







A GEOSPATIAL SURVEY OF ANGLERS TO ASSESS FISH CONSUMPTION FROM SAN DIEGO BAY, CALIFORNIA

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PROJECT OVERVIEW



- Goal: Improve understanding of risk to humans from consuming contaminated fish from the Bay.
 - Last such study in San Diego Bay was completed by the Environmental Health Coalition in 2005. (pier focused)
 - SD County Dept. Health Services completed a study in 1990.



KEY QUESTIONS (1)



- 1. Are anglers aware of consumption guidelines?
- 2. What are consumption rates for anglers in San Diego Bay and how do they relate to advisory recommendations?







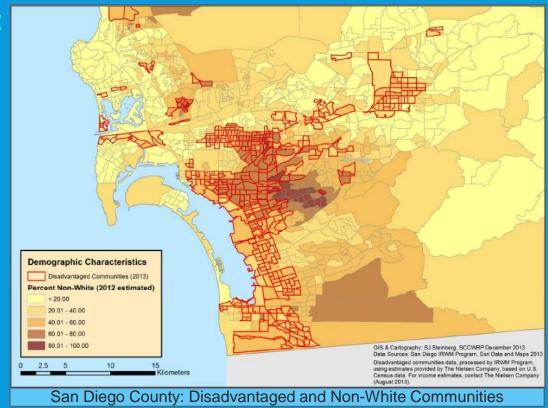
Signs in place when survey data collection was initiated May, 2015.



New signs which mimic the OEHAA pamphlets installed June 16, 2015

KEY QUESTIONS (2)

- 3. How do socioeconomic differences relate to differences in consumption rates?
- 4. How do catch and consumption rates vary in space and time by location around the bay and time of year?



STUDY DESIGN



- Used a total sampling methodology
- Field sampling plan considering:
 - Mode of fishing (pier, shoreline or boat)
 - Day of week (weekday vs. weekend)
 - Time of year (Spring, Summer, Fall, Winter)
 - Time of day (early morning, mid-day, evening)
 - Location on the bay (North, Mid, South)
 - New signs posted by Port (before/after)
- The survey also considered a variety of demographic categories (census data)



STUDY PLAN AND SURVEY



Used a total sampling method to capture sociodemographic, spatial and temporal coverage of fishing activity for a full year.

May 1, 2015 – April 30, 2016.



North Bay

Includes one pier and boat ramp (Shelter Island/Shoreline Park), and shoreline access via Harbor Island Park, Liberty Station NTC Park and along Harbor Drive north of downtown San Diego.

Mid Bay

Includes two piers (Coronado Ferry Landing, Embarcadero Marina Park), shoreline sites (Tidelands Park, Glorietta Bay Park & Embarcadero Marina Park), one boat ramp and rental boats (Glorietta Bay).

South Bay

Includes one pier, shoreline sites & two boat ramps (Chula Visa Bayfront Park/Bayside Park and Pepper Park).

NORTH BAY SITES



MIDDLE BAY SITES



SOUTH BAY SITES





FIELD SCHEDULE



Season		Fish Consumption Study Master Field Schedule - Pre Signs SPRING 2015														
Sequence	Pier> Ramp> Shore				Ramp> Shore> Pier				Shore> Pier> Ramp			Pier> Shore> Ramp				
Field Day Date	Mon 4-May	Tue 5-May	Sat 9-May	Sun 10-May	Wed 13-May	Fri 15-May	Sat 16-May	Sun 17-May	Wed 20-May	Thu 21-May	Sat 23-May	Sun 24-May	Mon 25-May	Fri 29-May	Sat 30-May	Sun 31-May
North Middle	A	С	B	С	C	С	В	Α	B	В	C	В	C	В	A C	В
South	В	Α		A	А	В	A	В	1101	С		С		С		С
				Fish Co	onsump			aster Fi	eld Sch	iedule	- Post S	igns				
Season						1100	JMMER 20								FALL 2015	
Sequence	Wed	Ramp> Sh	Thu			Shore> Pi	C.V. C. SECTION			12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	np> Shore			Ramp> Sh	A CONTRACTOR OF THE PARTY OF TH	
Field Day Date	3-Jun	Sat 13-Jun	18-Jun	Sun 21-Jun	Fri 3-Jul	Sat 11-Jul	Mon 13-Jul	Sun 19-Jul	Mon 27-Jul	Sat 8-Aug	Tue 10-Aug	Sun 16-Aug	Wed 26-Aug	Sat 5-Sep	Thu 10-Sep	Sun 13-Sep
North	С	A			В	С			C	A			В	С		
Middle		C	A			В	c			C	A			В	C	
South			С	A		- 10	В	C			C	A			В	С
Season	FALL 2015						WINTER 20			7 A. C						
Sequence	Shore> Pier> Ramp			Pier> Ramp> Shore				Ramp> Shore> Pier			Shore> Pier> Ramp					
Field Day	Fri	Sat 3-Oct	Mon	Sun 11-Oct	Tue 20-Oct	Sat 31-Oct	Wed 5-Nov	Sun 8-Nov	Thu 19-Nov	Sat 28-Nov	Fri 4-Dec	Sun 6-Dec	Mon 14-Dec	Sat 26-Dec	Tue 29-Dec	Sun
Date North	25-Sep A	3-Oct B	5-Oct	11-Oct	B B	C C	5-NOV	8-NOV	A A	B B	4-Dec	6-Dec	C C	A A	29-Dec	3-Jan
Middle		A	В		В	В	С		-	A	В			c	A	
South		- 52	A	В			В	c		1000	A	В			C	c
Season	1					WINTER 2	015 - 2016							SPRING	G 2016	
Sequence							Ramp> Shore> Pier				Shore> Pier> Ramp					
Field Day	Wed	Sat	Thu	Sat	Fri	Sat	Mon	Sat	Tue	Wed	Sun	Sun	Thu	Sat	Sun	Fri
Date	6-Jan	9-Jan	14-Jan	16-Jan	22-Jan	23-Jan	1-Feb	6-Feb	9-Feb	17-Feb	21-Feb	28-Feb	3-Mar	5-Mar	13-Mar	18-Mar
North Middle	Α	В	А	В		Fishing Derby	С	Α	c	A			В	c	Α	В
South			A		A	Shelter				1990	c	A				
Season	SPRING 2016													-		
Sequence	Shore> Pier> Ramp Pier> Shore									Start	End	Sprin	ng: March -	May		
Field Day	Mon	Sat	Tue	Sat	Sun	Wed	Sun	Thu	-		A	5:00 AM	11:00 AM	Summ	ner: June - A	lugust
Date	21-Mar	26-Mar	5-Apr	9-Apr	17-Apr	20-Apr	24-Apr	28-Apr	Time	slots	В	10:00 AM	4:00 PM	Fall: Sep	tember - N	ovember
North			С	В							С	3:00 PM	9:00 PM	Winter: [December -	February
Middle					C	A						Weekday	Weekend			
South	В	В					С	Α								

SURVEY DESIGN





- Administered in sections to get as much data as possible:
 - Observe and note all fishing activity (date, time, location) [All anglers observed]
 - Ask if surveyed before and, if YES, how recently (avidity)
 - 3. Home location and do you/family eat fish caught?
 - 4. Full survey if willing to complete (21 questions, ~10-15 minutes)
 - Used fish photos & sample filets as props

FISH SPECIES PHOTO CARDS

30 species: state listed species, plus others common in S.D. Bay







CONSUMPTION AMOUNT



 Example of sample filets used to establish consistent/actual consumption rates in grams/day





1.5 OZ.

3.0 OZ.

4.5 OZ.

6.0 oz.

7.5 OZ.

SURVEY RESPONSES



Anglers App	roache	Anglers Comple	%			
Type of Angler	Count	%	Type of Angler	Count	%	Surveys Completed
Pier Angler	952	61	Pier Angler	706	65	74
Boat Angler	367	24	Boat Angler	175	16	48
Shoreline Angler	230	15	Shoreline Angler	205	19	89
Total	1549	100	Total	1086	100	70





* 294 anglers previously surveyed 93% success for 1st time surveys

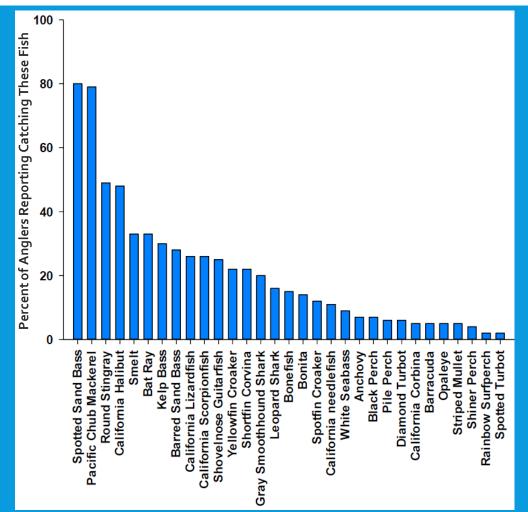
WHERE ARE ANGLERS FROM?





WHAT DO ANGLERS CATCH?



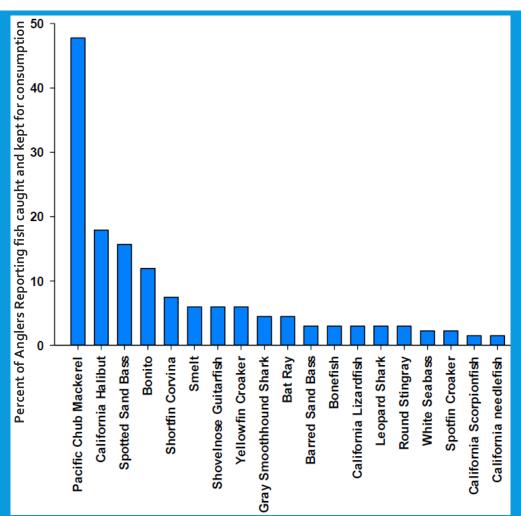


Fish Reported Caught					
Fish Name	Percent				
Spotted Sand Bass*	80				
Pacific Chub Mackerel*	79				
Round Stingray*	49				
California Halibut	48				
Topsmelt*	33				
Bat Ray	33				
Kelp Bass	30				
Barred Sand Bass*	28				
California Lizardfish*	26				
California Scorpionfish	26				

indicates inclusion on the fish consumption advisory guidelines

WHAT DO ANGLERS EAT?

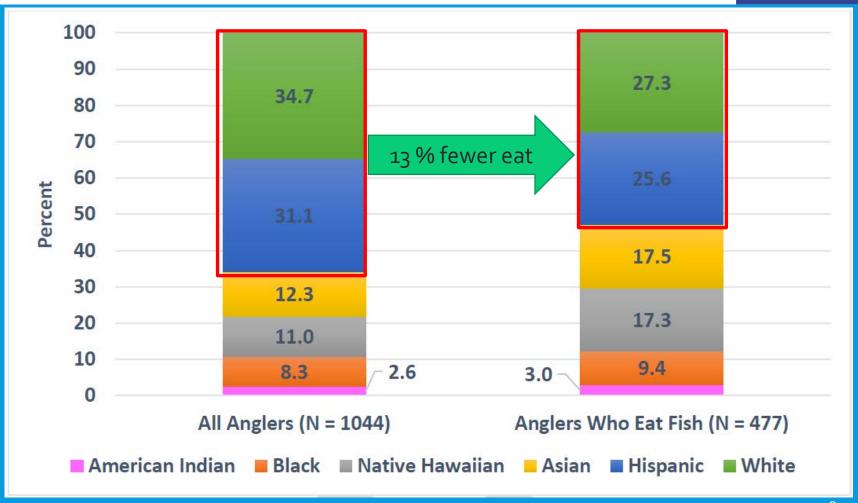




Fish Kept to Consume					
Fish Name	Percent				
Pacific Chub Mackerel*	48				
California Halibut	18				
Spotted Sand Bass*	16				
Bonito	12				
Shortfin Corvina	8				
Topsmelt*	6				
Shovelnose Guitarfish*	6				
Yellowfin Croaker*	6				
Gray Smoothhound Shark*	5				
Bat Ray	5				
* indicates inclusion on the					
consumption advisory quid	delines				

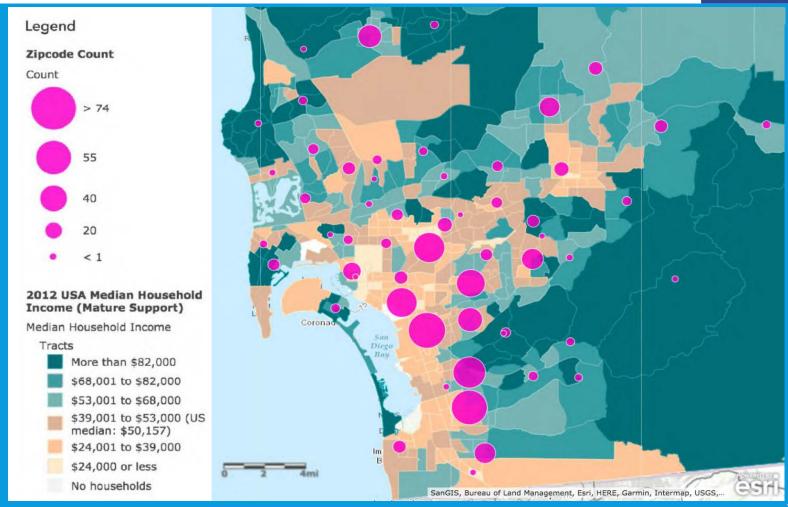
ETHNICITY





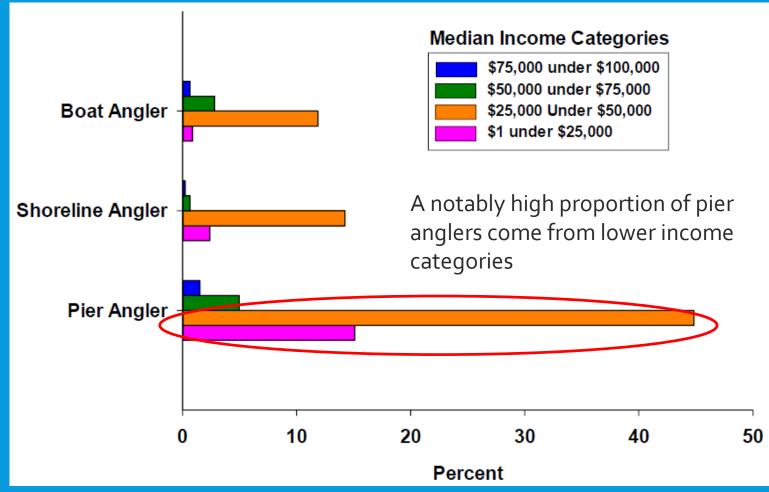
HOUSEHOLD INCOME





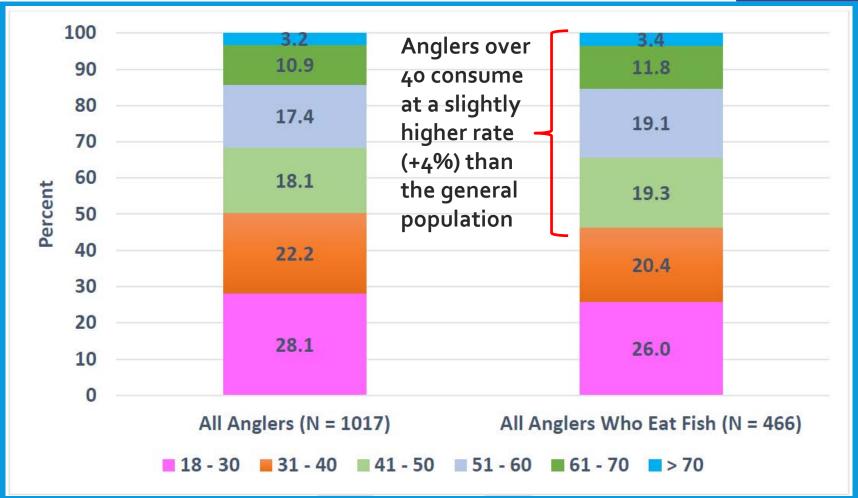
FISHING LOCATION BY INCOME





AGE

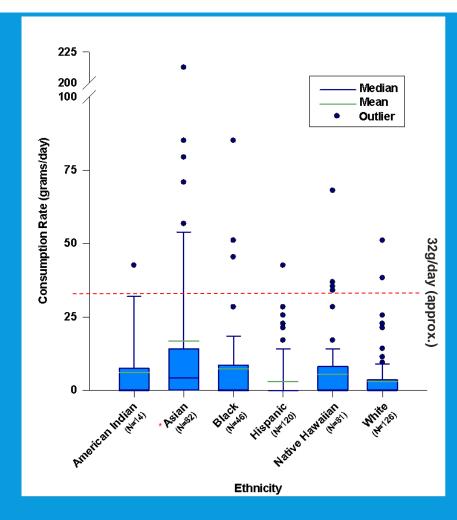




CONSUMPTION RATES

(GRAMS/DAY)





CONSUMPTION RATES

(GRAMS/DAY)



Statistic	All Anglers	Asians	> 60 years	
Mean	6.3	19.9	12.0	
(Standard Deviation)	(18.14)	(39.40)	(28.67)	
Minimum Value	0.0	0.0	0.0	
Maximum Value	212.6	212.6	212.6	
Median (50th Percentile)	0.0	8.5	4.3	
95th Percentile	28.3	76.8	42.5	
N	468	67	70	



1. Are anglers aware of consumption guidelines?

YES, but...

Awareness of consumption guidelines DOES NOT appear to affect on an individual's decision to consume/not consume fish from the bay.



2. What are consumption rates for anglers in San Diego Bay and how do they relate to advisory recommendations?

Generally, CONSUMPTION RATES ARE LOW for fin fish taken from San Diego Bay.



3. How do socioeconomic differences relate to differences in consumption rates?

Some **SELECT POPULATIONS** consume fish at rates greater than current guidance

In particular, socioeconomically disadvantaged, Asian men > 60 y.o.



4. How do catch and consumption rates vary in space and time by location around the bay and time of year?

NO SIGNIFICANT DIFFERENCES in spatial or temporal data were observed.

PARTING COMMENTS





We believe these study findings provide valuable information regarding actual consumption rates for San Diego Bay.

This will be useful to inform decision-making and policy appropriate to the local context.













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