Appendix A: Sample Construction and Trip Definition

As discussed in Section III.A, the FWC provided me with the universe of trip tickets associated with fishermen that *ever* sold *any* amount of lobsters during a 10-year period. From this universe, I identify and extract the population of South Florida lobster trap fishermen. I limit my analysis to this subset of individuals for three reasons. First, it seems clear that fishing for lobsters is not a viable daily alternative for all observed fishermen. For example, while some fishermen regularly harvest lobsters, others appear to have caught a few lobsters as by-catch on only one or two occasions. Including these fishermen in the estimation would likely bias parameter estimates and produce misleading policy forecasts.

Second, trapping and diving are sufficiently different methods for harvesting lobsters that I do not expect the same behavioral model to apply to both groups. Moreover, because the capital requirements for harvesting lobsters and stone crabs by trap are quite similar, it is trappers, not divers, that often participate in the stone crab fishery. For this reason, studying trappers provides an ideal setting to investigate the importance of modeling stone crab fishing as an outside option. Trapping is also by far the most common method for harvesting lobster (see Table A1), so studying this group is meaningful from a policy perspective.

Third, focusing the analysis on South Florida dramatically reduces the computational burden of the estimation while not jeopardizing the results or message of this paper. The coast of Florida is divided into 18 statistical areas (see appendix B). While in principal fishermen may choose to fish for lobsters or stone crabs in any of these areas (as well as in any other state or country), in practice they rarely choose to fish for either species in any of the thirteen northernmost areas: approximately 95% of all lobster and stone crab landings are made within the five southernmost areas. Thus, only a small percentage of landings are dropped by this simplification.

Dropping the thirteen northernmost areas from the analysis also serves a second purpose. As discussed in appendix C, I construct expected revenues for each area and each day using the price and landings data that is available on trip tickets. This is possible because many lobster and stone crab trips are made to the five southernmost areas, so I have sufficient data on prices and landings to construct expected revenues. However, very few lobster and stone crab trips are made to the thirteen northernmost areas. As a result, I would have to make very strong assumptions about how revenues vary across space and time to estimate expected revenue for each area on each choice occasion and for each species. This would entail a great deal of imputation and extrapolation based on a small number of data points, meaning there is a high likelihood of introducing prediction errors that could easily lead to biased parameter estimates and misleading policy forecasts.

To identify this population, a target species must be identified for each trip ticket. Since I do not explicitly know which species were targeted on a given trip, I infer intent based on observed catch. To do this, I calculate the value sold of lobsters, stone crabs, and all other species combined separately for each trip ticket. I label a trip a "lobster" trip, "stone crab" trip, or "other" trip if the largest share of the trip's value came from lobsters, stone crabs, or other species, respectively. I code all fisherman-day pairs for which I do not observe a trip ticket as "non-participation". Since it is very rare for fishermen to make trips, but have nothing to sell, this is a reasonable assumption.

Table A1 describes how my sample construction process affects the percentage of lobster sales, by weight and value, that are retained in the analysis. Beginning with the universe of trip tickets associated with individuals that ever sold lobsters, I first drop all fishermen that never make a lobster trip (see row 2). Second, I drop all trips made to the thirteen northernmost areas as well as all fisherman-season pairs during which the fisherman made a trip to one of these areas (see row 3). Third, for each season, I classify fishermen as "trappers" if at least 90% of the lobster trips they make report traps as the primary gear used, and I drop all fisherman-season pairs and associated trip tickets that do not meet this criteria (see row 4). Finally, I drop all seasons during which the fisherman made fewer than ten lobster trips (see row 5). My final sample includes the population of South Florida commercial lobster trap fishermen and retains a substantial 82% of all lobster sales in the state of Florida, by weight and value. Results are robust to variations in the sample construction process.

Table A1: Retained Lobster Sales by Sample Criteria

Criteria	Weight (%)	Value (%)
All lobster sales	100.00	100.00
1+ lobster trips, all seasons	99.97	99.97
South Florida fishermen	92.83	92.88
Trap fishermen	83.72	83.84
10+ lobster trips, per season	81.99	82.11

In the final sample, 99.7% of all trips are classified as "lobster" or "stone crab" trips according to my definition, and some amount of lobsters, stone crabs, or both species was sold on all of the remaining 0.3% of trips, with lobster and stone crab contributing 30% to the value of "other" trips, on average. Furthermore, lobsters and stone crabs comprise 99.6% of the total value of all species sold by fishermen in my sample. Hence, fishing for other species is rare, not of much value, and only done in conjunction with fishing for lobsters or stone crabs. Rather than code these choice occasions as "non-participation", which introduces the type of misspecification I seek to avoid, I re-classify these trips as "lobster" or "stone crab" trips depending on which contributed the larger value to the trip. Results are virtually identical when these choice occasions are dropped from the sample.

Appendix B: Statistical Areas in Florida

The Florida Fish and Wildlife Conservation Commission (FWC) divides the waters adjacent to Florida into eighteen statistical areas for the purpose of data collection. A map of these areas is shown in Figure B1. Approximately 95% of all lobster and stone crab landings are made within areas 1, 2, 3, 744, and 748. To reduce computing time, I focus my analysis on these five areas, only. To aid discussion, I re-label areas 744 and 748 as areas 4 and 5, respectively.

Appendix C: Variable Construction

Wind Speed: The U.S. National Oceanic and Atmospheric Administration's historical weather buoy database (http://www.ndbc.noaa.gov) records weather conditions every hour at numerous buoys spanning the coast of Florida. To determine daily wind speed, for each buoy, I average hourly wind speed from 6am until 6pm for each open-season day in the sample. I assign daily wind speed to each fisherman-choice occasion using data from the buoy closet to the modal area fished by that fisherman in that particular month.

Distance: To calculate the distance each fisherman must travel to visit each fishing location, I first establish port location using the centroid of the zip code associated with each fisherman's license. I next determine the "fishable" portion of each fishing location by removing marine reserves and marshy areas. I specify the distance between a port and the nearest fishable portion of each fishing location as the shortest navigable route by sea.

Expected Daily Revenue: Expected daily revenue is the product of price and expected catch. I observe price and realized catch for fisherman-choice occasions with sales records and use these

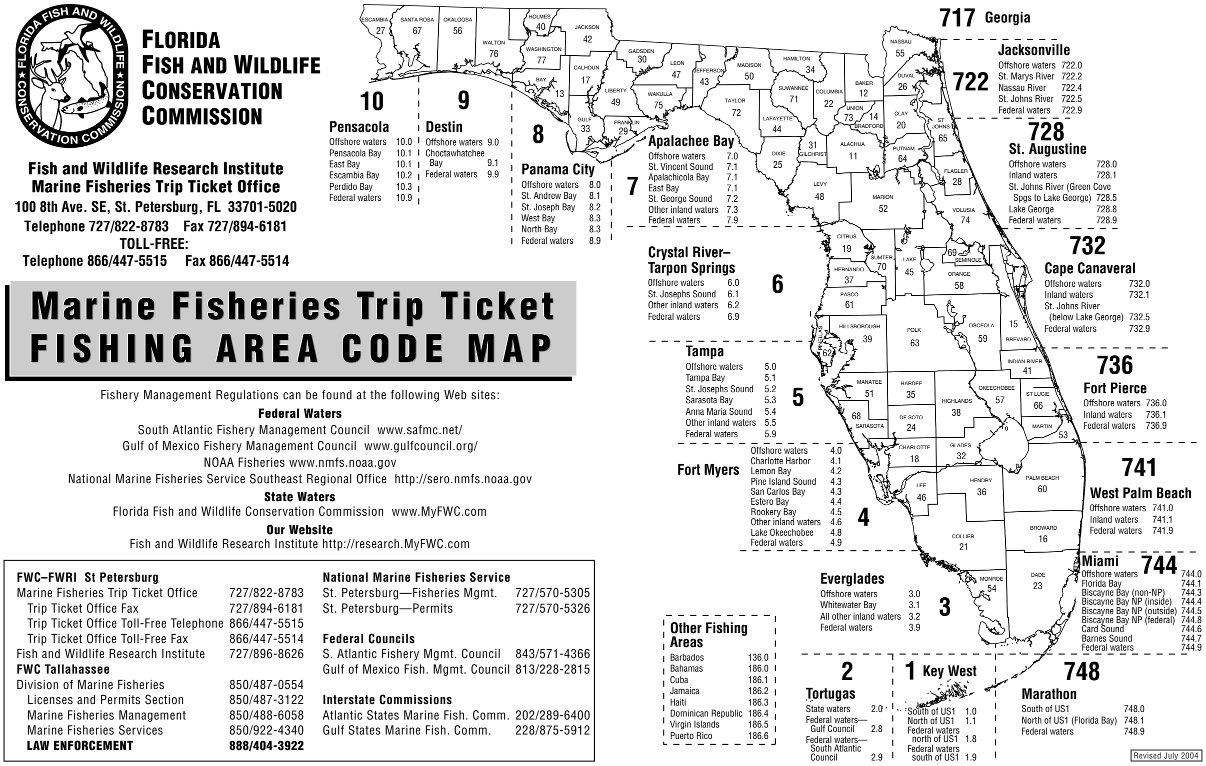

Figure B1: FWC Marine Fisheries Trip Ticket

data to construct a complete sample of expected lobster and stone crab revenues. To capture the spatial variation in prices offered by dealers, I construct daily price averages for each of five geographical areas that correspond to the spatial density of lobster and stone crab sales (on land). These areas are (i) Key West, (ii) Summerland and Big Pine, (iii) Marathon and Long Key, (iv) Islamorada, Tavernier, and Key Largo, and (v) Miami. I match price observations from trip tickets to these areas using the zip code associated with the license of the dealer reported on the trip ticket. Within each species-area-day cell, I first average all price observations, weighting observations by the corresponding quantity sold. I then use these daily averages to create seven-day weighted moving averages, where the present day receives a weight of 7, the previous day receives a weight of 6, and so on, with six-days prior receiving a weight of 1. I match price series to fishermen according to the zip code associated with their fishing license.

To make observations more comparable, I normalize catch by dividing by the number of traps pulled. Unfortunately, the number of traps pulled is not always recorded on the trip ticket, so the sample of observed, normalized catches is much smaller than the sample of observed prices. Consequently, I use a coarser averaging method. For each species and for each of the five fishing locations available to fishermen, I calculate 30-day weighted moving averages of normalized catch, where weights are constructed as above. In particular, present day observations receive weights of 30, previous day observations receive weights of 29, and so on, with 29-days prior observations receiving weights of 1. I multiply species- and location-specific catch series by species- and area-specific price series to create a complete panel of expected revenues for each species and each fishing location on each open season day.