**Indicators:**

-Aburto-Opreza: 51 indicators and then used PCA to determine which 5 were important indicators of success.

-Split the indicators into 3 categories and be explicit as to why chose them.

-Indicators will be different for each reserve because the objective of each reserve differs. Indicators should be a measure of how well the reserve is meeting its objectives. This is what COBI wants. If are only interested in lobsters, focus only on lobsters.

-Decision tree. If your objective is this, then measure this indicator.

Potential objectives of a reserve:

1) Restore population

2) Restore ecosystem

3) Make money

-Caio: Maybe do green and red for good and bad.

-JC: Can’t do green or red for all species if are only interested in lobsters.

-Voluntary established reserves, refugias pesqueros (fishermen set up and then gov. approves), core zones for MPA (gov said this is an MPA and this is a no-take zone). We are focusing on both (the green and blue chart COBI sent to us in the beginning).

-Add column to indicators list that says what objective it applies to.

-Add biomass to indicators list.

-Sent a list of biophysical indicators for JC (mean trophic level, density, size structure, trophic richness, biomass)

-Add units to the indicators list.

Socioeconomic and governance indicators:

-Principles in how to design MPAs/no-take zones (La Paz meeting), come up with objectives and then come up with a list of indicators.

-How should these principles be evaluated? Mar will focus on these indicators. Look pretty much the same so far. Send Mar an email tomorrow to remind her.

-Stuart sent an excel sheet with different categories with several questions in each category that the person could put a value in for each question and get an overall score that corresponds to a color (red=bad, green=good, etc.)

-Analysis should be simple enough for fishermen to understand the outcomes but fishermen will not be doing the analysis. Guidebook should be easy enough to understand for a fisher. Give an example of each. Ex. biomass for red lobster went up in Natividad

-See Mesoamerican reef booklet

-JC: don’t want a graph with p-values, etc. They want green, red. Yes, no. The staff will not be able to understand difference-in-difference analysis

-Dilemma: decision-tree, very simple OR we need to commit to Shiny app to do difference-in-difference analysis because the staff of COBI can only do Excel. If don’t do Shiny app, need to come up with a simpler way of getting at the difference-in-difference analysis.

-If resources have improved as compared to baseline, get a 5. It is a better measure of success, because it is not based on perception alone.

-Add of scores for each category. If you get more than this score, get this color (red=bad). This would be in the Shiny app. If the Shiny app said biomass doubled, get this score. Should be able to get the same result by doing it by hand.

-COBI loves the idea of the Shiny app. JC showed them the Shiny app of the histograms and they loved it.

-How handle size data. How some of the size data was inputted into the database was different amongst communities. Had to do the untable function for example. Will build a Shiny app to allow them to go from different table functions. Wanted to make sure that if did not see that species that year put a zero in, did the complete function in dplyr.

**CBA:**

-Part of the framework, not the analysis. The indicator is “Are revenues greater than cost?”

**Survey:**

-Will have survey for fishermen by Wednesday.

-Have Mar go over the survey.

**Natividad:**

-Document for Natividad. They submitted it to CONAPESCA and then handed it off to INAPESCA. INAPESCA said the science was solid and just want better format of document. In 3 months, it will be a refugio pesquero. Type of reserve: number of divers and fishermen (for governance), how become partners of cooperative, what species they target. Objective: recover green (blue in Spanish) abalone, and pink (yellow in Spanish) abalone. And approve the production of abalone in adjacent areas. Hasn’t fished abalone since 2006, so the MPA and TURF is a whole no-take reserve for abalone. The MPA may be doing well for abalone because they are using aquaculture to repopulate the population. Can’t use landings since haven’t been fishing it. Can’t compare reserve to control zone biomass because both are no-take areas.

-Natividad is a temporary reserve, not permanent. Will be a reserve for 3 years and is total in that it will not be fished. Signed into law to 2018 will be a legally recognized reserve. But implemented it as a reserve since 2006. No idea how to renew as a legally recognized reserve if it is a temporary reserve. If it is permanent, it is permanent. Idea of a temporary reserve, is to get rid of it if they don’t like it.

-So will have to focus on other species in the analysis for COBI, but will have to

-Same for El Rosario. Don’t have a permit for abalone. But are using the MPAs as leverage to get a permit for abalone.

**Spring Review Meeting:**

-Jorge say that is okay to just have meeting with Alvin.

-Plot the data we have.

-Costello wants the analysis of Natividad.

-Shiny app: inputs, analysis, output and how interpret results; powerpoint slides

**Divide and conquer:**

Indicators: Match indicator with data that we have. JC has the length-weight logistic curve to determine the biomass of fish.

-Instead of ecological niches, do mean trophic level.

-Costs and benefits are at the cooperative level. Do the cost of fuel, hiring divers to monitor.

-Alternative livelihoods: not many alternatives (100/150 are fishermen). Most are fish for abalone or do abalone aquaculture.

-TURFs with quotas and permits and by area. We know the number of permits and fishermen focused on each activity. So have mini-TURFS within the big TURFs. Not ecosystem-based management scheme. 10 permits for sea cucumber with max allowable catch of 9 tons per year for all permit users in total. Permit=3 per group. One drives boat, one who dives to catch the sea cucumber and one make sure engine doesn’t catch hose. Have 4 for finfish. 10 for snails. 19 for lobster. 10 permits for abalone, but no more fishing since 2011. Maybe able to look at some trends for first 5 years of the reserve.

-Read ETJ for Natividad. See Compatibility with other uses section.

-8 fishers do the monitoring dives

-Degree of illegal harvesting (don’t need to know now). Pretty sure is low. 8km away from land.

-Natividad has agreements with adjacent cooperatives from adjacent reserves. So very low illegal fishing.

-Adaptive management plan should be Management plan: yes or no. Probably not required for refugios pesqueros but probably required for government reserves.

-10% of the concession for cucumbers etc. and 0.6% of the concession for lobster. Figure out how to standardize that. Size of the reserve/size of TURF

**After the lecture:**

Functions for richness, biomass, density Build dataset, richness of dataset, get by year density and biomass and density. JC do.

-Socioeconomic and governance part (Caio and Jae extract it) is in the document.

Difference-in-difference:

-Reserves and control sites with two different time series. Do all the reserves pooled together and pool control sites for this one week analysis. Every reserve has a control for each reserve.

-Melaina: practically go through how to do DID. Use mock data and perform DID on it. Do it today and then tomorrow run DID on the data JC is formatting. Brief JC on how to do DID. And JC will brief on the functions. Goal: DID for Costello on Wednesday

-Walk through what would do for all indicators for Spring Review meeting

-Shiny app for review meeting

-JC: biophysical be one huge database; not so good for social or governance for the end of the project.