Final Report to The Christensen Fund

28 September 2016

Project: Knowledge Transfer in Northwestern Mexico: Conservation Ecology Courses to Create Local Leaders Among the Comcaac

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Grantee: International Community Foundation

(on behalf of Benjamin T. Wilder)

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Report Narrative

Executive Summary

Often, individuals who have the most direct impact on future land use have the least opportunities for education. This is especially true among indigenous and rural societies. In order to increase opportunities for knowledge transmission and to support the development of the next generation of leaders in conservation and ecology this project created an intensive field-based ecology course for the indigenous Comcaac. Rapid change envelops the Comcaac and their desert nation as outside cultures, paved roads, invasive species, and development pressures increasingly bear down on what was once a remote portion of the Gulf of California. A three-parted course over a year period provided foundations for how to undertake a research project from the beginning to end. In November 2015, March 2016, and April 2016, 16 students participated in and completed the three blocks of the course over a combined 50 days. Students received in-depth classroom training by a series of esteemed visiting researchers, conducted multiple field ecology projects, maintained a detailed field notebook, developed, wrote, and presented proposals for independent ecology and conservation projects formally submitted to the Mexican Commission for Natural Protected Areas (CONANP), took two final exams, and participated in shared learning with Duke University students. This intensive field course provided needed training in project development and implementation, and was a successful advancement of the trajectory of the participating students. Continued collaborative efforts among regional stakeholders can continue to realize the overarching goals of this project.

Detailed Narrative

The course had two main components, Conservation Ecology Courses (CEC) and Comcaac Community Research Teams (CCRT). The CEC were carried out in three blocks:

Block 1 – Foundations
Block 2 – Project implementation
Block 3 – Shared Learning

The CCRT proposals were submitted to the Program for the Development of Sustainable Conservation (PROCODES) of CONANP at the end of Block 1, received additional training in Block 2, and continue to operate.

This detailed narrative first describes the activities of the CEC (outcomes 1, 2, and 3) and then the CCRT (outcomes 4, 5, and 6), a discussion of challenges encountered, a discussion of major takeaways, a series of metrics, a list of collaborators, the financial report, and finally appendices.

Conservation Ecology Courses (CEC)

Outcome 1: At end of fall 2015, 15 Comcaac students are trained in the underlying basics of conservation and ecology. This will be realized over three weeks through the first course block – Foundations.

Outcome 1 was realized in two stages, first via the participation of the students at the 2015 N-Gen Summit in Guaymas, Sonora the 27–29 October, and secondly in the first block of courses between November 11th and 29th.

The course had 14 students (hometown):

Eduardo Samuel Romero Montaño (Punta Chueca)
Felipe Eliezer Barnett Herrera (Punta Chueca)
José Daniel Comito Molina (Punta Chueca)
Maximiliano Damian López Romero (Punta Chueca)
Romelia Barnett (Punta Chueca)
Vilma López (Punta Chueca)
Vilma Irasema Morales Astorga (Desemboque)
Claudia López (Punta Chueca)
Leonel Hoeffer (Desemboque)
Lourdes Karelia Perales Hoeffer (Desemboque)
Miriam Karina Montaño Segovia (Punta Chueca)
Ana Maria Morales Ortega (Desemboque)
Sócrates Rodriguez (Desemboque)
Eliza Romero (Punta Chueca)

There are also two Comcaac collaborators participating as teaching assistants and students:

Mayra Estrella (Desemboque), leader Grupo Tortugero Comcaac Desemboque.

Humberto Romero Morales (Punta Chueca), traditional elder and leader in conservation and plant ecology.

Students were identified by issuing a general, broadly themed exam to all interested participants to determine their level of familiarity with subjects to be covered in the course and ability to think critically (see Appendix 1 for the test). There were no right or wrong answers, and acceptance for participation was based on responding to the question (not simply repeating the question in the answer), providing detailed responses, and ability to problem solve.

A trip to both villages, Punta Chueca and Desemboque, was undertaken in middle August 2015 to administer the test. Sixty-eight interested Comcaac youth were identified (See Appendix 2), of which 42 submitted application exams.

The tests were reviewed by Ben Wilder and an additional advisor to the course. Those selected were sent acceptance letters, while those not accepted were sent letters of decline explaining this is just the first step in a larger scope of education programs. Communication with all individuals outside of personal interactions was undertaken primarily via Facebook messenger.

The course was based in a rental house half-way between Bahía de Kino and Punta Chueca, Sonora in the Western Horizons (or Dos Palmas) community. Students from Desemboque (6 individuals) stayed either in tents at the rental house or with relatives in Punta Chueca. A vehicle was rented from the University of Arizona to facilitate transportation.

The following proposed activities were undertaken:

• 1a. Participation in 2015 N-Gen Summit in Guaymas, Sonora.

The 2015 N-Gen Summit brought together over 170 participants, of which 60 were from the U.S., 82 from Mexico, and 28 indigenous. Of the 28 indigenous participants 20 were Comcaac. The Summit was based around 29 sessions identified and led by the participants. Two of these sessions were led by Comcaac participants, "Código de ética: trabajar en/con Comunidades" (http://nextgensd.com/codigo-de-etica-trabajar-encon-comunidades/) and "Defense of territory".

Summit photos, clockwise from top left: Vilma Morales, Karelia Hoeffer, Gaby Molina, and Leonel Hoeffer leading the Defense of Territory session; participants during session proposals the first morning of the event; Sócrates Rodriguez talking during the Código de ética session; the session proposals; group photo; Romelia Barnett (left) and Mayra Estrella during the Defense of Territory session.

• 1b. Field notebook methods for observations and data collection, the backbone of science.

Each student was given a field notebook and encouraged to use is as a base of their learning in the course. The very first exercise of the course was focused on picking a 2 x 2 m piece of desert and sitting there for an hour making observations in the field notebook.

A 2 x 2 m quadrat used as the first exercise for the course

The first week into the course there was a field notebook check to help the students utilize this tool. The final exam at the end of the course was an open notebook test that allowed them to directly use the notes they had taken during the three weeks of the course. Students used the field notebooks in all aspects of the course.

(*left) Vlima López working in her notebook at an estuary.*

(right) Claudia López writing in plant names into her notebook.

Notebook photos, clockwise from top left: Ben Wilder talking to the group at Estero Santa Rosa; Mayra and Karelia recording birds they observed during a birding walk; Max and Samuel working together to identify the parts of a bird in Cmiique Iitom; the parts of a bird as labeled in Cmiique Iitom in Samuel's notebook.

• 1c. Scientific and ethno-taxonomy trainings to link different ways of classifying biodiversity.

A series of presentations were given by multiple presenters on different perspectives of ecology and science. The topics and presenters, in order of date presented were:

- Dos mundos de Conocimiento, Occidental y Tradicional – Cathy Ramos
- Importancia de las series de datos de largo plazo en la conservación y manejo de los recursos naturales – Enriqueta Velarde
- Criterios para la identificación de Humedales de Importancia Internacional y lineamientos para su aplicación – Enriqueta Velarde
- ¿Que es El Niño? – Ben Wilder and Enriqueta Velarde
- Dibujando en el campo – Cathy Moser Marlett
- Linguistic and Biocultural Diversity– Carolyn O'Meara
- Como a hacer un presupuesto – Ben Wilder and Carolyn O'Meara
- Análisis de datos de Aves – Enriqueta Velarde
- Defaunación – Rodolfo Dirzo
- Biogeografía Histórical de las Grandes Islas – Ben Wilder

- Análisis de datos colectaba en Isla Tiburón – Rodolfo Dirzo
- Aplicaciones a PROCODES – Alberto Mellado

Scientific and ethno-taxonomy presentations, clockwise from top left: the diversity of columnar cacti fruit in the region of the Comcaac; Enriqueta Velarde presenting on the importance of long-term data series; Rodolfo Dirzo illustrating the loss of diversity; Ben and Enriqueta leading the analysis of data taken on birds from monitoring trips to various estuaries; Carolyn O'Meara discussing linguistic diversity; students practicing drawing natural objects; Rodolfo Dirzo walking thought results of the data collected on Isla Tiburón; Max entering his groups data calculations for density of plants observed in transects from Isla Tiburón.

• 1d. Biodiversity trainings by visiting professors and Comcaac elders.

There were five areas of focus of biodiversity trainings:

- Biodiversidad, Educación e Investigación en México– Rodolfo Dirzo
- Nuestra Flora: Conocimiento Occidental y Comcaac de las plantas – Ben Wilder
- Como a prensar una planta – Humberto Romero Morales

- Las Aves: Biología e Identificación – Enriqueta Velarde
- El Conocimiento de los moluscos por los Comcaac de Sonora, México – Cathy Moser Marlett

Biodiversity trainings, clockwise from top left: Cathy Moser Marlett presenting the diversity of Comcaac knowledge on mollusks; the course on a birding walk with Enriqueta Velarde; Rodolfo Dirzo leading the students in a field ecology project on Isla Tiburón; the students conducting bird monitoring at Estero Santa Rosa; Humberto Romero leading the course in how to press plants; Rodolfo Dirzo presenting on species diversity in Mexico; Rodolfo Dirzo leading the analysis of data taken earlier that day on Isla Tiburón.

• 1e. How to undertake an independent research project and PROCODES applications.

An underlying thread of the course was the development of independent research projects. Students were given the first week to make observations and develop ideas and identify

collaborations with other students in the course. By the second week they needed to have a firm project idea and main questions. At the end of the course each group was required to turn in a full project proposal with a title page, main question, introduction, objectives, methods, time table, identification of personnel and rolls, budget, and appendices. In addition, each group presented their project to the course.

Project proposals were used as a basis for applications to the Program for the Development of Sustainable Conservation (PROCODES) of CONANP. PROCODES is a funding mechanism for community led conservation and science projects.

See below under outcomes 4, 5, 6, and additional objectives for the actual proposals created by the students.

In addition to the originally proposed objectives, the following activities were undertaken:

• 1f. Final Exam.

To help crystalize and stress the importance of the concepts presented in this first part of the course, the students were given a final exam on the last day of the first block. Students were allowed to use their field notebooks and a calculator, but nothing else.

The average on the test was 78%.

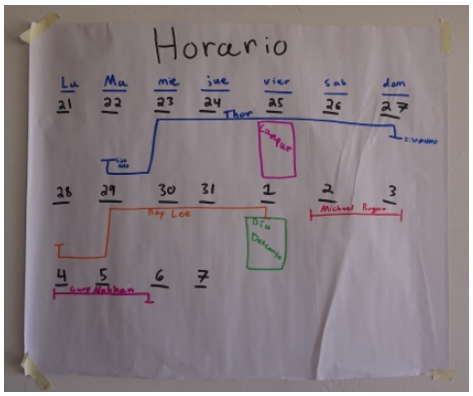
See Appendix 3 for the questions of the final exam.

• 1g. Course Facebook page

To help communicate the activities of the course among the Comcaac and to a broader audience, we created a Facebook page for the course. It can be seen at: https://www.facebook.com/cursocomcaac

Outcome 2: By the end of spring 2016, 15 Comcaac students are able to undertake applied conservation science projects. This will be realized through a second three week course block– Project Implementation.

The same 14 students and two teaching assistants began and finished course block 2, with one additional student, Servando López Monroy from Punta Chueca. Course block 2 was held in the same rental house half-way between Bahía de Kino and Punta Chueca, Sonora between March 20th and April 7th 2016. Students from Desemboque (6 individuals) stayed either in tents at the rental house or with relatives in Punta Chueca. A vehicle was rented from Adobe Transportation to facilitate transportation.

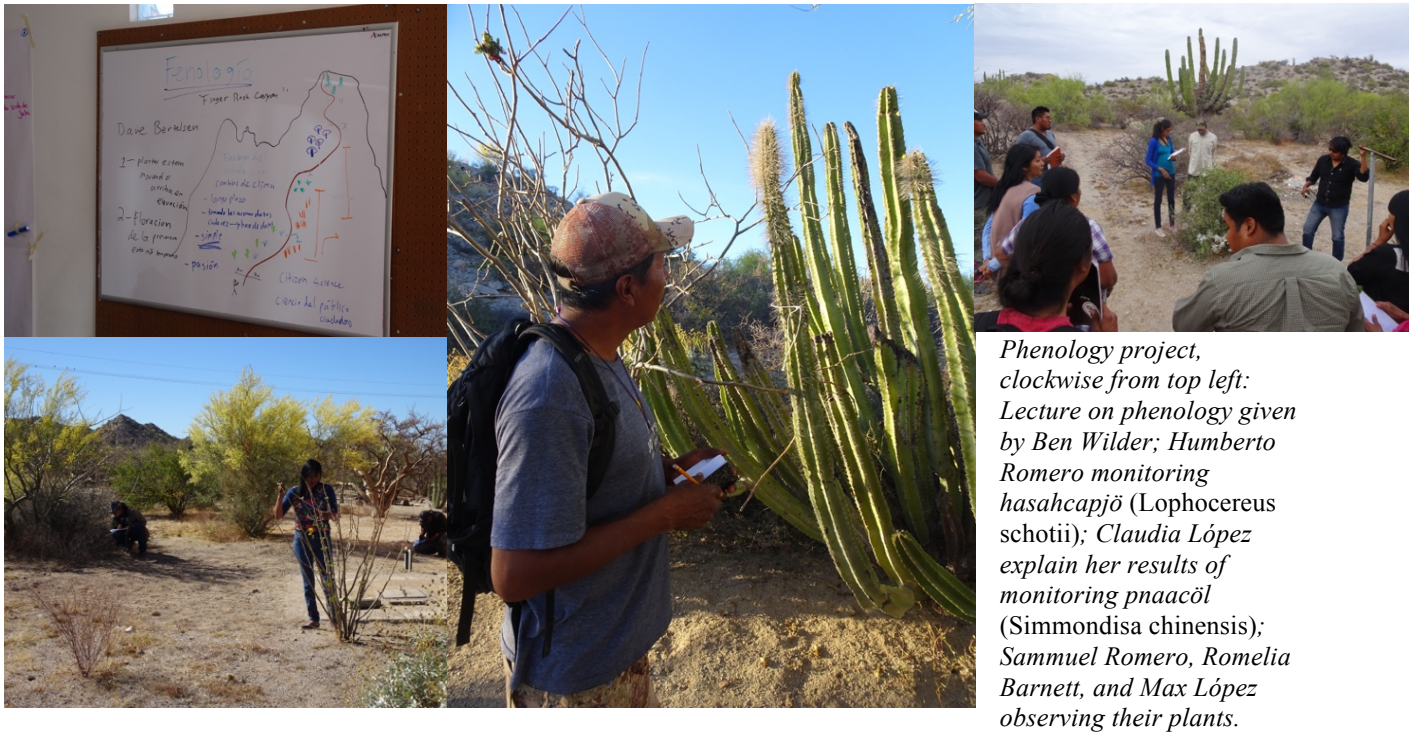


Schedule for course block 2

• 2a. Student-led interdisciplinary group research project.

Two group research projects were undertaken during block 2. The first was a phenology project started on the first day of the block and running to the last. The second part of the course was held during March at the height of spring with a great deal of plant growth and flowering. Phenology is the study of cyclic and seasonal natural phenomena, especially in relation to climate and plant and animal life. In order to help the students refine their observational skills, each student was asked to select a plant and identify aspects of that plant that they would monitor through the duration of the block. On the first day, students showed their plants to Ben who pushed them quantify their observations. Specifically, what are they tracking over time and how can they document the changes they are observing (i.e., count the number of closed and open flowers each day, measure the growth of a stem…).

Students then individually tracked the changes in their study plant throughout the block. On the final day of the course block each student presented their observations to the rest of the class.



Phenology project, clockwise from top left: Lecture on phenology given by Ben Wilder; Humberto Romero monitoring hasahcapjö (Lophocereus schotii)*; Claudia López explain her results of monitoring pnaacöl* (Simmondisa chinensis)*; Sammuel Romero, Romelia Barnett, and Max López observing their plants.*

The second group project was led by visiting instructor Thor Morales in which each student created a photo essay. Thor was with the course for four days. On the first day he presented basic concepts in photo composition and divided the course up into four groups to do rapid photo essays on topics of their choosing. The groups then presented the photos they took to the rest of the class. The next day each student developed a story board for their photo essay. On the third day of Thor's time with the course we all drove up the coast and camped at an estero on the edge of the Canal del Infiernillo. For that day, night, and next morning the students captured images for their photo essay. The students spent the final day of the project assembling their photo essay and writing captions for each image they included. That evening each student presented 10 images from their photo essay in Cmiique Iitom as we gathered outside under the setting sun.

Photo essay project, line by line from top left: Thor Morales assisting students with story boards; rapid photo essay topic presentation; image from the rapid photo essay "el curso"; Daniel Comito's story board; Camp site at Estero Viboaras; Vilma Morales applying face paint; Humberto taking photos; Vilma, Humberto, and Mayra Estrella; Thor assisting Daniel in selecting his photos; group working; the group presenting their photo essays; Daniel presenting his story "El silencio y la voz del mar"

• 2b. Short-course on desert bighorn sheep led by Dr. Ray Lee.

We were fortunate to be joined by Ray Lee, bighorn sheep biologist and conservation expert. Ray was the biologist that first worked with the Comcaac at the time of the initiation of the selling of hunting permits for bighorn sheep on Isla Tiburón in the 1990s. At that time Ray was the director of the Wild Sheep Foundation, and remained the lead bighorn sheep biologist for the Tiburón Island sheep until 2012. He is the expert on the management and biology of not just the Tiburón sheep population, but also the desert bighorn sheep in general. His gracious acceptance of the invitation to join the course marked the first time he had been back to the region in over four years and the first time he had led trainings for community members.

His four days with the course focused on wide variety of topics as related to bighorn sheep. The first days were lectures and discussions on biology, monitoring, and management topics. We addressed questions of how to estimate population size from helicopter surveys, what is the population status of desert bighorn sheep throughout their range, how does management of sheep populations vary between game ranches and conservation programs, and how has the Tiburón Island population changed through time.

The next days focused on field methods and a closer examination and discussion, with the information covered in day one as a baseline, of different strategies for management of the Tiburón bighorn sheep population. The revenue generated from the selling of hunting permits for bighorn sheep on Isla Tiburón is one of the most important economic aspects of Seri society. In the past five years there has been great strife and internal disagreement over the management of this resource. This intensive focus on bighorn sheep gave the students an opportunity to collectively discuss a complicated and culturally sensitive issue. Ray was able to provided skills of how to use census information to arrive at an estimate of a biologically sustainable number of hunting permits to be issued at market and how much money that could fetch. We combined that information with field monitoring techniques to quantify populations size.

The management of bighorn sheep is controlled by the Seri governor and is an increasingly politicized matter. These several days of focus on the biology and management of bighorn sheep, especially as it related to the Seri region, provided the students with a unique opportunity to see this issue from new perspectives. It was an important and productive first step to providing positive inroads into a complicated and nuanced management issue.

Short-course on desert bighorn sheep, clockwise top left to right: Ray Lee leading a lecture on population biology; Humberto Romero showing the students how to measure horns of a bighorn sheep; Ray Lee with an example of a bighorn sheep trophy; Felipe Barnett teaching the students the multiple names of mule deer in Cmiique Iitom; The course with Ray Lee; Romelia Barnett undertaking a census for mule deer; Servando López Monroy teaching the course how to undertake a population transect; three students overlooking the Canal del Infiernillo and Isla Tiburón.

• 2c. Training in oases biology by Dr. Michael Bogan

University of Arizona professor Michael Bogan joined the course for a focused training on desert oases. A series of talks introduced the students first to general concepts about the unique concentration of recourses that are normally rare and permit life in oases, the water cycle, the diversity and types of oases in the Sonoran Desert, and the types of aquatic species found in the oases. He then presented a detailed overview of freshwater invertebrates including morphology, life cycle, diversity, ecology, and physiology. Finally, this section was concluded with an introduction to field methods for monitoring oases. Specifically, how to measure temperature, conductivity, ph, dissolved oxygen, and an estimation of volume.

Training in oases biology, clockwise top left to right: Michael Bogan identifying aquatic invertebrate morphology; Michael teaching the students field methods; photo and explanation a carnivorous water beetle, here eating a fish; Felipe Barnett demonstrating how to take conductivity measurements.

• 2d. Ironwood ecology with Dr. Gary Nabhan and Dr. Laura Monti

Gary Nabhan and Laura Monti were able to join the course and share their extensive experience and knowledge of the biology, use, and conservation of ironwood (palo fiero, *Olneya tesota*). Our efforts were based on a study they undertook in the 1990s with Mexican biologist Humberto Suzan that quantified the relationship between crown coverage and basal diameter of the trunk. We went to areas that have been heavily impacted by clear cutting of ironwood forests and measured the basal diameter of the cut trunks. With that data, we were able to use the correlation established by the earlier paper to estimate the past canopy coverage of these ironwood forests.

This class room and field exercise allowed us to illustrate and practice a series of important topics. Ironwood is well recognized as a keystone species, among many reasons for its role as a nurse tree for associated species, especially columnar cacti and understory herbs. We were able to visit both cleared and extant ironwood forests and see the effect of clearing on the population structure of other desert plant species. Likewise, we were able to discuss and practice the meaning of a correlation. This was a running theme through the course, especially that when given an existing set of relationships, gathering additional data will allow you to extrapolate to

predict the other variable. In this case, the measurement of the trunk diameter of cut ironwood trees allowed us to estimate the past canopy coverage of the once grand forest.

Ironwood ecology, clockwise top left to right: Gary Nabhan discussing field methodology; Leonel Hoeffer plotting the correlation between trunk diameter and canopy cover; the course taking data in the field; the students with Gary and Laura; lecture of the nurse tree effect under the canopy of an ironwood tree; Karelia Hoeffer presenting her groups field data results.

• 2e. Biodiversity Trainings by visiting professors and Comcaac elders.

- Review of first final exam – Ben Wilder
- Fenología (Phenology) – Ben Wilder
- Guía de Campos – Ben Wilder
- ¿Que es una hipótesis? – Ben Wilder
- El Niño – Ben Wilder

- Photo composition – Thor Morales
- Monitoreo aéreo y terrestre del Borrego cimarrón (*Ovis Canadensis*) en Baja California – Ray Lee
- A Status of Bighorn Sheep in Various States of Mexico – Ray Lee
- Economic Aspects and the "Market" for Desert Bighorn Sheep – Ray Lee
- Factors that affect the biology of bighorn sheep in the territory of the Comcaac – Ray Lee
- Diet of bighorn sheep on Isla Tiburón – Humberto Romero
- Comcaac knowledge of Mule Deer – Felipe Barnett
- ¿Que es un oasis? – Ben Wilder
- Invertebrados de Agua Dulce – Michael Bogan
- Biodiversidad y conservación de invertebrados y especies acuáticas en los oasis del Desierto Sonorense – Michael Bogan
- Oases de Isla Tiburón – Michael Bogan
- Nurse Tree syndrome – Gary Nabhan
- Como mantener y protegir los recursos de palo Fierro – Laura Monti and Gary Nabhan

Biodiversity Trainings, clockwise top left to right: Mayra Estrella explaining the concept of hypotheses; students sharing their examples of hypotheses; Michael Bogan speaking about oases; Servando López Monroy sharing his hypothesis example; Ben Wilder speaking to the course; Ray Lee leading an example filed survey method.

• 2f. Final Exam.

A review of all concepts addressed during block 2 was held two days before the end of the course block. The most significant concepts, especially as related to quantitative ecology, presented in second part of the course were included on a final exam on the last day. Students were allowed to use their field notebooks and a calculator, but nothing else.

The average on the test was 91% and significant increase from the 78% average from Exam 1.

The most encouraging result of these test scores and the formal lecture portions of the course was the increased comfort and proficiency the students had in math. At the beginning of the course the students displayed a very introductory level of mathematical experience, no less interpreting graphs. By the end, every student was able to solve the core mathematical concepts covered and to identify and explain correlative relations in graphical format.

See Appendix 4 for the questions of the final exam.

Outcome 3: In spring 2016 ensure the experience of group learning for the 15 Comcaac students with 10 students from Duke University via a collaborative field course over one week – Shared Learning.

• 3a. Joint field excursion to Tiburón Island.

Between the 27th of April and the first of May, 10 Comcaac students spent four nights and five days on Isla Tiburón with Dr. Xavier Basurto's 15 student "Community-Based Marine Conservation in the Gulf of California" Duke University course. With boat and logistical support from the Prescott College Kino Bay Field Station, we established a base camp on the southeast corner of the island at site named Coralitos. From this location we were able to mount day expeditions to neighboring islands each day of the trip. The goals of our time on the island were several fold: foster a shared learning experience between students of the two classes, primarily through a joint field exercise (see discussion of the cardón plot in 3b); lead lectures and discussions about island biogeography (Ben Wilder), marine conservation (Xavier Basurto), ocean productivity and El Niño climate oscillations (Ben and Xavier), flora and fauna of the islands (Ben and Xavier), sea turtle conservation (Cosmé Becerra), and Comcaac traditional ecological knowledge especially as related to sea turtles (Mayra Estrella and Humberto Romero); explore neighboring islands and the principal waterhole, Xapij, on Isla Tiburón through trips led by the Comcaac; encounter marine mammals.

Despite unfavorable wind forecasts we were able to realize the exact trip we had hoped for. The first day we arrived at Isla Tiburón, established camp, and then went out towards the deeper channels in the Gulf. While there we encountered a dense mass of krill among which were multiple feasting fin whales, dozens of leaping manta rays, and thousands of phalarope seabirds also feasting on the krill. It was a magical beginning to the trip that put each of us in touch with the abundance and diversity of the Gulf of California.

The second day we divided the group in half. On group would begin the cardón plot (see below) and the other would go on a hike on Isla Tiburón to the Xapij waterhole led by Humerto Romero. The group that went to Xapij was able to make it to the waterhole, several kilometers inland, and experienced the most important fresh water site on the island through the eyes of the Comcaac.

The third day the whole group took advantage of good sea conditions and boated to the most isolated island in the Gulf of California, Isla San Pedro Mártir. Both Xavier and Ben have

Joint field excursion to Tiburón Island, clockwise top left to right: Comcaac students on the way to Isla San Pedro Mártir; Leonel Hoeffer observing fin whales, mantas, and phalaropes; the Torres sisters dancing on Isla Tiburón; Xavier Basurto leading a lecture while anchored off Isla San Pedro Mártir; Daniel Comito writing in his field note book on Isla Tiburón looking towards the south; the full Comcaac-Duke course on Isla Tiburón; Ben Wilder lecturing on island biogeography in the Gulf of California; moon setting behind cardón cacti of Isla San Pedro Mártir; base camp at Coralitos, Isla Tiburón; fin whales in front of Isla San Esteban.

conducted research on the island and were able to provide all students with information about its ecology and conservation. While circumnavigating the island we observed the large populations of California sea lions and tens of thousands of sea birds. We then made anchor in a protected cove and snorkeled, where students played with the sea lions and saw a rare juvenile hawksbill sea turtle. On the return from San Pedro Mártir we encountered a pod of bottlenose dolphins, which we were able to interact with for over half an hour.

The fourth day of the trip had the group divide in half again, with the other students undertaking the cardón census and those that had done the field exercise on day one going to Isla San Esteban. Humberto Romero, who led the excursion to Xapij joined the cardón survey, which gave several of the Comcaac students the opportunity to lead the trip and interpretation of the Duke students' time on San Esteban, one of the most important islands in the culture of the Comcaac.

The final day of the excursion allowed a brief morning discussion among all, a group photo, and then a return to the mainland.

• 3b. Cardón plot.

The collaborative field course presented the opportunity to both undertake important ecological research and foster learning across cultures and disciplines. A unique aspect of the islands of the Gulf of California is the relatively species poor small islands, which despite their low floristic diversity often harbor incredibly abundant populations of those species that are present. This is especially the case for the cardón cactus (*Pachycereus pringlei*) on Isla Cholludo. Following quantitative studies on Isla San Pedro Mártir by Richard Felger and Ben Wilder, which showed this island population to be both the densest and youngest population of cardón cacti in its entire range, it was deemed a priority to undertake a population census and establish permanent plots on Isla Cholludo.

Over two days of field work five subplots were surveyed by teams of four (two Comcaac and two Duke students). In each 10 x 10 m subplot the total number of cardón cacti in each of three subclasses (0–1 m; 1–3 m; 3m+) were tallied, with 20 individuals also permanently marked with nails and tags with data recorded for height, trunk height, and arm number so these individuals can be followed through time. The corners of each subplot and the four corners of the 10x50m plot were permanently marked by rebar and gps coordinates.

The results (see table below) established the Cholludo cardón population as the densest population in the species range by an order of magnitude. This is the densest population of any columnar cacti in the world known by Wilder.

Region	**Density (individuals/ha)**	**Regeneration index (proportion of population under 1m)**
Peninsula (Avg. 14 sites)	151	23.5
Islands (Avg. 3 Islas)	3,398	46.5
Sonora (Avg. 9 sites)	59	18.8
Isla San Pedro Mártir	2,697	62.2
Isla Cholludo	23,460	53.45

Isla Cholludo cardón plot, clockwise top left to right: Isla Cholludo; Xavier Basurto and Elizabeth Clark navigating the cardones; Elizabeth Clark and Daniel Comito measuring the height of a cardón; Erin Riordan (right) and Samantha Lukens making measurements; Sammuel Romero (right) and Max López recording census data; equipment used for the survey; pre census introduction and project plan information.

• 3c. Certificate and identification card.

To recognize the completion of the full course, each student was given a certificate of completion as well as an ecology identification card that recognizes the skills acquired during the course. These documents are meant to accredit their commitment and empower their future actions.

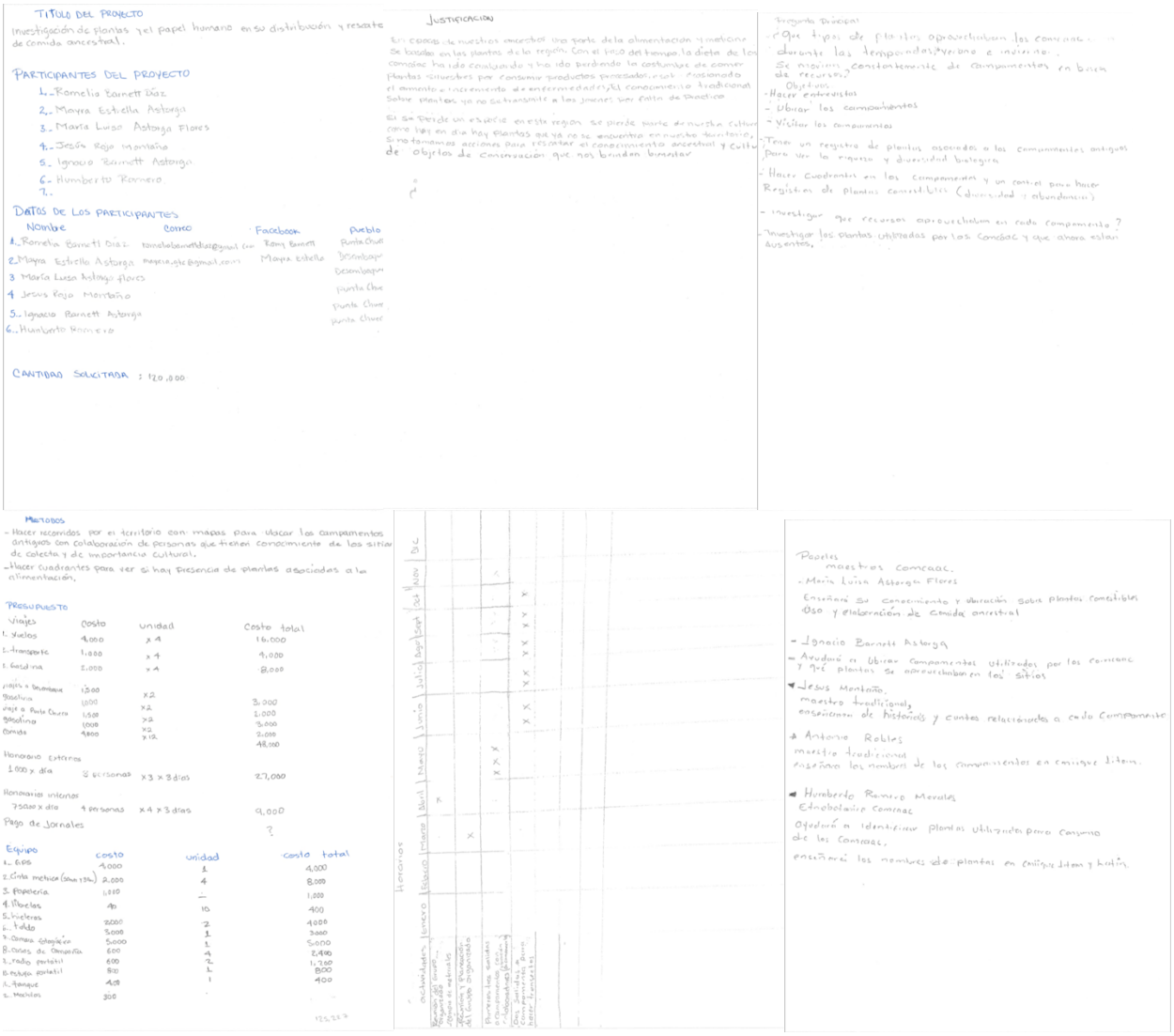
Ecology identification cards presented to each student.

Certificates presented to each student, here Ben Wilder with Max López, Elisa Romero, and Humberto Romero.

Comcaac Community Research Teams (CCRT)

Outcome 4: At the end of Objective 1 (i.e. start of 2016) Comcaac students lead in the initiation and execution of a project to study and conserve biologically and culturally important plants – Plant CCRT.

Two students, Mayra Estrella and Romelia Barnett developed the project, "Investigación de plantas y el papel humano en su distribución y rescate de comida ancestral". The details of the proposal can be seen in these scanned pages:



TITULO DEL PROYECTO

Investigación de plantas y el papel humano en su distribución y rescate de comida ancestral.

PARTICIPANTES DEL PROYECTO

1.- Romelia Barnett Díaz
2.- Mayra Estrella Astorga
3.- María Luisa Astorga Flores
4.- Jesús Rojo Montaño
5.- Ignacio Barnett Astorga
6.- Humberto Romero
7.-

DATOS DE LOS PARTICIPANTES

Nombre	Correo	Facebook	Pueblo
1.- Romelia Barnett Díaz	romeliabarnettdiaz@gmail.com	Romy Barnett	Punta Chueca
2.- Mayra Estrella Astorga	mayra.ejc@gmail.com	Mayra Estrella	Desemboque
3 María Luisa Astorga Flores			Desemboque
4 Jesus Rojo Montaño			Punta Chue
5.- Ignacio Barnett Astorga			punta Chue
6.- Humberto Romero			punta Chue

CANTIDAD SOLICITADA : $120,000

JUSTIFICACION

En épocas de nuestros ancestros una parte de la alimentación y medicina se basaba en las plantas de la región. Con el paso del tiempo la dieta de los comcáac ha ido cambiando y ha ido perdiendo la costumbre de comer plantas silvestres por consumir productos procesados, provocando el aumento e incremento de enfermedades. El conocimiento tradicional sobre plantas ya no se transmite a los jóvenes por falta de práctica.

El sol Pierde un especie en esta región se pierde parte de nuestra cultura como hay en día hay plantas que ya no se encuentra en nuestro territorio, Si no tomamos acciones para rescatar el conocimiento ancestral y cultu de objetos de conservación que nos brinden bienestar

Pregunta Principal

- ¿Que tipos de plantas aprovechaban los comcaac durante las temporadas, verano e invierno.
Se movían constantemente de campamentos en busca de recursos?

Objetivos

- Hacer entrevistas
- Ubicar los campamentos
- Visitar los campamentos
- Tener un registro de plantas asociadas a los campamentos antiguos para ver la riqueza y diversidad biológica.
- Hacer cuadrantes en los campamentos y un control para hacer Registros de plantas comestibles (diversidad y abundancia)
- Investigar que recursos aprovechaban en cada campamento?
- Investigar las plantas utilizadas por los Comcáac y que ahora están ausentes.

METODOS

- Hacer recorridos por el territorio con mapas para ubicar los campamentos antiguos con colaboración de personas que tienen conocimiento de los sitios de colecta y de importancia cultural.
- Hacer cuadrantes para ver si hay presencia de plantas asociadas a la alimentación.

PRESUPUESTO

Viajes

	Costo	Unidad	Costo total
1. Vuelos	4,000	x 4	16,000
2.- transporte	1,000	x 4	4,000
3. Gasolina	2,000	x 4	8,000
viajes a Desemboque	1500	x2	3,000
Gasolina	1000	x2	2,000
viaje a Punta Chueca	1,500	x2	3,000
gasolina	1,000	x2	2,000
Comida	4800	x12	48,000

Honorario externos

1,000 x día	9 personas	x3 x 3 días	27,000

Honorarios internos

750.00 x día	4 personas	x4 x 3 días	9,000

Pago de Jornales ?

Equipo

	costo	unidad	costo total
1.- GPS	4,000	1	4,000
2.Cinta metrica (50m y 15m)	2,000	4	8,000
3. Papeleria	1,000	—	1,000
4. Plumas	40	10	400
5. Binoculares	2000	2	4000
6.- Palo	3,000	1	3000
7.-Camara fotografica	5,000	1	5,000
8.-Libros de Campo	600	4	2,400
9.-radio portatil	600	2	1,200
10.-estufa portatil	800	1	800
11.-Tanque	400	1	400
12.- Machetes	300		

Maestros comcaac.

- María Luisa Astorga Flores

Enseñará su conocimiento y narración sobre plantas comestibles Uso y elaboración de comida ancestral

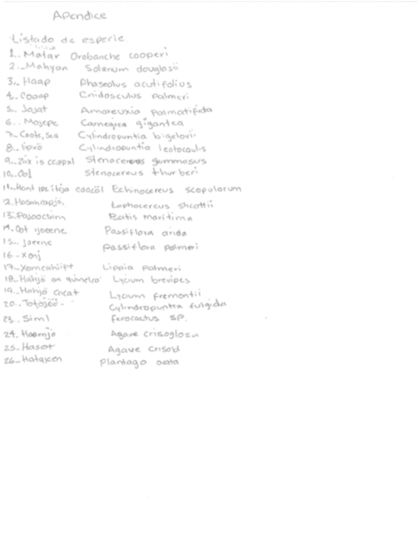
- Ignacio Barnett Astorga

- Ayudará en Ubicar campamentos utilizados por los comcaac y qué plantas se aprovechaban en los sitios

- Jesus Montaño
maestro tradicional,
enseñaran de historiales y cuentos relacionados a cada Campamento

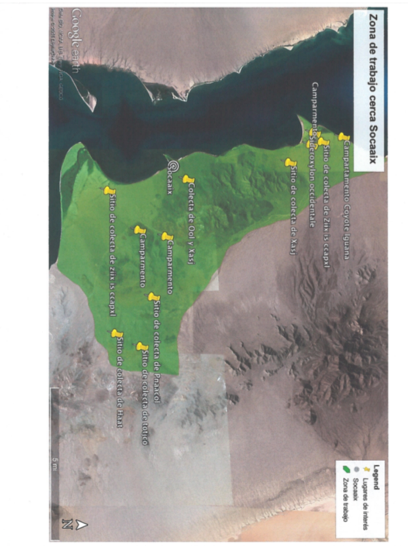
- Antonio Robles
maestro tradicional
enseñara los nombres de los campamentos en comcaac y tono.

- Humberto Romero Morales
Etnobotanico Comcaac
Ofrecerá a identificar plantas utilizadas para consumo de los Comcaac,
enseñará los nombres de plantas en comcaac y tono.


Apendice

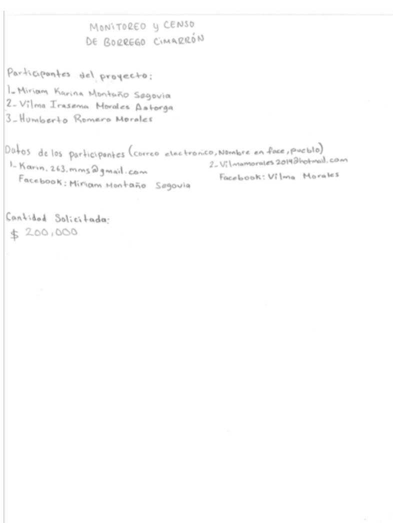
Listado de esperie

1.. Matar Orobanche cooperi
2.. Mahyan Solanum douglasii
3.. Haap Phaseolus acutifolius
4.. Coaap Cnidosculus palmeri
5.. Jojat Amoreuxia palmatifida
6.. Mojepe Carnegiea gigantea
7.. Coote, sea Cylindropuntia bigelovii
8.. Iipxö Cylindropuntia leptocaulis
9.. Ziix is ccapxl Stenocereus gummosus
10.. Ool Stenocereus thurberi
11.. Hant ipzi itéja caacöl Echinocereus scopulorum
12. Hosahnapjö. Lophocereus shcottii
13. Pasoocsim Batis maritima
14. Oot ijoeene Passiflora arida
15.. Joeene Passiflora palmeri
16.. Xonj
17.. Xomcahiift Lippia palmeri
18.. Hahjö an quinelro Lycium brevipes
19.. Hahjö cacat Lycium fremontii
20.. Totojöö - Cylindropuntia fulgida
23.. Siml Ferocactus sp.
24. Haamjö Agave crisoglosa
25. Hasot Agave crisold
26. Hataxcen Plantago ovata



Outcome 5: At the end of Objective 1 (i.e. start of 2016) Comcaac students lead in the initiation and execution of the scientific monitoring and project management for the desert bighorn sheep of Tiburón Island – Bighorn Sheep CCRT.

Two students, Miriam Karina Montaño and Vilma Morales with Humberto Romero Morales developed the project, "Monitoreo y censo de borrego cimarrón". The details of the proposal can be seen in these scanned pages:


MONITOREO y CENSO
DE BORREGO CIMARRÓN

Participantes del proyecto:

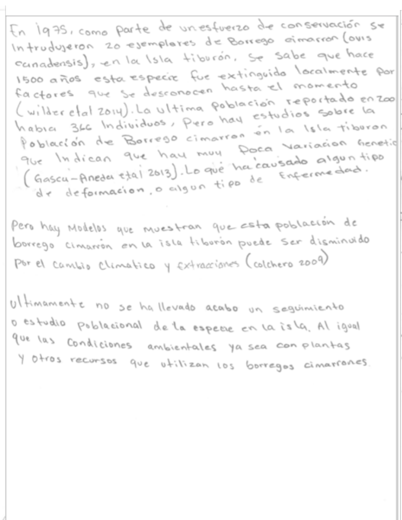
1.- Miriam Karina Montaño Segovia
2.- Vilma Irasema Morales Astorga
3.- Humberto Romero Morales

Datos de los participantes (correo electronico, Nombre en face, pueblo)

1.- Karin.263.mms@gmail.com
Facebook: Miriam Montaño Segovia

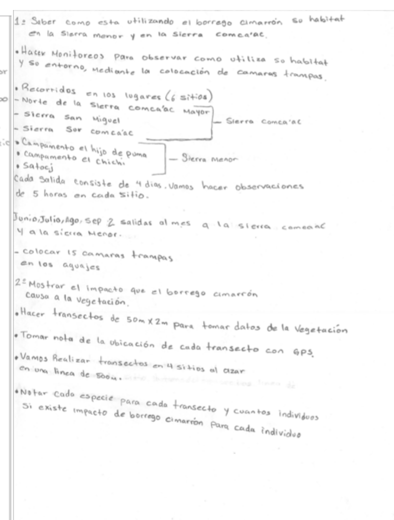
2.- Vilmamorales2014@hotmail.com
Facebook: Vilma Morales

Cantidad Solicitada:
$ 200,000


En 1975, como parte de un esfuerzo de conservación se Intrudujeron 20 ejemplares de Borrego cimarron (ovis canadensis), en la Isla tiburón. Se sabe que hace 1500 años esta especie fue extinguida localmente por factores que se desconocen hasta el momento (wilder etal 2014). La ultima poblacion reportado en 200 habia 366 Individuos, Pero hay estudios sobre la Población de Borrego cimarron en la Isla tiburon que Indican que hay muy Poca Variacion Genetic (Gasca-Aneda etal 2013). Lo qué ha causado algun tipo de Enfermedad. de deformacion, o algun tipo de

Pero hay Modelos que muestran que esta población de borrego cimarrón en la isla tiburón puede ser disminuido por el cambio climatico y extracciones (colchero 2009)

ultimamente no se ha llevado acabo un seguimiento o estudio poblacional de la especie en la isla. Al igual que las Condiciones ambientales ya sea con plantas y otros recursos que utilizan los borregos cimarrones.


1º Saber como esta utilizando el borrego cimarrón su habitat en la Sierra menor y en la Sierra comca'ac.

• Hacer Monitoreos para observar como utiliza su habitat y su entorno, Mediante la colocación de camaras trampas.

• Recorridos en los lugares (6 sitios)
- Norte de la Sierra comca'ac Mayor
- Sierra San Miguel
- Sierra Sur comca'ac
— Sierra Comca'ac
• Campamento el hijo de puma
• Campamento el Chichi
• Satocj
— Sierra Menor

Cada salida consiste de 4 dias. Vamos hacer observaciones de 5 horas en cada sitio.

Junio, Julio, Ago, Sep 2 salidas al mes a la sierra comcaac y a la sierra Menor.

- colocar 15 camaras trampas en los aguajes

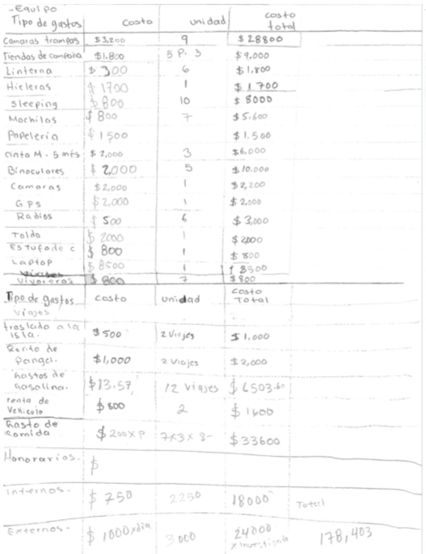
2º Mostrar el impacto que el borrego cimarrón causa a la vegetación.

• Hacer transectos de 50m X 2m para tomar datos de la Vegetación

• Tomar nota de la ubicación de cada transecto con GPS.

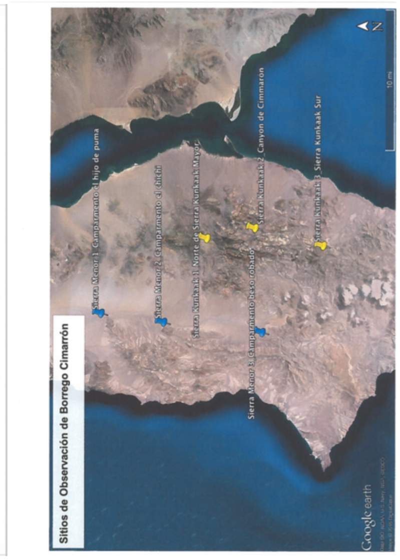
• Vamos Realizar transectos en 4 sitios al azar en una linea de 500m.

• Notar cada especie para cada transecto y cuantos individuos Si existe impacto de borrego cimarrón para cada individuo



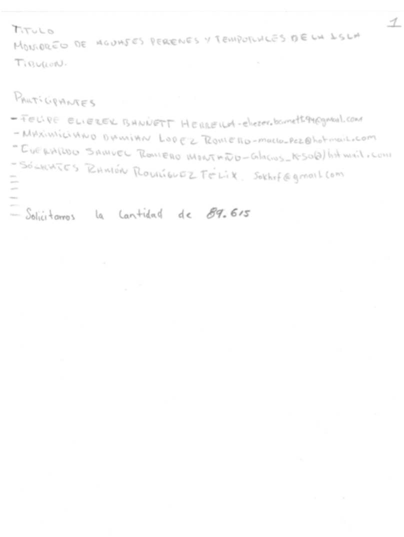
-Equipo Tipo de gastos	Costo	unidad	costo total
Camaras trampas	$3,200	9	$28800
Tiendas de campaña	$1.800	5 P. 3	$9.000
Linterna	$300	6	$1,800
Hieleras	$1700	1	$1.700
sleeping	$800	10	$8000
Mochilas	$800	7	$5.600
Papelería	$1500		$1.500
cinta M. 5 mts	$2,000	3	$6,000
Binoculares	$2000	5	$10.000
Camaras	$2,000	1	$2,200
GPS	$2,000	1	$2,000
Radios	$500	6	$3,000
Toldo	$2000	1	$2000
Estufa de c	$800	1	$800
Laptop	$8500	1	$8500
Viveres	$800	7	$800
Tipo de gastos Viajes	costo	unidad	costo total
traslado a la isla.	$500	2 Viajes	$1.000
Renta de Panga.	$1,000	2 Viajes	$2,000
Gastos de gasolina.	$13.57	12 viajes	$6503.60
renta de Vehiculo	$800	2	$1600
Gasto de comida	$200xP	7x3x8-	$33600
Honorarios.	$		
internos.	$750	2250	18000
Externos.	$1000xdia	3000	24000 x investigador

Total 178,403



Outcome 6: At the end of Objective 1 (i.e. start of 2016) Comcaac students lead in the initiation and execution of a project to increase the protection and maintain the integrity of their territory – Human Impacts CCRT.

Four students, Felipe Barnett, Maximiliano López Romero, Samuel Romero Montaño, and Sócrates Rodrigez Félix developed the project, “Monitoréo de agjuaes perenes y temporalis de la Isla Tiburón”. The details of the proposal can be seen in these scanned pages:

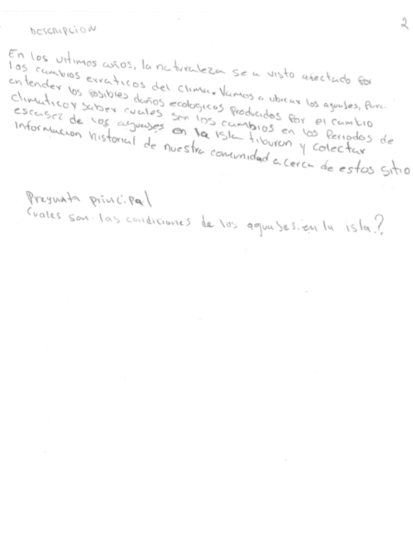


1

TITULO
MONITORÉO DE AGUAJES PERENES Y TEMPORALES DE LA ISLA TIBURON.

PARTICIPANTES
- FELIPE ELIEZER BARNETT HERRERA - eliezer.barnett94@gmail.com
- MAXIMILIANO DAMIAN LOPEZ ROMERO - maclo_pez@hotmail.com
- EVERARDO SAMUEL ROMERO MONTAÑO - Glacius_K-50@hotmail.com
- SÓCRATES RAMÓN RODRÍGUEZ FÉLIX. Sokhrf@gmail.com

- Solicitamos la Cantidad de 89.615



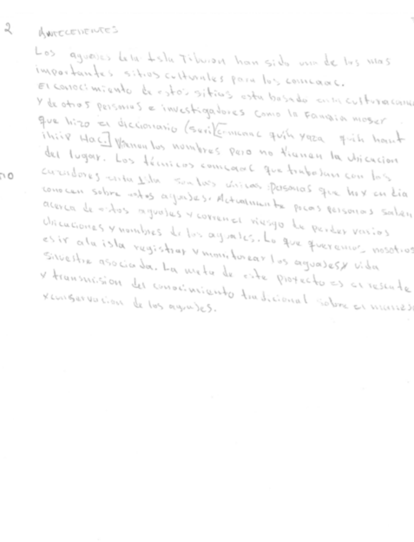
1

DESCRIPCION

En los ultimos años, la naturaleza se a visto afectado por los cambios erraticos del clima. Vamos a ubicar los aguajes, para entender los posibles daños ecologicos producidos por el cambio climatico y saber cuales son los cambios en los periodos de escasez de los aguajes en la isla tiburon y colectar informacion historial de nuestra comunidad acerca de estos sitio

Pregunta principal
Cuales son las condiciones de los aguajes en la isla?

2



2

ANTECEDENTES

Los aguajes de la Isla Tiburon han sido uno de los mas importantes sitios culturales para los comcaac. El conocimiento de estos sitios esta basado en la cultura comcaac y de otras personas e investigadores como la Familia Moser que hizo el diccionario (seri-comcaac quih yaza quih hant ihiip hac) tienen los nombres pero no tienen la ubicacion del lugar. Los técnicos comcaac que trabajan con los cuidadores en la Isla son las unicas personas que hoy en dia conocen sobre estos aguajes. Actualmente pocas personas saben acerca de estos aguajes y corren el riesgo de perder varios ubicaciones y nombres de los aguajes. Lo que queremos nosotros es ir a la isla registrar y monitorear los aguajes y vida silvestre asociada. La meta de este proyecto es el rescate y transmision del conocimiento tradicional sobre el manejo y conservacion de los aguajes.

3

OBJETIVOS 4

1- Buscar informacion de antecedentes historicos de los lugares ubicados. Trabajando con personas en las comunidades haciendo entrevistas. y comparaciones de fotos antiguos, historias y de investigadores externos.

2- ubicar aguajes perenes y/o temporales

3- hacer registro de flora y fauna (rostros de vida silvestre

4- analisis de indice de salud de agua de los aguajes. haciendo una comparacion de algunos aguaje de la isla por posibles impactos negativos del pasado y de hoy.

PREGUNTA PRINCIPAL

Cuales son las condiciones de los aguajes en la isla.

METODOS 5

1- Entrevista con gente mayor a identificar sitios en donde hay aguaje en la isla usando mapa.

- personas que se entrevistaron 6 personas de punta chueca
- usar grabadoras de audio. Las entrevistas se guardaran en distintas ubicaciones.

2 Con informacion de los entrevistados y datos publicados, localizar los sitios y marcar con GPS. y hacer un poligon con google earth en la zona humedal.

3 registro de Flora y Fauna hacer un listado alrededor de cada aguaje identificar las plantas si son nativos o exotica todo se registrará dentro del poligono en la zona humedal observacion de los mamiferos sin pertubar el aguaje. a una distancia razonable, Biodiversidad acuatica con fotos para los que no puedan ser identificados en el lugar. Para las plantas sacar fotos detallados y prensar las hojas.

4. Indice de salud analizar los aguajes con el rapido analisis con el Sansorex Sam 1 el nivel de oxigeno temperatura Ph. Salinidad segun el resultado calificarlo del uno al diez observacion de plantas invasoras, acceso del agua. y basura.
basura inorganica calificasion 1 basura organica 5 sin impacto human 8

tipo de gasto	costo	unidad	costo total
Gasolina	13.57 $	500	6,285
Renta de lancha	2.000	3	6.000
comida	14,400	4, salida	14,400
aceite para motor fuera de borda	80	2	160
aceite para motor a Gasolina.	85	2	170
liquido de freno	40	2	80
bomba	200	1	200
llantas	800	2	1600
Renta de motos	10.000	4	20,000
infla llanta	80	2	160

Viaje = 49.055
Equipo = 40.560
Total = 89.615

Equipo tipo de gasto	costo	unidad	costo total
lamparas	300	5	1,500
Botiquin Primer auxilio	200	4	200
zapatos	700	6	4,200
Palas	300	2	600
Viboreras	800	6	4,800
casa de campaña	800	2	16,000
Guantes	200	3	600
libretas	300	3	900
camel back	200	4	800
mochilas	2000	6	12,000
Sleeping	500	6	3,000
Sansorex-Sam 1	2880	1	2 880
GPS	2000	1	2,000
binocular	2,500	1	2,500
botella de muestra de agua.	5,00	20	10
prensas	250	1	250
cartones	250	1 caja	250

7

Equipo tipo de gasto	costo	unidad	costo total
ziplocs	50	1	50
estufa	600	2	600
gas	500	1	500
ollas	100	1	100
Sarten	150	1	150
tenedores y cuchillos	50	1	50
mesa plegable	1,200	1	1,200

Total de equipo
$ 40,560

APENDICE 6

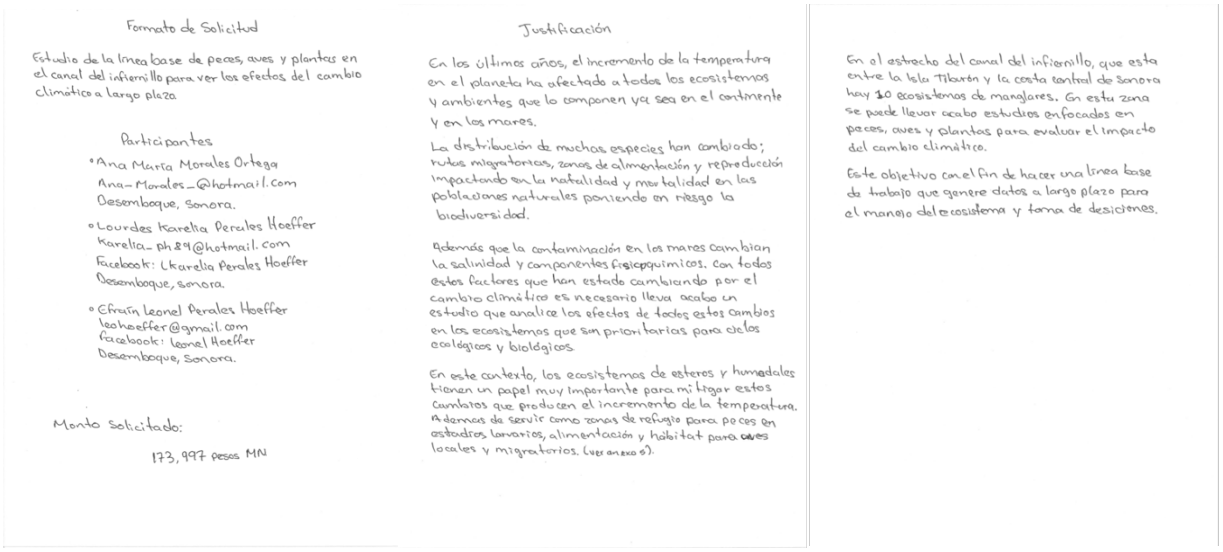
1- Has hax
2- xactos
3- sope hax
4- paz hax
5- taxétel
6- somcam hax
7- xacacs
8- xapis
9- tis imas hax

En este mapa de "etnobotanico" que fue publicado por Richard Stephen Felger y Mary Beck Moser en el 1985

con este mapa del etnobotanico, vamos a hacer los recorridos y monitoreo

There were two additional projects developed by the students:

Ana María Morales Ortega, Karelia Perales Hoeffer, and Efraín Leonel Perales Hoeffer developed the project, “Estudio de la línea base de peces, aves y plantas en el Canal del Infiernillo para ver los efectos del cambio climatico a largo plazo”



Formato de Solicitud

Estudio de la línea base de peces, aves y plantas en el canal del infiernillo para ver los efectos del cambio climático a largo plazo

Participantes

- Ana María Morales Ortega
  Ana-Morales_@hotmail.com
  Desemboque, Sonora.
- Lourdes Karelia Perales Hoeffer
  Karelia_ph89@hotmail.com
  Facebook: Lkarelia Perales Hoeffer
  Desemboque, sonora.
- Efraín Leonel Perales Hoeffer
  leohoeffer@gmail.com
  Facebook: Leonel Hoeffer
  Desemboque, Sonora.

Monto solicitado:

173,997 pesos MN

Justificación

En los últimos años, el incremento de la temperatura en el planeta ha afectado a todos los ecosistemas y ambientes que lo componen ya sea en el continente y en los mares.

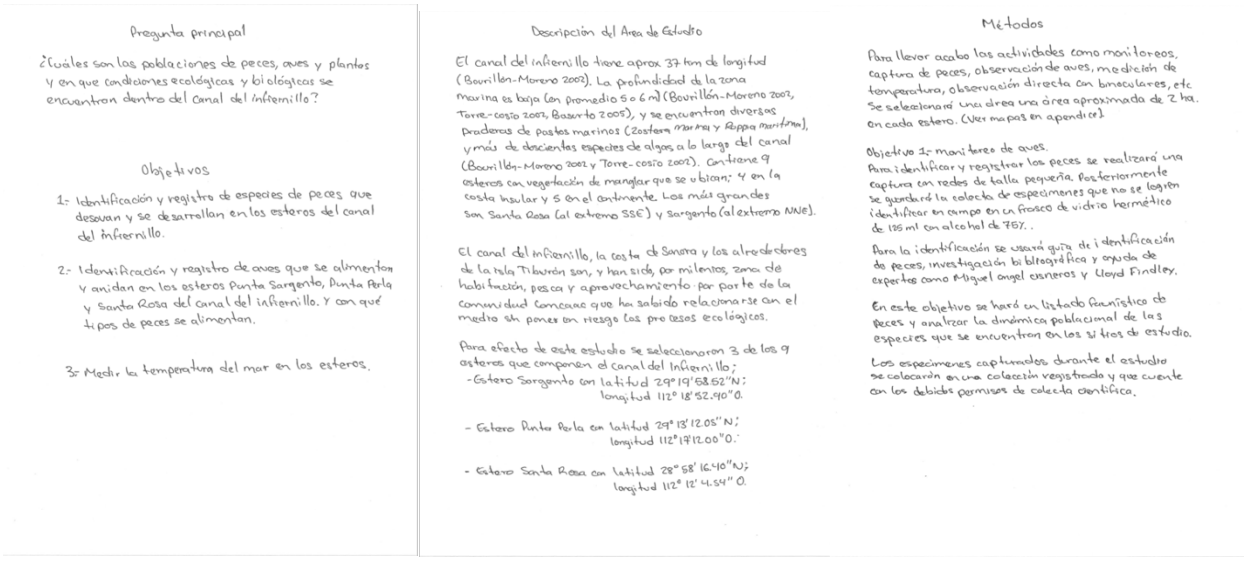
La distribución de muchas especies han cambiado; rutas migratorias, zonas de alimentación y reproducción impactando en la natalidad y mortalidad en las poblaciones naturales poniendo en riesgo la biodiversidad.

Además que la contaminación en los mares cambian la salinidad y componentes fisicoquímicos. Con todos estos factores que han estado cambiando por el cambio climático es necesario llevar acabo un estudio que analice los efectos de todos estos cambios en los ecosistemas que son prioritarias para ellos ecológicos y biológicos

En este contexto, los ecosistemas de esteros y humedales tienen un papel muy importante para mitigar estos cambios que producen el incremento de la temperatura. Además de servir como zonas de refugio para peces en estadios larvarios, alimentación y habitat para aves locales y migratorios. (ver anexo 6).

En el estracto del canal del infiernillo, que esta entre la isla Tiburón y la costa central de Sonora hay 10 ecosistemas de manglares. En esta zona se puede llevar acabo estudios enfocados en peces, aves y plantas para evaluar el impacto del cambio climático.

Este objetivo con el fin de hacer una línea base de trabajo que genere datos a largo plazo para el manejo del ecosistema y toma de desiciones.



Pregunta principal

¿Cuáles son las poblaciones de peces, aves y plantas y en que condiciones ecológicas y biológicas se encuentran dentro del canal del Infiernillo?

Objetivos

1.- Identificación y registro de especies de peces que desovan y se desarrollan en los esteros del canal del Infiernillo.

2.- Identificación y registro de aves que se alimentan y anidan en los esteros Punta Sargento, Punta Perla y Santa Rosa del canal del Infiernillo. Y con qué tipos de peces se alimentan.

3.- Medir la temperatura del mar en los esteros.

Descripción del Area de Estudio

El canal del Infiernillo tiene aprox 37 km de longitud (Bourillón-Moreno 2002). La profundidad de la zona marina es baja (en promedio 5 o 6 m) (Bourillón-Moreno 2002, Torre-cosío 2002, Basurto 2005), y se encuentran diversas praderas de pastos marinos (Zostera marina y Ruppia maritima), y más de doscientas especies de algas a lo largo del canal (Bourillón-Moreno 2002 y Torre-cosío 2002). Contiene 9 esteros con vegetación de manglar que se ubican; 4 en la costa insular y 5 en el continente. Los más grandes son Santa Rosa (al extremo SSE) y Sargento (al extremo NNE).

El canal del Infiernillo, la costa de Sonora y los alrededores de la isla Tiburón son, y han sido, por milenios, zona de habitación, pesca y aprovechamiento por parte de la comunidad Comcaac que ha sabido relacionarse con el medio sin poner en riesgo los procesos ecológicos.

Para efecto de este estudio se seleccionaron 3 de los 9 esteros que componen el canal del Infiernillo;

- Estero Sargento con la latitud 29° 19' 58.52" N; longitud 112° 18' 52.90" O.
- Estero Punta Perla con latitud 29° 13' 12.05" N; longitud 112° 17' 12.00" O.
- Estero Santa Rosa con latitud 28° 58' 16.40" N; longitud 112° 12' 41.54" O.

Métodos

Para llevar acabo las actividades como monitoreos, captura de peces, observación de aves, medición de temperatura, observación directa con binoculares, etc se seleccionará una área una área aproximada de 2 ha. en cada estero. (Ver mapas en apendice)

Objetivo 1.- monitoreo de aves.
Para identificar y registrar los peces se realizará una captura con redes de talla pequeña. Posteriormente se guardará la colecta de especimenes que no se logren identificar en campo en un frasco de vidrio hermético de 125 ml con alcohol de 75%.

Para la identificación se usará guía de identificación de peces, investigación bibliográfica y apoyo de expertos como Miguel Angel Cisneros y Lloyd Findley.

En este objetivo se hará un listado faunístico de peces y analizar la dinámica poblacional de las especies que se encuentren en las 3 áreas de estudio.

Los especimenes capturados durante el estudio se colocarán en una colección registrada y que cuente con los debidos permisos de colecta científica.

Objetivo 2- monitoreo de aves

Para identificar y registrar las especies de aves que se alimenten y anidan en los esteros del canal del infiernillo; Punta perla, Punta Sargento y Santa Rosa.

Se hará un muestreo directo en los sitios de estudio con observaciones directas apoyados con binoculares e identificadores de aves. Además de contar con el apoyo de experto en el tema la Dra. Enriqueta Velarde de la Universidad Veracruzana

Llegar un registro o inventario de fauna de aves de los esteros. El equipo básico como binoculares y guías de identificación serán aportados por el grupo que realizará el estudio.

Objetivo 3- Medición de parámetros fisicoquímicos del agua de mar.

Se instalarán sensores Data logger en los sitios de estudio para medir los parámetros fisicoquímicos como la temperatura, PH y Salinidad.

Presupuesto

Viajes

Tipo de gasto	Costo	Unidad	Costo total
Renta de carro	1,600	4	6,000
Renta de Rango	1,500	4	6,000
Gasolina	3,000	4 (200 Lts/c viaje)	12,000
Monto total			24,000

Equipo

Tipo de Gasto	Costo	Unidad	Costo total
kit para acampar	10,000	1	10,000
GPS	2,000	1	2,000
Camara	2,000	1	2,000
Data logger	2,128	3	6,384
Redes	2,000	1	2,000
guia de peces	400	1	400
Papeleria/ Pharmatek.	2,000	1	2,000
Frascos de vidrio 125ml	25.00 3,000	120	3,000
Alcohol de etanol	34.48	12	413.76
Guantes latex	180	2	360
Monto total			28,557.76

Presupuesto

Consumo

Tipo de gasto	Costo	Unidad	Costo total
Desayuno comida cena	150 cada alimento	14 personas x 5 dias de alimentos 12 salidas	14 x 150 = 2,100 2,100 x 12 = 25,200
Renta de 20 Lts.	20 c/u	3 garrafones por dia 3x20 = 60 x salida 60x4 = 240 para	240
Monto total			25,440

Honorarios

Tipo de gasto	Costo	Unidad	Costo total
Honorario externo	14,000	4	56,000
Honorario interno	2,857	14	40,000
Monto total			96,000

Costo total del proyecto:
173,997

Papel o rol de los integrantes

Coordinadora general
Karelia Perales Hoeffer

Coordinadora Equipo de aves
Ana maria Morales

Coordinador Equipo de Peces
E. Leonel Perales Hoeffer

Equipo de Aves
- Benadad Comito
- Diana Molina
- Vilma Morales
- Yuneli Perales
- Salma Barnett
- Gaby Barnett

Equipo de Peces
- Karelia Perales
- Samuel Monroy
- Alberto Estrella
- Aaron Barnett
- Daniel Comito
- Julio Cesar Robles

Equipo de Apoyo técnico

- Enriqueta Velarde
  Aves marinas y Pesqueras
  Universidad Veracruzana
- Miguel Angel Cisneros
  Biologia marina/calo y Jaiba
  INAPESCA
  Guaymas, Sonora.
- Xavier Basurto
  Pesquerias/Biologia marina
  Universidad de Duke
  USA
- Lloyd Findlay
  Experto en Peces
  USA

Meses

ACCION	MAYO	JUNIO	JULIO	AGOSTO	SEPTIEMBRE	OCTUBRE
Obj. 1	X1					
Obj. 2		X2				
Obj. 3				X3		
Reporte final					X4	X5

Objetivo 1. Primera visita del área de estudio para delimitar y empezar los trabajos X1; visitar durante 3 días los 3 sitios seleccionados.

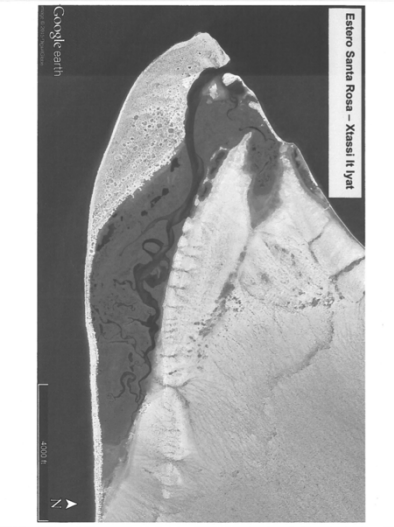
Objetivo 2. Hacer recorridos y colocación de redes de peces para y plantas. X2; segun la materia rida para visitar los sitios y trabajar en los monitoreos. Cabanas para resguardo.

Objetivo 3. Seguir con los trabajos en campo durante X3; visitando los sitios después un presentamiento y con listo de datos. X4; Visita a campo, reunión para ver los avances del proyecto

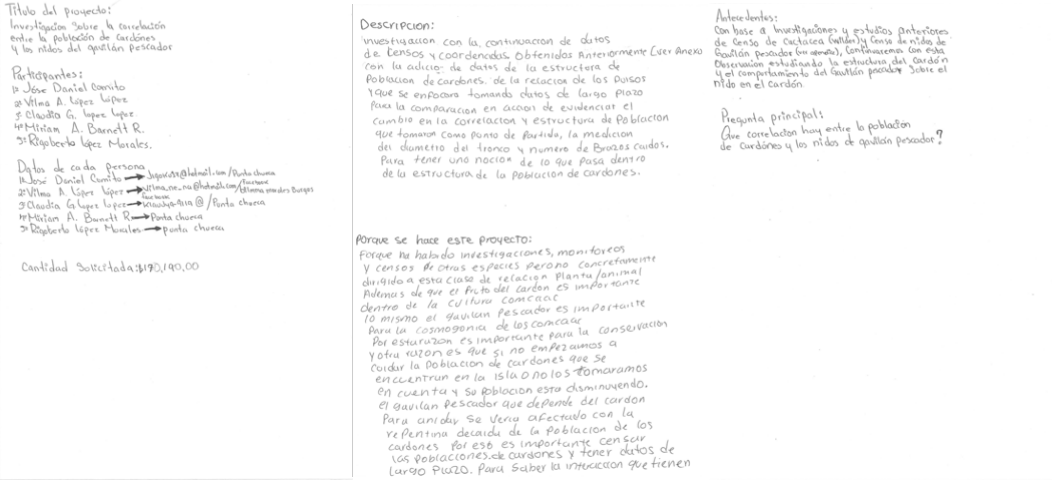
Reporte final: el reporte se hará a finales de octubre, incluyendo el total de datos obtenidos al reporte final con revisión final y una reunión en el equipo de trabajo para el cierre del proyecto.

Apéndice

- Lista de anexos:
  - Anexo 1: Mapa del canal del infiernillo e lista del Tiburón.
  - Anexo 2- Mapa del Estero Punta sargento/ Zaaj cheel.
  - Anexo 3- Mapa del Estero Santa Rosa/ Xtaasi it Iyat
  - Anexo 4.- Mapa del Estero Punta Perla/ Hant cmaa Coocp
  - Anexo 5.- Lista de especies en alguna categoria de protección y/o en la lista Roja de la UICN.



José Daniel Comito, Vilma López, and Claudia López developed the project, “Investigación sobre la correlación entre la población de cardones y nidos de gavilán pescador”



Título del proyecto:
Investigación Sobre la correlación entre la población de Cardones y los nidos del gavilán pescador

Participantes:
1. José Daniel Comito
2. Vilma A. López López
3. Claudia G. lopez lopez
4. Miriam A. Barnett R.
5. Ricaberto López Morales.

Datos de cada Persona
1. José Daniel Comito → Jdgcomito@hotmail.com / Punta chueca
2. Vilma A. López López → vilma.me...na@hotmail.com / Punta chueca
3. Claudia G. lopez lopez → [illegible] / Punta chueca
4. Miriam A. Barnett R. → Punta chueca
5. Ricaberto López Morales → punta chueca

Cantidad Solicitada: $170,190.00

Descripcion:
Investigacion con la continuacion de datos de Censos y coordenadas Obtenidos Anteriormente (Ver Anexo) con la adicion de datos de la estructura de Poblacion de cardones. de la relacion de los Pulsos y que se empezara tomando datos de largo Plazo para la comparacion en accion de evidenciar el cambio en la correlacion y estructura de Poblacion que tomaron como punto de partida, la medicion del diametro del tronco y numero de Brazos caidos. Para tener una nocion de lo que pasa dentro de la estructura de la Poblacion de cardones.

Porque se hace este proyecto:
Porque ha habido investigaciones, monitoreos y censos de otras especies pero no concretamente dirigido a esta clase de relacion Planta/animal Ademas de que el Pato del Cardon es importante dentro de la cultura comcaac lo mismo el gavilan pescador es importante Para la cosmogonia de los comcaac Por esta razon es importante para la conservacion y otra razones es que si no empezamos a Cuidar la Poblacion de cardones que se encuentran en la isla o no los tomaramos en cuenta y su poblacion esta disminuyendo. El gavilan pescador que depende del cardon Para anidar se veria afectado con la repentina decaida de la Poblacion de los cardones. por eso es importante censar los Poblaciones de cardones y tener datos de Largo Plazo. Para Saber la interaccion que tienen

Antecedentes:
Con base a investigaciones y estudios anteriores de Censo de Cactacea (Cardon) y Censo de nidos de Gavilán pescador (no aprobado), Continuaremos Con esta Observacion estudiando la estructura del Cardón y el comportamiento del Gavilán pescador Sobre el nido en el cardón.

Pregunta principal:
Que correlacion hay entre la poblacion de cardones y los nidos de gavilan pescador?

Objetivos:

1- censo cardones con nidos y sin nidos
2- Ubicacion y medicion de cardones y nidos
3- investigacion indice de regeneracion
4- Busqueda: Prospeccion de cardones con nido

Metodos:

#1- censo cardones con nidos y sin nidos
revisitar los sitios ya marcados (ver Anexo)
hacer cuadrantes permanentes para la identificacion del lugar para elaborar datos de largo plazo.

#2- Ubicacion y medicion de cardones y nidos
dentro de cada cuadrante de los ocho sitios tomar medidas de circunferencia del tronco, Altura, numero de brazos, ubicacion gps y tomar medidas del nido mas altura.

#3- indice de regeneración
Analisis de datos de los ocho sitios
Porsentaje de individuos de un metro y menos de Altura.

#4- busqueda de Prospeccion de nuevos cardones con nido
recorridos de reconocimiento para la comprobación de la existencia de nuevos nidos y denidos de otros especies que tengan conexion con el cardon, dentro de los ocho sitios.

Presupuesto

VIAJES — VIAJES — VIAJES — VIAJES

Tipo de Gastos	costo	unidad	costo total
renta de panga	1.500	13	$ 19.500
pago del capitan	500	13	$ 6.500
Gasolina	800	13	$ 10.400
consumo	2800	3	$ 34.400
renta de Carro	1000	8	$8.000
			$80.800

EQUIPO — EQUIPO — EQUIPO — EQUIPO

Tipos de Gastos	costo	Cantidad	costo total
Sleeping bag	450	7	3.150
colchonetas	$250	7	1.750
Casa de campaña	$800	4	3.200
Hieleras	$450	2	900
contenedores	$300	4	1200
Camara	$3.000	1	3.000
GPS	$2.000	1	2.000
binoculares	$2.000	3	6.000
cinta metrica	$250	8	2.000
Telescopio	$1.500		3.000
Laptop	$2000		2.000
Rey de hojas	$ 8		24
Lapices y otros	$ 50		2
Plumas	$100		2
Kalvos de Aforo	$15		150
Libretas	$30	1	30
botiquin	$ 500		1000
Lamparas	$30		1.500
			36.800
Presupuesto total			117.690

Honorarios

Tipo de Gasto	costo	U	costo total
Externos			20.000
Internos			132.500

Presupuesto Total: $170.190

HORARIOS

MARZO - 8 y 4
recorridos Para hacer los cuadrantes
y conteo de cardones con nidos activos e inactivos
revisitar los lugares ya marcados, medicion de circunferencia de tronco, Altura y numero de Brazos mas la marcacion con GPS.

ABRIL 10 y 15
Observacion de nidos para descartar nidos inactivos, conteo de Pollos y parejas

MAYO 14 y 15
Continuacion de Actividades: conteo de Cardones y medicion

Junio 3 y 4
Observacion del nido con parejas y Pollos

Septiembre 10 y 11
Prosesamiento de datos

noviembre 5 y 6
Analisis de la Poblacion de cardones Jovenes.

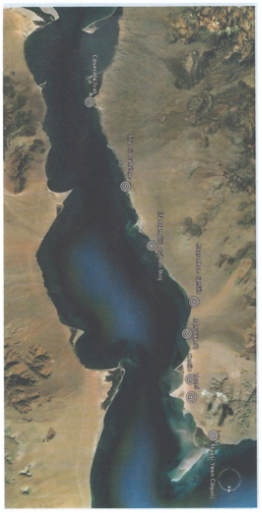
Papeles de equipo
1. José Daniel Comito Molino
2. Claudia Gardenia ~~López~~ López López
3. ultimo Aniela ~~López~~ López López

A: Investigacion y Prospección
B: Ubicacion y Marcación
C: Censo de nidos (Adultos y Pollos)

asistentes.
un asistente en la observacion de aves,
dos asistentes en la elaboracion de cuadrantes
y un ultimo asistente en los recorridos de Prospeccion.

APENDICE:

mapas de los sitios ya marcados de los nidos de gavilan pescador.
e Investigaciones de las plantas (wilder 2012)

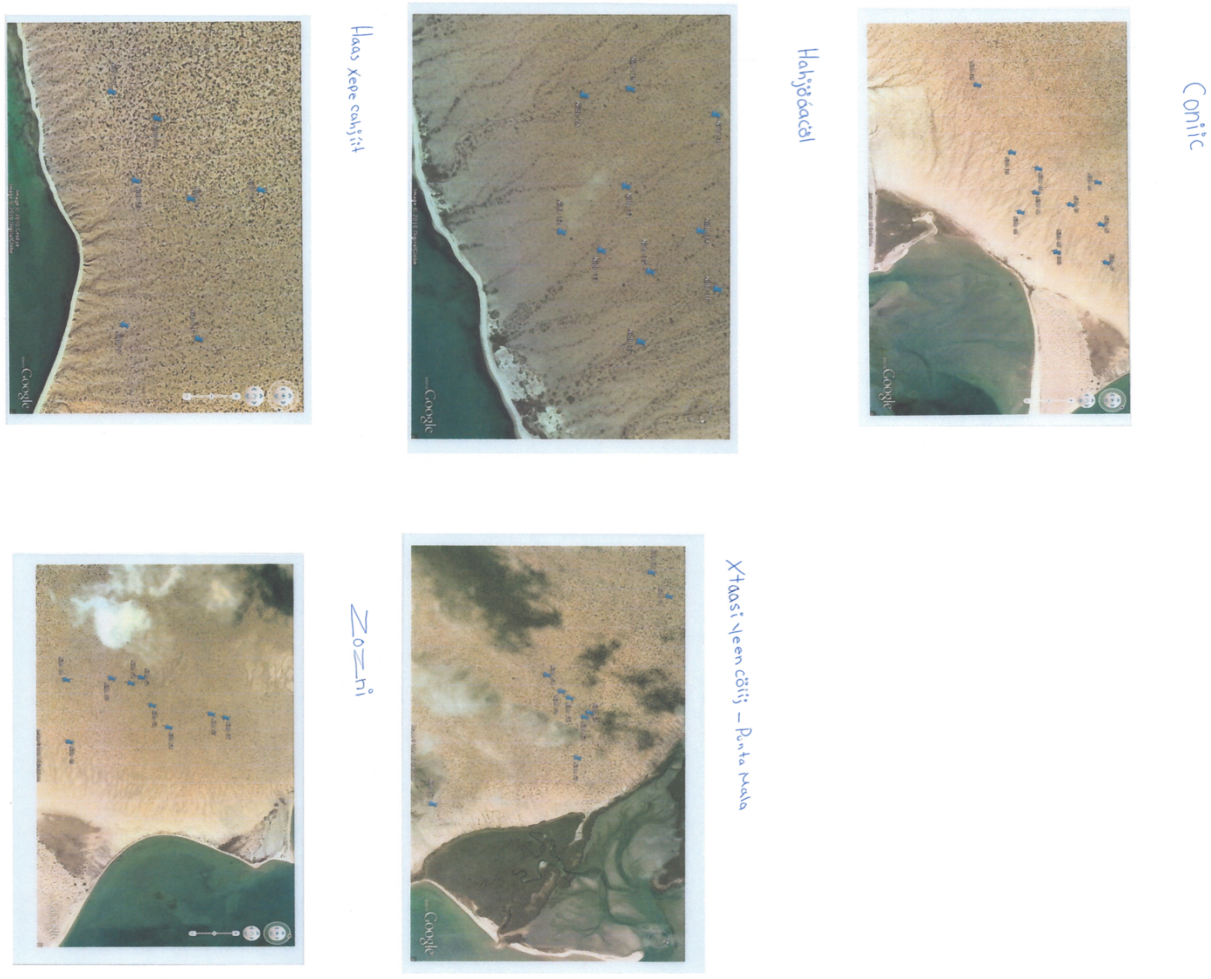


Canal del Infernillo

Cózcelq Lugt - Tormenta

Ifa Ht Icahéme - Palo Fierro

Ifa Hamotij Qath Ht Ihij - Punta Círculo



Journal Article

During the project period in collaboration with Gary Nabhan, Carolyn O'Meara, and Laura Monti, we published an article in the journal *BioScience* titled, "The Importance of Indigenous Knowledge in Curbing the Loss of Language and Biodiversity". The article contextualized the goals of our collaborative efforts with the Comcaac and provided the first all taxa biodiversity inventory for the Seri region. As supplemental material, full species diversity lists with scientific and Comcaac nomenclature were provided. The article was published open access and can be found at: http://bioscience.oxfordjournals.org/content/66/6/499.full
The abstract is as follows:

> Biodiversity inventory, monitoring, and recovery efforts are best advanced by a dynamic collaboration of Western, citizen, and ethno-science. Indigenous and local traditional knowledge of place-based biodiversity are perhaps the oldest scientific tradition on earth. We illustrate how an All Taxa Biodiversity Inventory network of projects in collaboration with the *Comcaac* (Seri People) in northwestern Mexico has advanced not only biosystematics, but species recovery, habitat restoration, language revitalization, and maintenance of traditional

livelihoods. We encourage scientists to establish collaborations with indigenous and or local communities to better understand the wealth of knowledge held in local categorization systems. In doing so it is essential to not merely seek out one-to-one correspondences between Western and indigenous knowledge but recognize and respect the creative tensions among these different knowledge systems, for this is where the most profound insights and fruitful collaborations emerge.

d. Explanation of the problems encountered for any outcomes not met.

The largest challenge faced during the project was the application, approval, and execution of the Comcaac Community Research Teams (CCRT) project proposals to CONANP's PROCODES funding source.

The development of project ideas by the students during the first course block exceeded expectations. Beyond the three project proposals hoped for, five were drafted. However, the first challenge was connecting these paper written project proposals as done for the course in November and the actual PROCODES applications due in January. The proposals created for the course (seen above) were more detailed than the actual PROCODES proposal format. The fact that the application period was in between the course blocks also complicated what students should apply for. Were they to apply for the exact project idea conceived during the first part of

the course or another project idea that continues work they had already been doing or work with others not in the course? The imbalance between the proposal format and that the PROCODES application period was outside a course block led to certain projects established during the first course block not being submitted to PROCODES.

The other challenge found in connecting the projects created by the students during the course to PROCODES is a difference in focus. Many of the projects created by the students have a strong research emphasis, especially "Investigación sobre la correlación entre la población de cardones y nidos de gavilán pescador" and "Investigación de plantas y el papel humano en su distribución y rescate de comida ancestral". In the case of these two projects, they were deemed too technically scientific by the PROCODES reviewers and rejected. In the perspective of the course the technical rigor was a great accomplishment. PROCODES are conservation related projects with a specific rubric for involvement of men, women, members of different families, and as many people as possible, all of which are ranked higher than the research question itself. In this sense they are not necessarily the best fit for many of the projects developed by the students in the course.

Another challenging aspect of connecting the course with PROCODES projects was the timing. The results of which PROCODES projects were selected was not announced until the end of April, at the end of the course blocks. Thus, the second block as originally envisioned to help support the realization or refinement of the projects was not possible. Those projects that were approved by CONANP were undertaken in the summer and fall of 2016, unfortunately after the course project period.

In the future, and as an important next step it would be worthwhile to connect the students to other funding opportunities that exist. PROCODES is not the only option, and as we experienced is fairly limited as related to more scientifically focused projects. Perhaps, for similar courses paired with student created projects, budget line items to support these projects would be useful, instead of relying on external funding which may not match the realities of what is created by the students despite best attempts to predict those outcomes beforehand.

The other significant challenge experienced within the course is the great demand of time and logistical challenges in undertaking the intensive nature of the course. The course was realized during a transition period for Dr. Wilder from Visiting Scholar in Dr. Rodolfo Dirzo's lab at Stanford and his new role as a Research Scientist at the University of Arizona. Dr. Wilder's bosses at the UofA generously allowed him to lead the courses as part of the terms of his hiring. However, that required significant time in the field away from University duties. In thinking about repeating the course, it is hard to find the same amount of time that can be committed both in planning and execution.

e. Major takeaways

This project ventured into new space as an extension of Dr. Wilder's research in the region, which started in 2004. The courses were born out of the observation that now is a critical time in Comcaac society to reestablish opportunities for growth and education among the youth, much as was done by Gary Nabhan and Laura Monti in the para-ecologos courses of the 1990s. Having accomplished this intensive field course there are several salient lessons learned that are important to note in the continued effort towards a model that provides opportunities for indigenous students to be leaders in research and conservation.

• Importance of a safe place.

From the outset of the project, establishing a unique context and autonomy for the courses was a priority. The experience that was being created was unlike other efforts in the region, each of which is part of a larger collaborative effort. Yet, to achieve the intensive and immersive nature of the course it was important to have a space from which to operate that signified this was a new learning environment. In addition, it was essential to create a space where the students could step out of their everyday context as much as possible, similar to students who study abroad.

A neutral communal space where we could undertake the course does not exist in Punta Chueca, and Desemboque was too isolated for the logistics of this course. Prescott College's field station in Kino Bay has an established collaborative partnership with the Comcaac, of which this course would have been subsumed within had it been held at the Station. It was important to create a novel environment without any preconceptions. The solution of a safe place was found at the suggestion of Cathy and Steve Marlett in the form of a rental house in the Western Horizons community half way between Kino Bay and Punta Chueca. We were able to rent the house for months at a time, and it served as an ideal home base for the course. Without this neutral and flexible space, the course as realized would not have been possible.

• Food preparation.

One of the more effective aspects of the course was hiring three cooks from Bahía de Kino through the recommendation of the Prescott College Kino Bay field station. Led by Vicky Yanez, they were in charge of all food purchasing and food preparation. They came to the house each day and prepared a hot lunch and dinner for all of the students and visiting instructors. The presence of delicious home cooked meals for all of the students throughout the entirety of the course was an intangible comfort as well as making meal times a cherished and communal event as the course went along. In addition and perhaps even more importantly, taking food preparation out of the hands of the instructors was essential. In any future field course effort, a budget line item for dedicated people to lead food preparation is essential.

• Pushing the students.

There can be a tendency for cultural outsiders to not risk alienating their collaborative relationship with individuals and acceptance in foreign lands by being easier or having relaxed expectations. The great benefit of undertaking this course after 10 years of collaboration, were the established relationships Dr. Wilder had with the community. Given a mutual respect and understanding, he was able to push the students into to the uncomfortable territory of not knowing and struggling to understand concepts.

This was especially the case with math and the interpretation of graphs. Early on in the course, primarily during our time with Dr. Dirzo, the vast gap that the students had in basic math and the failing of their primary education became apparent. Dr. Dirzo, one of the world's leading ecologist spent hours going over basic division and the calculation of relative percentages. Yet, this is exactly what the students needed. Throughout the rest of the course we continued to focus on core math skills and drawing and analyzing graphs. These skills were featured on the exams and in nearly every section of the course. By the end of the course, a significant corner had been turned, as evidenced by the 91%

average on the second final exam, with nearly every student flawlessly answering the math and graph questions.

If a common sense of respect is established, the students proved to be not only willing to have their boundaries pushed, but to derive great pride from surmounting them. Such a relationship does not need 10 years to form, and future courses should be aggressive in their rigor.

• Amount of time.

As discussed above in challenges, the time taken to undertake a project of this scope was formidable. This is an unavoidable reality of the scope of these courses. Both the courses by Gary and Laura in the 1990s and now this effort benefited from a desire to make them happen on the part of the instructors, belief from supporting foundations and institutions, and a flexibility in schedule to allow them to happen. Due to the set of variables that are needed to allow such an intensive course to be executed, they will remain a rare occurrence if led by academics, whose primary responsibilities exist in a campus setting and merit is evaluated by traditional metrics.

However, collaboration among related efforts led by many of the participants of this course and others that are in direct alignment with the overarching goals of this project can continue to accomplish mutual priorities. There are multiple fantastic examples currently active. The efforts of the Prescott College Field Station as led by Laura Monti have pointed emphasis in providing opportunities for the Comcaac to engage and advance issues of most importance as they have identified them. Xavier Basurto's annual Duke University field course will continue to present an opportunity for shared learning and pointed research through cross-cultural field exercises on the islands. Cathy and Steve Marlett's continued devotion to the Comcaac culture, language, and region is a guiding model to the rest of the outside research community in how to both develop opportunities for learning, and how to give back to the community through knowledge transfer and the development of learning materials. Thor Morales' video projects provide the participants with a voice to communicate their world and also develop them as leaders to train other communities in these techniques. CONANP's steadfast presence in the region as led by Ana Luisa Figueroa through temporary employment projects and PROCODES programs, among others has and continues to be a paradigm shift in making livelihoods based on science and conservation a reality. These are but several of a multitude of simultaneous efforts.

The key will be to link the efforts of this community to continue to make advances in supporting the Comcaac to be leaders with an equal stake as outside individuals and institutions.

• Just the beginning.

The goals of this course were to provide fundamental knowledge in research and conservation in a three-month period. A university student would develop an understanding towards a mastery of the equivalent concepts over a decade of continuous schooling. Inherently, these courses were an initial step towards this goal.

Topic areas of immediate needs are a continued focus in quantitative skills, an in-depth training into how to write project proposals, training in financial management, connecting the students to other funding opportunities besides CONANP, and provide

clear examples of how the students can apply traditional ecological knowledge to science, research, and conservation through experience based learning.

Collectively, as a community of collaborators we can push forward the collective goals of this project until the variables align to repeat an intensive field course.

f. Metrics

Conservation Ecology Courses (CEC).

Course block 1 – Foundations

The number of students that complete course block
Goal: At least 10/15
Realized: 16

The number of PROCODES proposals submitted to support CCRTs
Goal: 3
Realized: 5

Field notebook use
Goal: 15/15
Realized: 16/16

Field and class room trainings
Goal: 4 (field), 4 (classroom)
Realized: 5 (field), 16 (classroom)

Comcaac participation in 2015 N-Gen Summit
Goal: 15
Realized: 20

Additional metrics:

Number of application exams submitted
No pre-stated goal, although hoped for at least 15
Realized: 68

Average of final exam for course block 1
No pre-stated goal, although hoped for above 75%
Realized: 78%

Number of visiting researchers
No pre-stated goal, although hoped for 4 per block
Realized: 18

Course block 2 – Project Implementation

The number of students that complete course block
Goal: At least 10/15
Realized: 17

Development and completion of self designed group project
Goal: Organized and coherent scientific data
Realized: Two projects, photo essays and phenology.
Photo projects are organized and coherent
Phenology data is not replicable

# of PROCODES proposals accepted
Goal: 3
Realized: 3 (mule deer monitoring, esteros, insects [led by students from course, not one of the projects submitted as part of course])

Field and classroom trainings
Goal: 4 (field), 4 (classroom)
Realized: 6 field, 17 classroom

Additional metrics:

Average of final exam for course block 2
No pre-stated goal, although hoped for above 75%
Realized: 91%

Number of visiting researchers
No pre-stated goal, although hoped for 4 per block
Realized: 7

Course block 3 – Shared Learning

The number of students that complete course block
Goal: At least 10/15
Realized: 10

Additional metrics:

Field and classroom trainings
No pre-stated goal, although hoped for 3
Realized: 6

Field project
No pre-stated goal, although hoped for 1
Realized: 1, cardón plot

Activities led by the Comcaac

No pre-stated goal, none were expected

Realized: 3 (two hikes and one discussion)

g. Description of any cooperation or collaboration among local organizations that was directly associated with this project.

The course has benefited from multiple collaborations. The two most significant local organizations that are supporting our efforts are of the Prescott College Kino Bay Center for Cultural and Ecological Studies and the Mexican Commission for Natural Protected Areas (CONANP). The Prescott College field station has provided logistical, technological, and additional support in the form of weather forecasts and transportation of students. CONANP has provided direct support in the application process of the independent projects for the PROCODES program. The joint field course to Isla Tiburón was realized in collaboration with Xavier Basurto and Elizabeth Clarke of Duke University with boat and logistical support by Prescott College.

In addition, one of the strongest aspects of the course has been the participation of visiting researchers and Comcaac elders. The contribution of their expertise and knowledge has made the course a world class opportunity. The following individuals participated during the course (specialty; organization/city):

Dr. Xavier Basurto (marine conservation; Duke University)
Cosmé Becerra (sea turtle conservation; Prescott College)
Dr. Michael Bogan (aquatic biology; University of Arizona)
David Burckhalter (photpgraphy; David Burkhalter Photography)
Elizabeth Clark (sustainable fisheries; Duke University)
Dr. Rodolfo Dirzo (plant ecology, conservation; Stanford University)
Tim Dykman (marine conservation; Ocean Revolution)
Dr. Ray Lee (bighorn sheep biology and management; Wild Sheep Foundation)
Maria Luisa Estrella (botany; Desembque)
Cathy Moser Marlett (malacology, linguistics, drawing; Summer Institute of Linguistics)
Steve Marlett (linguistics; Summer Institute of Linguistics)
Alberto Mellado (conservation; CONANP)
Dr. Laura Monti (plant ecology and traditional medicine; Prescott College)
Thor Morales (photography, sea bird ecology; InsightShare)
Dr. Gary Nabhan (ethnoecology; University of Arizona)
Dr. Carolyn O'Meara (linguistics; Universidad Nacional Autónoma de México)
Catherine Ramos (sociology; Universidad de Columbia)
Dr. Enriqueta Velarde (sea bird ecology, long-term data series; Universidad Veracruzana)

Financial Report

Line Item	Sub Line Item	Amount	Costs	Balance
Time Compensation	Teaching Assistants	$6,000.00	$6,000.00	**$0.00**
Time Compensation	Wilder	$35,000.00	$33,701.36	**$1,298.64**
Course Travel	Van Rental	$1,100.00	$2,398.64	**-$1,298.64**
Indirect ICF Cost	Indirect ICF Cost	$2,900.00	$2,900.00	**$0.00**
	Totals	**$45,000.00**	**$45,000.00**	**$0.00**

Budget explanation

Time Compensation

Teaching Assistants

The full amount of funds requested was paid out to the teaching assistants for the course, Humberto Romero Morales (blocks 1, 2, and 3), Mayra Estrella (blocks 1, 2, and 3), and Catherine Ramos (block 1).

Benjamin Wilder

The full amount of funds requested was paid out to Dr. Wilder for execution of the course, minus the overdraft from course travel, see next.

Course Travel

Van rental (boat rental)

Costs for course travel were more than budgeted. This was primarily due to the high costs of the boat charter from Prescott College for block 3 of the course, the joint trip with Duke University to Isla Tiburón. The overdraft was covered by a portion of the funds originally identified for Dr. Wilder's salary.

Indirect ICF Cost

The full amount of funds identified for the 7% indirect costs of direct project costs was transferred to ICF.

Appendix 1. Course Application Exam

Examen para determinar la participación
en los Cursos de Ecología y Conservación

Explicación

Para hacer parte y participar en los cursos de ecología y conservación con Ben Wilder y diversos investigadores y ancianos Comcaac es necesario completar este formato.

Qué: La meta de los cursos es a ayudar los Comcaac a convertirse en líderes de los proyectos de ciencia y conservación. El curso se enfoca específicamente en la construcción de proyectos desde su concepción, el desarrollo hasta la conclusión. Los cursos brindarán el conocimiento que los estudiantes quieren y les hace falta para realizar proyectos de alto nivel. En la primera parte del curso, en noviembre, desarrollarán con otros estudiantes propuestas de proyectos que pueden ser apoyados como PROCODES.

Cómo: Es un curso intensivo que consta de tres etapas. La primera dura tres semanas. El tiempo de los participantes será retribuido con una beca y al final de las tres etapas los participantes que asistan a las tres etapas recibirán una acreditación que certifique que completaron todo el curso.

Quién: Los instructores principales son Ben Wilder y Rodolfo Dirzo. Entre los instructores visitantes estarán Enriqueta Velarde, Xavier Basurto, Carolyn O'Meara, Cathy y Steve Marlett, Gary Nabhan, entre otros.

Estudiantes: 15 Comcaac que tengan experiencia e interés en manejar proyectos de ciencia y conservación.

Cuándo: El proyecto es de un año, dividido en tres etapas.

(1) Fundamentación: **9–27 noviembre 2015**

(2) Aprendizaje Compartido: marzo 2016 (fechas definitivas se decidirán juntos)

(3) Implementación de Proyectos: abril 2016 (fechas definitivas se definirán juntos)

Dónde: La base es una casa en Western Horizons al sur de Punta Chueca, con mucho tiempo en campo. Hay espacio para acampar cerca la casa para la gente de Desemboque (y Punta Chueca si quieren)

Instrucciones:

Por favor responde a cada pregunta en la páginas siguientes

Datos
Nombre:
Pueblo:
Correo electrónico y/o nombre en Face:
Edad:
Trabajas en (e.j., plantas, mamíferos…):
Experiencia (en qué proyectos has trabajado, qué actividades has realizado en esos proyectos y en qué fechas):

Preguntas

(1) Estas explorando en la Sierra Kunkaak de Tahejöc. En el filo más alto encuentras 10 cótotaj (cirios) creciendo en un solo lugar, es un nuevo registro para la isla. Cuando regresas a tu casa, tu mamá te pregunta sobre la información que recolectaste en tu salida ¿Cómo le explicas a ella la presencia de esa planta en ese lugar?

(2) Llegas al aguage Xapij. inmediatamente te das cuenta que las cosas no son como las recuerdas , ni como lo ha descrito tu familia. En lugar de un flujo de agua y masas densas de Xapij, encuentras una pequeña piscina de agua y sólo un grupo de Xapij. Sin embargo, no está claro en qué momento las cosas cambiaron. Tienes la intención de volver en seis meses para ver si algo más ha cambiado. ¿Qué puedes hacer para estar seguro de que lo que veas la próxima vez es diferente, si necesitas decirle a la comunidad lo que observaste al volver?

(3) Varias personas han dicho que al parecer el borrego cimarrón en la Isla Tiburón sufre de una enfermedad. Otros dicen que hay menos borregos en los últimos años. Para poder seguir cazando borregos en la isla, es necesaria la información. ¿Qué podría estar causando la enfermedad de los borregos? ¿Cómo se puede saber si la población es cada vez más pequeña y darle una explicación a ese cambio en la población?

(4) ¿Cuál es el nombre de Isla Ángel de la Guarda en Cmiique Iitom y porqué tiene ese nombre?

(5) Basado en tu conocimiento y experiencia, una fundación ha decidido darte $ 15,000 USD para liderar un estudio sobre el cambio climático en el canal del Infiernillo o uno de los esteros. Para recibir los fondos necesitas presentar tu idea de proyecto a todo el pueblo y al director de la fundación. Es necesario que respondas a estas tres preguntas: 1) ¿qué mirar? 2) ¿cómo hacerlo? y 3) ¿Para qué y en qué utilizarías el dinero?

Proporciona una visión general de lo que dirías para cada uno de estos tres puntos:

Appendix 2. Comcaac youth interested in conservation and ecology. List made Summer 2015.

Person_First	Person_Last_1	Person_Last_2	Village	Age	Interest	Email
Juan Alfredo	Barnett		Punta Chueca		Aves, pesquerías	
Felipe Eliezer	Barnett	Herrera	Punta Chueca	21	pesqueres, Trabaja con la AC, ha ido a cursos de Prescott	eliezer.barnett.94
Romelia	Barnett		Punta Chueca	33	Grupo tortuguero, coordinadora AC	romeliabarnettdiaz12@gmail.com
Aaron	Barnett		Punta Chueca			
Angel Ignacio	Barnett	Herrera	Punta Chueca	19	pesquerias	angel_barnett_15@hotmail.com
Eunice	Barnett		Punta Chueca			
Gabriela Viridiana	Barnett		Punta Chueca			
Hermenegildo Rene	Barnett		Punta Chueca			
Ivan Eliseo	Barnett	Romero	Punta Chueca	23	Pesqueria, trabaja con la AC	ivan.eliseo.barnett@gmail.com
Jose Alejandro	Barnett		Punta Chueca	28	plantas, tortugas marinas	
Erika	Barnett	Diaz	Punta Chueca			
Benadad A.	Comito	Molina	Desemboque	21	Trabajó con Cathy y Steve, Grupo Tortugero	bena-115@hotmail.com
Yarlin Mauricio	Comito		Desemboque		Marina	
José Daniel	Comito	Molina	Punta Chueca	20	club de ecología	
Jorge Alfredo	Diaz		Desemboque			
Mayra	Estrella		Desemboque	34	grupo tortuguero	maykla.gtc@gmail.com
Reynaldo	Estrella		Desemboque	40	grupo tortuguero (hizo el curso pasado	josreyes@hotmail.com
Abner Isaías	Estrella		Desemboque		Marina	
Keren Elianeth	Estrella		Desemboque		Marina	
Victor Manuel	Estrella	M.	Desemboque	25	grupo tortuguero	vicorestrella@gmail.com
Efrain Alberto	Estrella		Desemboque	37	Marina	alberto.estrella75@hotmail.com
Belinda	Flores		Desemboque		Aves	
Francely Isabel	Garcia		Desemboque			
Genaro Abidan	Herrera	Moreno	Punta Chueca	21		
Omar	Herrera	Cassanova	Desemboque	22	pesca, ocean revolution	

Gabriel	Hoeffer		Desemboque			
Jose Adoniram	López	Moreno	Punta Chueca	22		
Maximiliano Damian	López	Romero	Punta Chueca	28	plantas	
Servando	López	Monroy	Punta Chueca	31	planta, mamifero y aves	circus_cyaneus22@hotmail.com
Vilma	López		Punta Chueca	18	plantas	vilma_ne_na@hotmai.com
Vanessa	López		Punta Chueca	21	plantas	vane-94-yesen@hotmail.com
Alberto	Mellado	Moreno	Punta Chueca	30	pesquerias, monitero de recursos naturales	alberto.mellado@conanp.gob.mx
Gabriela	Molina		Desemboque	26	minería-pesquerías-insectos	gabriella_moreno@hotmail.com
Diana	Molina		Desemboque			
Feyna Yoquebed	Molina	R.	Desemboque	19	Grupo Tortugero	fjoke-23@hotmail.com
Reina Erika	Molina	Romero	Desemboque	?	Grupo Tortugero	?
Francisco "El indio"	Molina	Sesma	Punta Chueca	42		
Miriam Karina	Montaño	Segouia	Punta Chueca	22	club de ecología	
Julia	Montaño		Punta Chueca		traducción	
Rogelio	Montaño		Punta Chueca			
Esteban Adolfo	Montero	Burgos	Desemboque	23	grupo tortuguero	
Ricardo Aaron	Montero	B.	Desemboque	21	Grupo Tortugero	?
Vilma Irasema	Morales	Astorga	Desemboque	27	Plantas	vilmamorales2014@hotmail.com
Alma Imelda	Morales	Romero	Desemboque	37	Observación de mamíferos y aves	None
Ana Maria	Morales	Ortega	Desemboque	39	Observación y monitoreo de aves	
Gaudelia Berenice	Morales		Desemboque			
Hernan Dario	Morales	Molina	Desemboque	16		
Jesus Aldahir	Morales		Desemboque			
Valeria Enedina	Morales		Desemboque			
Noelia	Ortega	Molina	Desemboque	20	Mamíferos	chinita_vsgg@live.com.mx
Daniel	Ortega	Molina	Desemboque			
Efraín Leonel	Perales	Hoeffer	Desemboque	25	Ecología	*leohoeffer@gmail.com*
Yasmin	Perales	Molina	Desemboque	18	Aves	

Lourdes Karelia	Perales	Hoeffer	Desemboque	26	monitoreso de mamiferos terrestres	karelia=ph@hotmail.com
Genaro Gabriel	Robles		Punta Chueca			
Julio Cesar	Robles	B.	Punta Chueca	19		
América	Rodriguez		Desemboque		tortugueros	
Ana Victoria	Rodriguez	Torres	Desemboque	23	Grupo Tortugero	annavictoria.avr@gmail.com
Selene	Rodriguez		Desemboque		pesquerías-insectos	
Sócrates	Rodriguez		Desemboque		Minería-pesquerías-insectos-artes-legislación	
Eduardo Samuel	Romero	Montaño	Punta Chueca	32	mamíferos y aves; Grupo de video, trabajó con Cathy y Steve	glucius_k-60@hotmail.com
Adan Humberto	Romero	Morales	Punta Chueca	23		
Dora Adela	Romero	Montaño	Punta Chueca	37		
Maria Victoria	Romero	Torres	Punta Chueca	19	Ecología y conservación	rotu-mar-@hotmail.com
Betsabe	Torres		Punta Chueca			
José Ramon	Torres	Molina	Punta Chueca		mamíferos, cacería, grupo de video	
Valentina	Torres		Punta Chueca			

Appendix 3. Final exam for block 1 – Foundations

Curso de Ecología y Conservación Comcaac

Bloque 1 - Fundaciones

Examen, 29 noviembre 2015

Nombre:_____

1. ¿Qué son las tres partes de defaunación? Escribe la palabra correcta antes de cada nivel.

1. _____ global
2. _____ poblaciones de especies
3. _____ de la abundancia

2. ¿Cuantas extinciones grandes han pasado en la historia del mundo?

3. En los años en que El Niño se ha presentado, qué ocurrió en los siguientes factores en relación con las condiciones normales? Escriba la palabra correcta en el espacio. Sus opciones son (no es necesario usar cada uno):

más, menos, bajo, alta, caliente, fría, grande, poco, feliz, triste

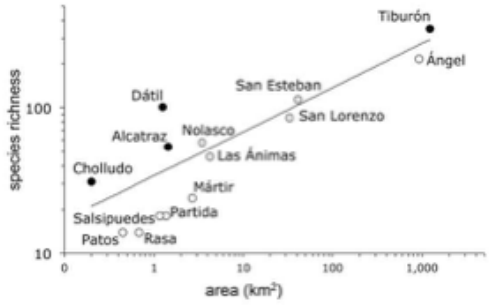
En el Golfo de California el agua está _____ y la productividad es _____. Por eso, la cantidad de peces (sardinas y anchovetas) es _____ y las poblaciones de aves es más _____ de normal. Al mismo tiempo, en la tierra hay _____ lluvia y _____ crecimiento de plantas, y Humberto y Ben están _____.

4. Llene la tabla con las cálculos para Densidad total, cada densidad relativa, el total de la densidad relativa, la frecuencia total, cada frecuencia relativa, el total de la frecuencia relativa, el total de la Dominancia, cada dominancia relativa, el total de la dominancia relativa, cada valor de importancia y el total del valor de importancia.

Especies	Densidad	Densidad relativa	Frecuencia (%)	Frecuencia relativa	Dominancia (m2)	Dominancia relativa	Valor de Importancia
Xoop	54		90%		78		
Mocni	17		15%		120		
Jomjeeziz	28		60%		66		
Seepol	108		10%		59		
Total	207						

5. Biogeografía de las Islas.

A. La figura que sigue indica que hay una relación entre el área y la riqueza de especies. ¿ Cual es?



R:

B. Las puntas negras indican que la isla tiene más especies de la expectación y las puntas blancos indican que estas islas tienen menos. ¿Cuáles son las razones por este resultado?

R puntas negras:

R puntas blancas:

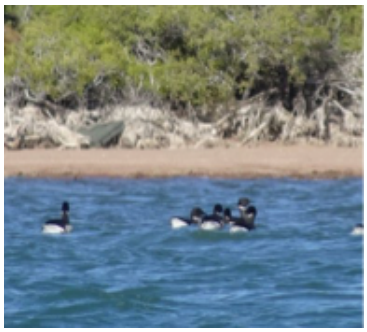
6. Identificación de especies

Nombre en Cmiique Iitom

_____

Nombre científico

_____



Nombre en Cmiique Iitom

_____

Nombre científico

_____

Nombre en Cmiique Iitom

_____

Nombre científico

_____

Nombre en Cmiique Iitom

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Nombre científico

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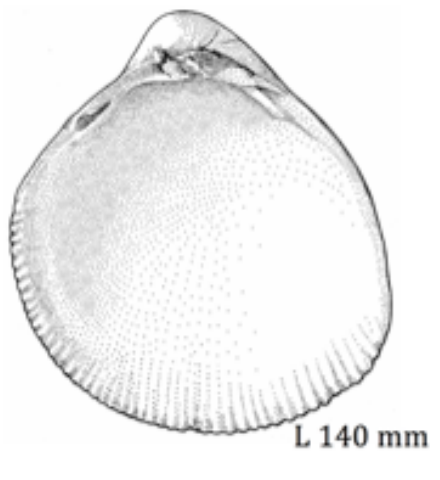
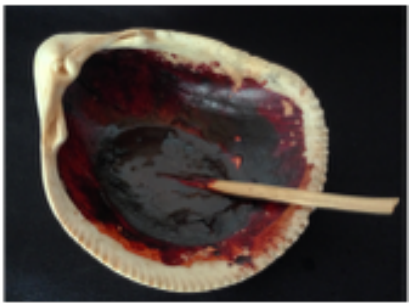




Nombre en Cmiique Iitom

_____

Nombre cientíifico

_____

Nombre en Cmiique Iitom

_____

Nombre científico

_____

Appendix 4. Final exam for block 2 – Project Implementation

Curso de Ecología y Conservación Comcaac

Bloque 2

Examen 2, 7 abril 2016

Nombre:_____

(1). Definiciones. Poner la definición de los siguientes conceptos. [10 puntos / 2 cada uno]

(1A). Hipótesis.

(1B). Fenología.

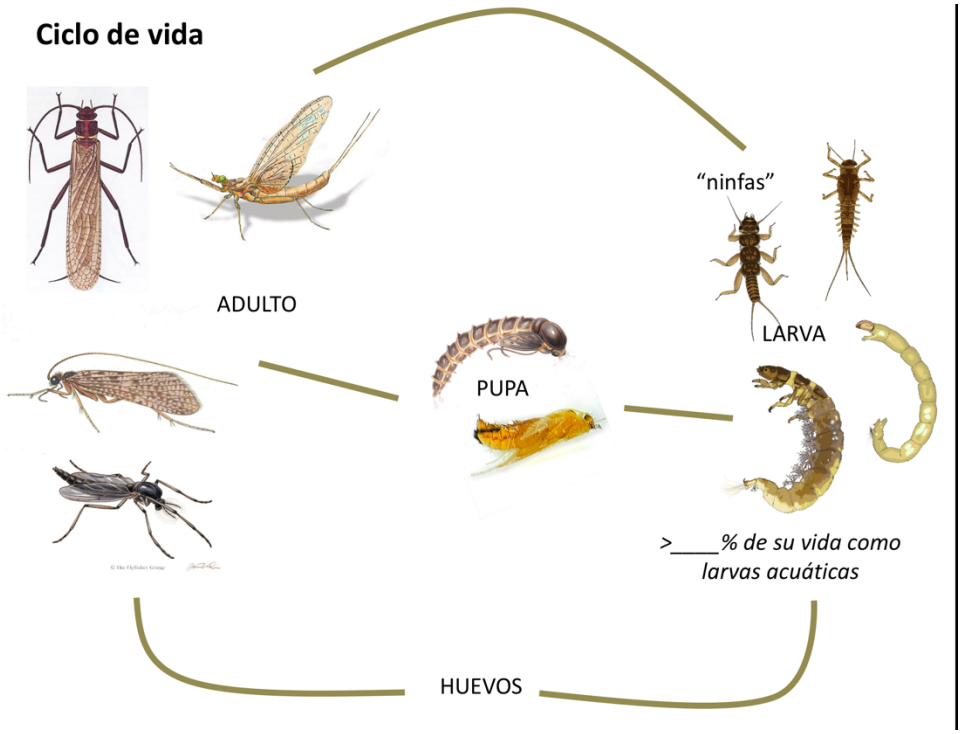
(1C). Corriente en chorro.

(1D). Capacidad de carga.

(1E). Oasis.

(2). ¿Qué son tres adaptaciones que insectos acuáticos tienen a respirar abajo el agua? [6 puntos]

(3). Completas este figura del ciclo de vida de insectos acuáticos con una flecha en cada línea mostrando la dirección de desarrollo, y la porcentaje de su vida como larvas acuáticas. [6 puntos]



(4A). ¿Qué son cinco nombres en Cmiique Iitom para hap, y que significa cada uno? [10 puntos]

(4B) ¿Porque tres de esos están conectado con icaati? [2 puntos]

(5). Abajo son los datos de los censos de aire del mojet en Tahejöc.

Año	# observaciones directo	Estimación de la población total
1993	295	738
2006	366	915
2009	265	663
2012	163	408

En 2016 Ray Lee hizo un censo del mojet en Tahejöc. El encontró los siguientes datos:

Clases						
1	**2**	**3**	**4**	**Hembras**	**Crías**	**Añeros (M&H)**
30	33	17	23	130	35	22

(5A). Llenar la tabla con los números de animales observado directo y la estimación de la población total. [4 puntos]

Año	# observaciones directo	Estimación de la población total
2016		

(5B). Dibujar el cambio del tamaño de la población por tiempo (1993-2016) abajo, incluyendo números en los ejes. [10 puntos]

(5C). ¿Que es el rango de permisos de casería son recomendable a vender en el siguiente año basado en los datos de 2016? [8 puntos]

¿Para clases 1 a 4?

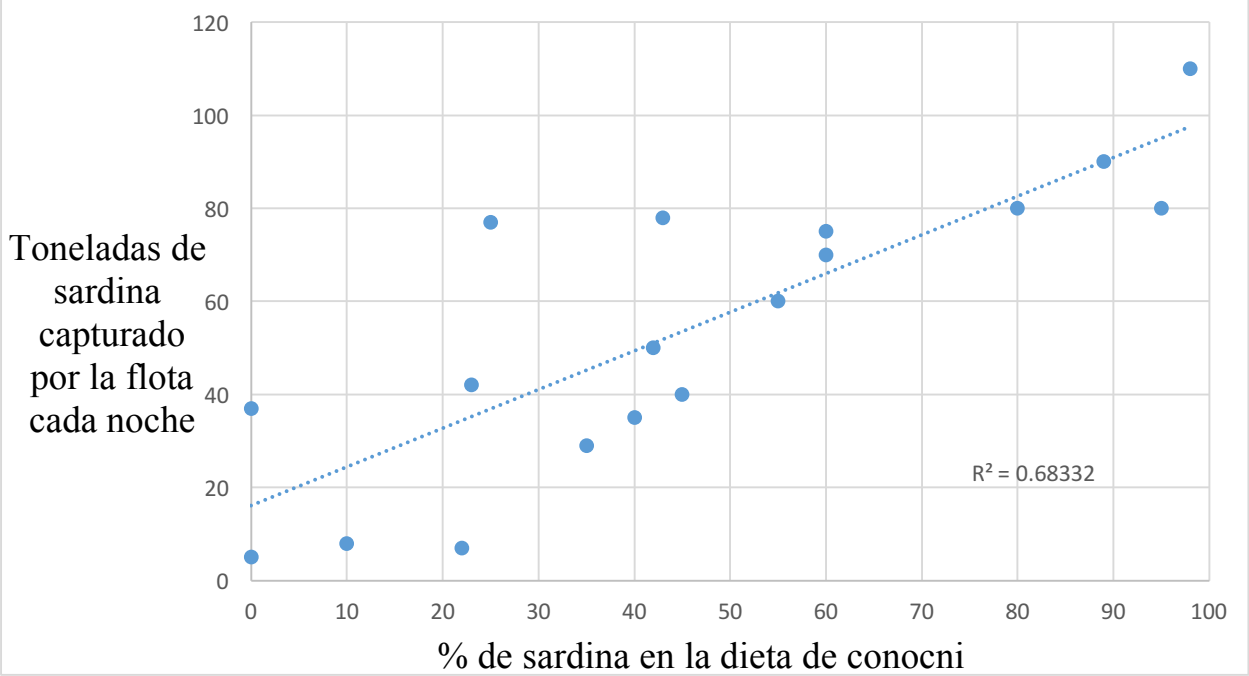
¿Para clases 3 + 4?

(5D). ¿Con este nuevo data, que son sus recomendaciones para el manejo del borrego cimarrón en Isla Tiburón y porque (puede tomar en cuenta número de permisos, genética, capacidad de carga, furtivismo, fie de comiso, estudios de la vegetación, etc…)? [8 puntos]

(6A). Usando la siguiente figura:

(6A). Explica en una frase que es la relación entre la porcentaje (%) de sardina en la dieta de conocni y los números de toneladas capturado por la flota. [6 puntos]

(6B). ¿Vas a Isla Rasa con Dra. Conocni Velarde y colectas datos que muestran la dieta de la gaviota ploma consiste 60% de sardina, que es la predicción de los números de toneladas capturado por la flota? [6 puntos]



CRÉDITO ADICIONAL.

(1). ¿Que es el nombre científico del bicho cabrón? [2 puntos]

(2). ¿Xepe ano hax es un ejemplo de que tipo de hábitat de agua? [2 puntos]