Parallel trends assumption: before treatment is applied, have to make sure what is happening in control and treated area is the same. Look at trend before in treatment and control to make sure the changes you are observing are the same. Having at least a couple of data before the reserve goes in. Is the change that happened the same in both areas?

Issue with the one year: could said ideally would collect data in the way described above

Our linear regression model is correct

Any time varying co-variates? Yes, temperature but wouldn’t really change between reserve and control. Can put in time-varying co-variates as another term.

How many observations for a given zone? 12-24 transects per site per year.

Won’t affect estimate of Beta 3. Can include long and lat of transect (will affect only precision, standard error smaller).

Do fish move around? Yes. They move in and out of the zone. This is like in economics where treated and control groups are part of same market. Ex. housing market, some get regulation and some didn’t and want to see effect. If affect housing prices, affect prices everywhere.

Interpretation of Beta 3: net effect of reserve = proper interpretation (affects both in and out of reserve). Recognize that outside of reserve is affected as well.

No control group in OA area when there is a TURF around the reserve.

Zone will take value of reserve of control even if before implementation. Year (0 or 1 depending on before or after implementation).

DID is usually before and then after. Not a time series after. How do deal with that? 1. Do separate models. One estimate B3 right after treatment and then next year or not. Gives a sense of whether treatment effect goes up over time.

Is a way to pool all data instead? Instead of year being 0 or 1, put all data together. You can have for years after treatment goes in, have a dummy for year 2012, year 2013 which will allow you to estimate beta for years after.

Issue: we have been treating Year as continuous rather than 0 or 1. Don’t do that. **Assuming increment from 2014 to 2015 is same effect as from 2014 to 2016**. Forcing a one year change to always have the same effect. JC: Use binary code for variables. Will have a value of slope for each one of them.

**Use separate dummy variables for year**. The year becomes a dummy for year you are in. You allow different beta 3’s for diff years are in.

**Landings data**: have data from TURF, not reserve. Or OA, not reserve. Compare slopes before and after implementation? No counterfactual in sense that don’t have transect data where no TURF. Plantiga: time series for landings. **Do means test before and after**. Is average before different from average after implementation? Issue that may not have enough observations, we have monthly landings so we may be okay. But changes in seasonality, so need to control for that. JC: ask Allison if we should do slope thing instead

Change in policies will be difficult to separate from effect of reserve = challenging. Would have to get into details of what happened in each area to know. Caio: could include as a descriptive variable

More power if have multiple areas. Here are areas that have reserves, pool data and put in fixed effects for the area and then test the trends against that. If only have 10 observations before, don’t have much power.

Overall for effect: Alpha=anything that is unique to area i. Indicator that turns on, it turns on after T=year of treatment. Issue we want to inform every area, may not want to pool areas like this. This assumes have one beta overall.

Another thing might do with equation: Worry about how compute standard errors. People usually use **cluster-robust standard errors**. Plantiga has to think about it. We care about magnitude of B3 and if is sig. Thus, standard errors are important because care about getting SE right to know B3 is right. We should think about that issue. Will have spatial correlation in data depending on where the transect was placed: account for that using cluster-robust SEs. Define clusters: all data you get from those two areas are correlated, is a common SE within each cluster that could be different between clusters