach, methods to reduce human-carnivore conflicts have been shared and</p>	<p>Substantial progress has been made in Honduras, but several things pend. They are:</p> <ol style="list-style-type: none"> 1) Complete the entire suite of 66 individual farm visits recording GPS coordinates, taking photographs and discussing challenges and successes

	<p>discussed. In Honduras there is a five-person committee in each of the five communities. In Nicaragua, we work with three indigenous coordinators. In Honduras, locally-based alumni of the UNAG were field coordinators, now WCS Honduras has contracted an expert in sustainable livestock management from Olancho and several in-territory techs in Gracias a Dios (project areas). Abundant technical training has been delivered in both countries.</p>	<p>2) Conduct gender balanced annual/final community meetings in all participating communities to assess project impact</p> <p>3) Complete the socio-economic/livestock husbandry / wildlife management questionnaires for the entire suite of project participants.</p> <p>When those three pending items are complete, we will have all the data in hand, and the analysis, separately and jointly of success in accomplishing the goals outlined in 1.2 can be better assessed.</p>
<p>Activity 1.3 <i>Conduct exchange visits to participating farms</i>, inviting and supporting at least 50 farmers from nearby communities to tour farms with improved techniques, exposing them to the concepts and practices in a participatory fashion, and openly discussing challenges and successes.</p>	<p>In Nicaragua, three exchanges of experiences in the management of silvopastoral systems were organized by territory and conducted in February 2020. They involved a total of 79 people, 26 in Mayangna Sauni Bu (84% women and 16% men), 26 in Kipla Sait Tasbaika (27% women and 73% men), and 22 in Miskitu Indian Tasbaika Kum (40% women and 60% men)</p>	<p>In Honduras, determine 2-3 best farms to use as hosts and examples. Organized and execute the exchanges.</p>
<p>Output 2. Explicit agreements through which project beneficiaries commit to conservation outcomes adopted by at least 200 families in seven communities across four ethnic groups, four protected areas, and two countries</p>	<p>2.1 Explicit agreements with 130 families with clear commitments to conservation outcomes in exchange for support with livestock management developed, signed, and implemented by year 2.</p> <p>2.2 A total of 21 meetings (one in each of seven communities annually for 3 years) held to present and discuss</p>	<p>2.1 At end of Year 2, we thought that we had obtained conservation agreements with 130 families. However, when we clarified after switching from UNAG to WCS, the total is 66 current families in Honduras, and 43 in Nicaragua, 109 families in total. It is still 21 communities, four ethnic groups, three protected areas, three watersheds and two countries, but less families. All conservation agreements were signed in Years 1 and 2 and at this stage, we are assessing compliance.</p>

	<p>results achieved, and challenges of conservation agreements by 2019.</p>	<p>2.2 During Year 1 we conducted a total of 15 meetings between the two countries. During Year 2 we conducted 14 meetings in Nicaragua and 9 in Honduras, for a total of 23. During Year 3 we conducted 3 meetings in Nicaragua and 2 in Honduras for a total of 5. Thus, we entered Year 4 with a total of 43 meetings. Including the 5 final meetings in Nicaragua and 12 in Honduras translates to a total of 60 meetings, thus far.</p>	
<p>Activity 2.1. Activity 2.1. <i>Generate conservation agreements with target communities</i> through a participatory process, linking technical assistance in livestock management to explicit community commitments to forest and biodiversity conservation outputs that are congruent with protected area conservation objectives.</p>		<p>Conservation agreements were signed prior to delivery of materials. They were linked to the technical assistance and required specific commitments to forest and biodiversity conservation with an emphasis on maintaining forests, moderating hunting of resilient game species, ceasing hunting of less resilient and threatened species, implementation of human-jaguar conflict reducing measures, and tolerance of carnivores.</p>	<p>In Honduras we need to assess compliance through the questionnaires and final community meetings.</p>
<p>Activity 2.2. Activity 2.2. <i>Hold annual assembly meetings</i> in each community implementing a conservation agreement to present and discuss results achieved, challenges, and lessons learned (a total of 21 meetings, or one in each of seven communities annually for 3 years).</p>		<p>We completed the first annual reviews in Nicaragua in 6 meetings, with representatives from 16 communities, the second annual reviews in Nicaragua in 3 meetings. The third annual review and final in Nicaragua was conducted in five communities, for a total of 14 annual meetings. We have pooled this a bit by communities (for example in Nicaragua we can pool sixteen communities into 3-6 meetings.) Beyond that, this project has conducted 60 meetings thus far. Due to delays in Honduras, we have thus far not conducted any annual review meetings.</p>	<p>In Honduras, organizing the remaining socio-economic questionnaires, and individual farm visits should be followed by annual/final community meetings to present and discuss results achieved, challenges, and lessons learned as far as farm improvements and conservation agreements.</p>

<p>Output 3. Learning and Outreach: Report on the impacts of improved livestock management practices, evaluating and comparing forest cover, biodiversity, and poverty reduction impacts across the spectrum of cultural contexts. Dissemination of methods and lessons learned to nearby communities, agricultural and protected area agencies, and across the entire NGO, Multilateral, and government community.</p>	<p>3.1 Pre- and post- intervention measurements of livestock management knowledge, attitudes, and practices, productivity, forest cover, biodiversity, wildlife conflict, and livelihoods at the household and community level by years 1 and 3, respectively. 3.2 Working paper rigorously evaluating the effectiveness of sustainable ranching interventions on conservation and development impacts drafted, presented to participating communities for feedback, and article submitted for publication in a peer-reviewed scientific journal by year 3. 3.3 Written reports delivered to relevant actors and four presentations are given to local and national leaders by year 3</p>	<p>3.1 Pre and post intervention measurements are done in Nicaragua. Their detailed analyses pend, although a substantial amount of advance metrics and conclusions can be reviewed in Section 3.1, Output 1, Activity 1.2, Output 2, Activity 2.2, Output 3, Activity 3.1, Section 3.2, Output 1, Section 3.3, 0.2, 0.3, and Annexes 4,5,7,8,9,10 (of this report). The post-intervention measurements pend in Honduras. Although the ARR3 reviewer questioned the efficacy of some indicators, we can likely skin that cat with what we have in the hat, at least for Nicaragua, by/before October 2020. This is an extraordinarily data rich project, with many thousands of camera trap images, even more data on birds, and over 100 socio-economic questionnaires that included eight pages each. More conclusions will be available in October 2020.</p> <p>3.2 The working paper summarizing the holistic project effectiveness pends, but we should aim to be wrapping that up by September 2020 (four months hence). Beyond that, we have a number of adaptive management-oriented papers also planned, but they may take longer.</p> <p>3.3. Not only is important that we keep our eye on having a written bi-national working paper done by September 2020, but we will also need to ensure the report's delivery to all relevant actors and institutions in both countries, and deliver the results in two presentations in each country, one to an audience if government and non-government institutions, and another to the people who helped us collect the data and execute, I.E. in the indigenous territories which are at the centre of this project.</p>	
<p>Activity 3.1. <i>Pre / post monitoring of livestock management practices and livelihoods indicators and biodiversity and forest conservation indicators</i> including knowledge, attitudes, practices, and productivity of livestock management, forest cover, avian diversity and abundance, medium and large sized mammals, and human-jaguar conflicts</p>		<p>The pre-intervention diagnostics for both countries were completed, summarized, and analysed. These are quite comprehensive and serve as a solid baseline, for the post-intervention diagnostics (data collected for Nicaragua, pends for Honduras). We already have perspectives on some of these parameters – presented in thus AR but much greater detail will be available October 2020.</p>	<p>In the next four months it is important that we complete the full suite of post-project diagnostic questionnaires, conducts the requisite annual meetings, with over 40% participation by women, and also assesses project performance with individual visits to all the farms- in Honduras. If the COVID19 lock down in Honduras lifts soon, we should be in good shape.</p>
<p>Activity 3.2. <i>Working paper</i> rigorously evaluating the effectiveness of sustainable ranching interventions on</p>		<p>Planned for the next 4-5 months</p>	<p>Planned for the next 4-5 months</p>

<p>conservation and development impacts drafted, shared with all participating communities for feedback, and <i>one article completed and submitted for publication</i> in a peer-reviewed scientific journal by year 3.</p>			
<p>3.3 <i>Disseminate informational material</i> highlighting results and lessons learned to share with institutions working in and impacting the Mosquitia. Share information about conservation agreements more widely in electronic form on social networks, websites, and through partner institution networks and deliver written reports to relevant actors, including four separate presentations delivered to relevant local and national leaders.</p>		<p>Planned for the next 4-5 months</p>	<p>Planned for the next 4-5 months</p>

Annex 2: Project’s full current log frame as presented in the application form (unless changes have been agreed) - if applicable

N.B. if your application’s log frame is presented in a different format in your application, please transpose into the below template. Please feel free to contact Darwin-Projects@ltsi.co.uk if you have any questions regarding this.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Impact: Environmentally sustainable livestock management practices are successfully adopted across the bi-national Heart of the Mesoamerican Biological Corridor, leading to biodiversity protection and improved welfare of vulnerable communities.</p>			
<p>Outcome: Improved livestock management techniques are successfully implemented in ladino and indigenous farms in Mosquitia, leading to rigorously documented improved welfare of vulnerable communities, conservation of biological diversity, and forest cover.</p>	<p>0.1 Forest cover: Rate of forest clearing in 40,000 hectares of target communities and household farms is reduced by 30% as compared to the 10-year historical average.</p> <p>0.2 Biodiversity: After three years, avian alpha diversity/ species richness in livestock systems and frequency of medium-sized and large mammals adjacent to livestock systems has increased, and species composition between specific livestock production systems and nearby intact forests have become significantly more similar according to the Sorenson quantitative /Bray-Curtis index.</p> <p>0.3 Human-wildlife conflict: Retaliatory killing of carnivores, particularly jaguars, reduced by 50% across project farms, households and communities.</p> <p>0.4 Local Livelihoods: At least 130 families will experience a 50% increase in livestock productivity due to integrated livestock management</p>	<p>0.1 Forest cover: Comparisons between long-term trends and project impacts using remote sensing, validated by on-ground reconnaissance and interviews.</p> <p>0.2 Biodiversity: Results of pre- and post- intensive avian sampling in and adjacent to implemented systems and in nearby forest. Results of medium and large mammal sampling adjacent to pilot projects and in nearby forests, using block design.</p> <p>0.3 Human-wildlife conflict: Baseline information on attacks from questionnaires compared to frequencies during the project.</p> <p>0.4 Local Livelihoods: Project participant surveys; livestock mortality; calving rate; time to market; records of livestock sales from rancher logs (improvements will be disaggregated by gender).</p>	<p>0.1 Forest cover: Cloud-free and current scenes of project areas are available for remote sensing analysis. (This is one of the reasons we will also employ on-ground verification).</p> <p>0.2 Biodiversity: Relative frequency data reflect true population trends. Fluctuations due to weather, seasons, disease, and wildlife population dynamics remain within normal parameters, allowing detection of the effects of improved agriculture and reduced deforestation. (To mitigate this risk, we will standardize sampling and use robust experimental design.)</p> <p>0.3 Human-wildlife conflict: Honest pre- and post- reporting by project participants.</p> <p>0.4 Local Livelihoods: Changes due to improved livestock management are measurable and observable within the 3-year project lifetime.</p>

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	(including market value and availability for local consumption and subsistence).		
Output 1 Improved livestock management and community conservation techniques adopted by at least 130 families in seven communities across four ethnic groups in four protected areas and two countries	<p>1.1 At least 130 Miskitu, Mayangna, Sumo, and campesino families identified and trained in management techniques (with >40% of participants' women) by year 1.</p> <p>1.2 Improved management techniques adopted and established in seven target communities by year 3.</p> <p>1.3 At least 50 farmers from nearby communities are invited to tour farms with improved techniques, exposing them to the concepts and practices in a participatory fashion with challenges and successes openly discussed by year 3</p>	Number of households/ farms implementing integrated systems; number of people trained in ranch management plans and methods; notes of meetings with ranchers; field visit reports and photos; rancher logs documenting use of improved practices. Participant lists of inter-community exchanges, tours, and presentations; Changes in knowledge, attitudes, and practices, ascertained through pre- and post questionnaires.	Ranchers and vulnerable communities will be interested and incentivized to participate in project activities.
Output 2 Explicit agreements through which project beneficiaries commit to conservation outcomes adopted by at least 130 families in seven communities across four ethnic groups, four protected areas, and two countries	<p>2.1 Explicit agreements with 130 families with clear commitments to conservation outcomes in exchange for support with livestock management developed, signed, and implemented by year 2.</p> <p>2.2 A total of 21 meetings (one in each of seven communities annually for 3 years) held to present and discuss results achieved, and challenges of conservation agreements by 2019.</p>	<p>Signed conservation agreements, photos, annual reports, final external report, meeting minutes.</p> <p>Meeting minutes, photos, annual reports.</p> <p>Informational materials produced, list of institutions reached.</p>	Institutional support and legal framework remain favourable to the implementation of community conservation agreements. Communities are able to reach consensus and maintain an adequate amount of cohesion regarding their participation in community agreements.
Output 3 Report on the impacts of improved livestock management practices, evaluating and comparing forest cover, biodiversity,	3.1 Pre- and post- intervention measurements of livestock management knowledge, attitudes, and practices, productivity, forest cover,	Monitoring databases; working paper draft; minutes of meetings with communities and other stakeholders; submission or acceptance letter of peer-	External factors do not significantly change the socioeconomic or ecological context in a manner that confounds the attribution of impacts of livestock

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>and poverty reduction impacts across the spectrum of cultural contexts. Dissemination of methods and lessons learned to nearby communities, agricultural and protected area agencies, and across the entire NGO, Multilateral, and government community.</p>	<p>biodiversity, wildlife conflict, and livelihoods at the household and community level by years 1 and 3, respectively. 3.2 Working paper rigorously evaluating the effectiveness of sustainable ranching interventions on conservation and development impacts drafted, presented to participating communities for feedback, and article submitted for publication in a peer-reviewed scientific journal by year 3. 3.3 Written reports delivered to relevant actors and four presentations are given to local and national leaders by year 3</p>	<p>reviewed article; 1,000 copies of report printed and delivered and copy of four separate presentations, one local and one national, for each of the two countries.</p>	<p>management implementation or conservation agreements (e.g. El Niño impacts on forest fires).</p>
<p>Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)</p> <p>Output 1: Improved Livestock Management</p> <p>1.1 <i>Conduct participatory diagnostics of livestock management and forest conservation challenges</i> in each community and determine interventions tailored to each target community/household, ensuring at least 40% participants women. Participatory diagnostic of livestock and farm management challenges, will include questionnaires and meetings to assess knowledge, attitudes and practices regarding livestock condition, livestock management, forest clearing, human-jaguar conflicts, sources of livestock losses, nutritional status in households, hunting practices and locations.</p> <p>1.2 <i>Deliver capacity-building training in participatory livestock management improvements.</i> Initiate expert delivery of hands-on participation training in field schools, generating a cohort of future leaders in each target community, working in site specific increasing productivity in target farms, diversification of food sources for livestock sites, elevating nutritional status, effecting protection of water sources, and training in diagnosis of diseases and basic veterinary medicine, as well as education on methods to reduce human-carnivore conflicts.</p> <p>1.3 <i>Conduct exchange visits to participating farms,</i> inviting and supporting at least 50 farmers from nearby communities to tour farms with improved techniques, exposing them to the concepts and practices in a participatory fashion, and openly discussing challenges and successes.</p> <p>Output 2: Community Conservation Agreements</p> <p>2.1 <i>Generate conservation agreements with target communities</i> through a participatory process, linking technical assistance in livestock management to explicit community commitments to forest and biodiversity conservation outputs that are congruent with protected area conservation objectives.</p> <p>2.2 <i>Hold annual assembly meetings</i> in each community implementing a conservation agreement to present and discuss results achieved, challenges, and lessons learned (a total of 21 meetings, or one in each of seven communities annually for 3 years).</p> <p>Output 3: Learning and Outreach</p>			

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>3.1. <i>Pre / post monitoring of livestock management practices and livelihoods indicators and biodiversity and forest conservation indicators</i> including knowledge, attitudes, practices, and productivity of livestock management, forest cover, avian diversity and abundance, medium and large sized mammals, and human-jaguar conflicts.</p> <p>3.2. <i>Working paper</i> rigorously evaluating the effectiveness of sustainable ranching interventions on conservation and development impacts drafted, shared with all participating communities for feedback, and <i>one article completed and submitted for publication</i> in a peer-reviewed scientific journal by year 3.</p> <p>3.3 <i>Disseminate informational material</i> highlighting results and lessons learned to share with institutions working in and impacting the Mosquitia. Share information about conservation agreements more widely in electronic form on social networks, websites, and through partner institution networks and deliver written reports to relevant actors, including four separate presentations delivered to relevant local and national leaders.</p>			

Annex 3: Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 total	Total to date	Total planned during the project
Established codes									
4a, 4b	Number of undergraduates receiving training		Honduras Nicaragua		4camera trap installation and bird evaluations	1 undergraduate student Nicaragua's National Agricultural University 3 more Honduras		8	15
5	Number of people to receive at least one year of training (field work and analysis one year)		Nicaragua and Honduras	53 Nicaragua, 6 people project operations, 47 farmers	66 people Honduras		During a trip, UNAG delivered some veterinarian training to 87 people, but no continuity	53 – 66 Σ= 119	119
6a, 6b	Number of people receiving training in diagnosis and treatment of health issues in livestock		Nicaragua and Honduras	58 people in workshops			87 people in Honduras, even if only 66 long term participants Annex 15	145	80

6a, 6b	Number of people getting additional training and capacity building systematic sampling of fauna		Nicaragua and Honduras	12 people, 7 beneficiaries and 5 parabiologists Nicaragua	6 parabiologists Honduras	3 more students Honduras, 1 additional student Nicaragua		22	24
9	Number of species/habitat plans produced for governments, public authorities, or other implementing agencies in the host country		Nicaragua and Honduras		3 territory wide conservation agreements signed by legally titled indigenous territorial governments	1 WCS Yale analytical product (White paper), highlighting bi-national threats and communicating recommendations	1 WCS sub agreement to support BAKINASTA indigenous territory in conservation activities, in Honduras	5	5
12a	Number of computer based data bases to be established and handed over to the host country								2
14a	Number of conferences/seminars/workshops to be organized to present/disseminate findings		Nicaragua and Honduras		4 formal presentations in Nicaragua, 1 informal albeit with Vice Minister	Presentation to students UNAG (batched with American Bird Conservancy) = 1, small succinct presentation widely shared (e.g. species listing workshop) with one ICF at five forests CR = 1, plus UNAG personnel and students' presentations = 2	Five final meetings in three indigenous territories Nicaragua, Project concludes October, we are still in Year 4, more to come	13	4 territorial and national conferences to present results
14b	Number of conferences/seminars/workshops to be attended at which findings		Nicaragua and Honduras		Portions shared 4 x	Portions shared 4 x	Portion's shared 5 x, however LOGFRAME calls for 3	Portions 13x, but 4 more pend. Aim for	We had said 3, but in Log frame -----it is 4

	from Darwin project work will be presented/disseminated						more, fed level Nicaragua and fed and indigenous Honduras 3	17 in total	two in each country, @ federal and territory levels, so 4 in Log frame, now at 13, aim for 4 more COVID19 depending
22	Number of permanent field plots and sites to be established during project and continued after Darwin funding has ceased.		Nicaragua and Honduras	23 Nicaragua, 16 camera traps, 7 bird sites	21 Honduras, 18 camera traps, 3 bird sites	An additional 12 camera trap sites Nicaragua, an additional 6 avian sampling sites Honduras	No new sampling Year 4	62	48
23	Value of resources raised from other sources (e.g. in addition to Darwin funding) for project work		Nicaragua and Honduras						

Publications – Please see Annex 16

Annex 4 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	x
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	x
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	
Have you involved your partners in preparation of the report and named the main contributors	x
Have you completed the Project Expenditure table fully?	x
Do not include claim forms or other communications with this report.	