

# Final Report

Pier Outreach Report

August

2013

This report has three main goals. The first is to observe the **behaviors** of pier anglers who catch Do Not Consume (DNC) fish who receive outreach. The second goal is to test three hypotheses related to **intentions**: (1) pier anglers who receive outreach will be less likely to report intentions to eat DNC fish across species (compared to anglers who did not receive outreach), (2) pier anglers who receive outreach will be less likely to report intentions to give DNC fish to friends or family across species (compared to anglers who did not receive outreach), and (3) pier anglers who receive outreach will be more likely to report intentions to catch and release DNC fish across species (compared to anglers who did not receive outreach). The third goal is to show that pier anglers who receive outreach will show greater **awareness** of DNC fish contamination across species (compared to anglers who did not receive outreach).

FCEC Angler Outreach

## Executive Summary

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Highlights of the descriptive analyses and statistical significance testing are as follows.

### Angler Characteristics

The sample consisted of 670 anglers surveyed from July 22, 2012- June 2, 2013. The sample was largely male (93%). The most common ethnic backgrounds reported by respondents were Latino (32%), followed by Other (29%) and Filipino (13%). A majority of surveys (92%) were conducted in English. The majority of participants were moderately experienced fishermen, with nearly half of the sample having 10 years or more of fishing experience (43%). Among these, there was a substantial contingent of very experienced fishermen reporting 20 or more years of fishing experience (25%). A number of characteristics differed by pier location including survey language, angler ethnicity and outreach exposure. This information can be used to inform resource allocation for future outreach efforts.

### 1. Fishing Behaviors

A total of 58 anglers caught at least one DNC fish. Topsmelt (n=155) was the most commonly caught DNC fish, followed by white croaker (n=70).

### 2. Awareness of DNC Fish Contamination

Pier anglers who received outreach showed significantly greater awareness of DNC fish contamination across the five DNC species compared to anglers who did not receive outreach. There were no significant differences in awareness for non-DNC fish species. This suggests accurate discriminate knowledge between DNC and non-DNC fish contamination.

### 3. Intentions with DNC Fish

Across the entire sample, irrespective of outreach status, the most common response provided for all fish species (DNC and non-DNC) was to throw it back. For DNC fish, the high-risk behaviors (eating and giving to friends/family) ranged from 7% reporting eating topsmelt to 21% reporting eating barred sand bass.

We also examined these results by outreach status. For intentions to eat DNC fish, results were in the desired direction for all species except barred sand bass, meaning that a smaller proportion of anglers who received outreach reported intending to eat DNC fish relative to anglers who did not receive outreach.

Results for intentions to give fish to friends/family showed that anglers who received outreach were generally less likely to give contaminated fish to friends or family, which was in the desired direction. This was true for topsmelt, white croaker, barracuda and black croaker. A higher proportion also reported giving non-DNC fish to friends or family, including mackerel and perch.

Results for intentions to throw DNC fish back were in the desired direction, such that a larger percentage of anglers who received outreach reported intending to throw DNC fish back relative to anglers who did not receive outreach. This was true across all DNC species. Additionally, a statistically significant difference was observed for white croaker: a significantly higher percentage of those who received outreach reported

intending to throw back white croaker compared to those who did not receive outreach.

## 1. Introduction

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### 1.1 Background

This report addresses one of the Institutional Controls (outreach/education targeting pier fishermen) that was implemented in an attempt to address fish contamination associated with the Palos Verdes Shelf (PVS) Superfund Site. In June 2009, the California State Office of Environmental Health Hazard Assessment (OEHHA) issued a new fish consumption advisory for Southern California. Prior to June 2009, only white croaker was listed as a DNC fish. The new advisory included white croaker, topsmelt, barred sand bass, barracuda and black croaker as DNC fish. Under the strategic direction of S. Groner Associates (SGA), Heal the Bay and Cabrillo Marine Aquarium and SGA staff have coordinated on implementing outreach efforts on piers extending from Santa Monica Pier to Seal Beach Pier. The outreach and evaluation efforts aims to protect anglers and at-risk communities from possible adverse health effects of eating DNC fish in areas found to be affected by contamination arising from the PVS Superfund Site, by understanding their actions, knowledge and preferences and addressing them accordingly.

### 1.2 Purpose

This report has three main goals:

1. The present the finding of surveyed and observes behaviors of pier anglers who catch Do Not Consume (DNC) fish.
2. The second goal is to evaluate three strategies used in implementing the pier outreach effort related to intentions:
  - 1) Pier anglers who receive outreach will be less likely to report intentions to eat DNC fish across species (compared to anglers who did not receive outreach);
  - 2) Pier anglers who receive outreach will be less likely to report intentions to give DNC fish to friends or family across species (compared to anglers who did not receive outreach); and
  - 3) Pier anglers who receive outreach will be more likely to report intentions to catch and release DNC fish across species (compared to anglers who did not receive outreach). The third goal is to show that pier anglers who receive outreach will show greater awareness of DNC fish contamination across species (compared to anglers who did not receive outreach).
3. Inform the pier outreach program of the results and make adjustments to improve the outreach efforts as one part of the institutional control measures set out in the Interim Remedial Action Plan to protect the public's health.

## 2. Methodology

From April 2010 forward, survey and outreach materials changed in accordance with the 2009 OEHHA advisory revision. However, when considering whether or not anglers had received outreach, it is not possible to distinguish if they received outreach based on the old or new advisory. Therefore, we conservatively consider outreach in general as a potential influence on DNC fish retention and post-catch behavior.

### 2.1 Survey Content

The survey was designed by S. Groner Associates (SGA) and was administered by trained SGA staff. Questions assessed eligibility criteria, assessed demographic characteristics and information about the survey circumstances (e.g., day, time, location, number of anglers in group). An additional set of items assessed angler-reported fish catch and surveyor-verified counts of fish in bucket. Another set of items focused on future intentions with caught DNC fish. The final topic area assessed consumption of DNC and non-DNC fish. The survey is attached as Appendix A and B at the end of this report.

### 2.2 Outreach Procedures

Outreach workers from Heal the Bay and Cabrillo Marine Aquarium and trained by SGA visited piers in 4-hour shifts from Thursday-Sunday, typically during mid-day hours. In addition, SGA developed tactics for more hands-on outreach conducted by Heal the Bay and Cabrillo called “Fishing Sessions” with anglers who consented to participate. Fishing Sessions consisted of discussion of the key points of the advisory message and provision of the FCEC tip card in an angler’s preferred language; for the 2012-2013 fiscal year we had tip cards available in English, Spanish, Chinese and Vietnamese. The English tip card is available in Appendix C. A total of 8,083 outreach sessions were conducted during the 2012-2013 fiscal year.

The Fishing Sessions were designed to further improve pier outreach efforts this past year (based on 2011 - 2012 data and effectiveness measures), SGA worked with Heal the Bay and Cabrillo Marine Aquarium in implementing Fishing Sessions to address gaps in angler outreach. This began to be implemented in March 2013. During Fishing Sessions, the Angler Outreach team provided anglers with hands-on fishing experience, demonstrating and explaining how to try and target “safe” fish to eat. When DNC fish were caught, the anglers could see what the DNC fish look like and practice proper catch and release techniques. The outreach team also set up a see-through tank on the piers along with fish that were caught and placed into the tank for anglers to see and help with fish identification.

Pier Outreach was conducted by Heal the Bay staff in the following 295 shifts at:

- Belmont Pier and Seal Beach Pier on 7/12, 7/15, 7/26, 7/28, 7/29, 8/9, 8/11, 8/12, 8/24, 8/25, 8/26, 9/6, 9/8, 9/9, 9/20, 9/22, 9/23, 10/5, 10/6, 10/7, 10/18, 10/20, 10/21, 11/2, 11/3, 11/4, 11/16, 11/17, 11/18, 12/1, 12/14, 12/15, 12/16, 1/3, 1/4, 1/5, 1/17, 1/19, 1/20, 1/31, 2/2, 2/3, 2/14, 2/16, 2/17, 2/28, 3/2, 3/3, 3/14, 3/15, 3/17, 3/28, 3/30, 3/31, 4/12, 4/13, 4/14, 4/25, 4/27, 4/28, 5/9, 5/10, 5/11, 5/12, 5/23, 5/24, 5/25, 5/26, 6/6, 6/7, 6/8 and 6/9
- Santa Monica Pier and Venice Pier on 7/6, 7/7, 7/8, 7/19, 7/21, 7/22, 8/2, 8/3, 8/4, 8/17, 8/18, 8/19, 8/30, 9/1, 9/14, 9/15, 9/16, 9/27, 9/28, 9/29, 10/12, 10/13, 10/14, 10/25, 10/27, 10/28, 11/8, 11/9, 11/10, 11/21, 11/24, 11/25, 12/6, 12/7, 12/9, 12/21, 12/22, 12/23, 1/10, 1/11, 1/12, 1/25, 1/26, 1/27, 2/7, 2/9, 2/10, 2/2, 2/23, 2/24, 3/7, 3/9, 3/10, 3/21, 3/22, 3/23, 4/4, 4/6, 4/7, 4/18, 4/20, 4/21, 5/2, 5/3, 5/4, 5/5, 5/16, 5/17, 5/18, 5/19, 5/30, 5/31, 6/1 and 6/2
- Rainbow Pier and Pier J on 7/12, 7/13, 7/14, 7/26, 7/27, 7/28, 8/9, 8/10, 8/11, 8/23, 8/25, 8/26, 9/7, 9/8, 9/9, 9/21, 9/22, 9/23, 10/4, 10/6, 10/7, 10/19, 10/20, 10/21,

11/1, 11/3, 11/4, 11/15, 11/17, 11/18, 12/1, 12/2, 12/13, 12/15, 12/16, 1/3, 1/4, 1/6, 1/17, 1/18, 1/20, 1/31, 2/2, 2/3, 2/14, 2/16, 2/17, 2/28, 3/2, 3/3, 3/14, 3/16, 3/17, 3/28, 3/29, 3/31, 4/11, 4/13, 4/14, 4/26, 4/27, 4/28, 5/9, 5/10, 5/11, 5/12, 5/23, 5/24, 5/25, 5/26, 6/6, 6/7, 6/8 and 6/9

- Hermosa Pier and Redondo Pier on 7/6, 7/7, 7/8, 7/14, 7/19, 7/20, 7/21, 8/2, 8/4, 8/5, 8/16, 8/18, 8/19, 9/1, 9/2, 9/13, 9/15, 9/16, 9/28, 9/29, 9/30, 10/11, 10/13, 10/14, 10/26, 10/27, 10/28, 11/8, 11/10, 11/11, 11/21, 11/24, 11/25, 12/6, 12/8, 12/9, 12/20, 12/22, 12/23, 1/10, 1/12, 1/13, 1/24, 1/26, 1/27, 2/7, 2/9, 2/10, 2/21, 2/23, 2/24, 3/7, 3/9, 3/10, 3/21, 3/23, 3/24, 4/5, 4/6, 4/7, 4/19, 4/20, 4/21, 5/2, 5/3, 5/4, 5/5, 5/16, 5/17, 5/18, 5/19, 5/30, 5/31, 6/1 and 6/2

Pier Outreach was conducted by Cabrillo Marine Aquarium staff in the following 140 shifts at:

- Cabrillo Pier on 7/5, 7/6, 7/7, 7/12, 7/13, 7/14, 7/19, 7/20, 7/21, 7/22, 7/26, 7/28, 7/29, 8/2, 8/3, 8/4, 8/9, 8/10, 8/16, 8/17, 8/18, 8/23, 8/26, 8/30, 8/31, 9/1, 9/6, 9/7, 9/8, 9/13, 9/14, 9/16, 9/20, 9/21, 9/22, 9/27, 9/28, 9/29, 10/4, 10/6, 10/7, 10/11, 10/12, 10/13, 10/18, 10/19, 10/20, 10/25, 10/26, 10/27, 11/1, 11/2, 11/3, 11/8, 11/9, 11/15, 11/16, 11/17, 11/24, 11/29, 11/30, 12/1, 12/6, 12/8, 12/13,, 12/14, 12/15, 12/20, 12/21, 12/22, 12/27, 12/28, 1/3, 1/4, 1/5, 1/10, 1/11, 1/12, 1/17, 1/18, 1/24, 1/25, 1/26, 1/31, 2/3, 2/4, 2/5, 2/10, 2/11, 2/12, 2/17, 2/18, 2/24, 2/25, 3/2, 3/7, 3/8, 3/9, 3/14, 3/16, 3/21, 3/22, 3/23, 3/28, 3/30, 4/4, 4/5, 4/6, 4/12, 4/13, 4/18, 4/19, 4/25, 4/26, 4/27, 5/2, 5/3, 5/4, 5/9, 5/10, 5/11, 5/16, 5/17, 5/18, 5/19, 5/23, 5/24, 5/25, 5/26, 5/30, 5/31, 6/1, 6/2, 6/6, 6/7, 6/8 and 6/9

### 2.3 Survey Data Collection Procedures

Similar to procedures for outreach, survey data collection procedures involved trained SGA surveyors visiting piers in 4-hour shifts from Thursday-Sunday, typically during mid-day hours, and administering surveys to anglers who consented to participate.

Survey training involved two separate training sessions, one in July 2012 before the current fiscal year's dataset was initiated and a second in February 2013 as a refresher to ensure the staff was implementing proper protocol. Survey items were read to anglers orally by SGA staff. Data were recorded using a paper form and clipboard filled out by staff throughout each individual interview session. In the fall of 2012, an iPad began to be used as well as paper/pencil forms. The questions asked by SGA staff during the interviews were identical across the different survey formats.

A few minor updates were made to the survey mid-way through the 2012-2013 fiscal year. A screening question for outreach eligibility was moved from the beginning to the end, a redundant question pertaining to the individual's birth year was removed and a few questions were slightly rephrased. The updated version began being administered in place of the original version in late December 2012.

Pier Outreach Evaluation surveys were conducted by SGA staff in the following 50 shifts at:

- Belmont Pier and Seal Beach Pier on 7/22, 8/24, 9/21, 10/28, 12/02, 1/11, 2/9, 3/16, and 4/21
- Santa Monica Pier and Venice Pier on 7/27, 8/31, 9/30, 11/04, 12/08, 1/13, 2/16, 3/24, 4/27 and 5/25
- Rainbow Pier and Pier J on 8/03, 9/02, 10/05, 11/11, 12/22, 1/19, 2/24, 3/31, 5/04, 5/31 and 6/02
- Hermosa Pier and Redondo Pier on 8/10, 9/07, 10/12, 11/16, 12/21, 1/25, 3/3, 4/06, 5/11 and 5/24

- Cabrillo Pier on 8/18, 9/14, 10/19, 12/07, 1/04, 2/2, 3/10, 4/14, 5/12 and 6/07

#### **2.4 Participants and Eligibility**

Nine popular fishing piers affected by the PVS Superfund Site contamination were selected as locations for survey administration and outreach activities. The nine piers included Santa Monica, Venice Beach, Hermosa Beach, Redondo Beach, Cabrillo, Pier J, Rainbow Harbor, Belmont Shores and Seal Beach. All individuals on the target piers were eligible to receive outreach. Anglers were eligible to participate in the survey if they were at least 18 years of age and indicated they had not responded to a survey in the past month related to the types of fish they eat. A total of 895 anglers were approached to be surveyed. The response rate was 82.9%. Approximately 14.1% (n=126) of these anglers who agreed to be surveyed had been surveyed previously, and thus their responses were excluded from analyses. A total of 670 responses were retained for analyses.

#### **2.5 Data Preparation**

Data from four separate databases, corresponding to the two versions of the survey used during the 2012-2013 fiscal year and to either hard copies or iPad used for recording, were combined into a single dataset for analyses. In general, only variables shared in common by all four databases were included.

### 3. Angler Characteristics

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#### 3.1 Total Number of Respondents by Pier Location

The number of anglers surveyed was lowest at Hermosa (n=49) and Rainbow Harbor (n=40) Piers. Belmont Pier provided the most respondents (n=97).

#### 3.2 Gender Breakdown

The majority of respondents were male (93%, n=649). The gender composition is consistent with data collected from previous years. In 2011-2012, the majority of respondents were also male, at 95%.

#### 3.3 Ethnic Background

Latino (n=211) was the most represented ethnic group across the entire sample. Filipino (n=84), Caucasian (n=69) and African American (n=59) were the next most frequently represented ethnicities. There were 199 respondents who identified as 'Other'.

#### 3.4 Breakdown of Ethnicity by Pier Location

Hermosa Pier reflected the highest rate of Filipino anglers, while Cabrillo and Redondo Piers reflected no Filipino angler respondents. African Americans were represented most frequently at Rainbow Harbor Pier and Caucasians were represented most at Seal Beach Pier. Cabrillo, Pier J, Santa Monica, Venice and Rainbow Harbor Piers had a high rate of Latino fishermen. There were a substantial number of fishermen who chose not to provide a response across all piers.

#### 3.5 Primary Language of Fishermen vs. Language Used To Conduct the Survey

The majority of anglers spoke English (n=468) as their primary language, followed by Spanish (n=148) and Tagalog (n=47). Nearly all surveys were conducted in English (n=768) and some in Spanish (n=62), in part due to interview language capabilities. It may be beneficial in the future to conduct surveys in Tagalog to reflect the primary languages of the anglers.

#### 3.6 Previous Receipt of Outreach

The majority of respondents (60%) surveyed reported they DID NOT previously review the FCEC tip card with someone. In other words, 40% of the sample received outreach, while 60% of the sample did not. The comparison of angler populations who did and did not receive outreach is the main way we are examining whether or not initial project objectives were met.

#### 3.7 Fishing Experience

The number of years respondents reported fishing varied greatly across the sample. Two main subgroups emerged: one group who had one to two years of fishing experience (n=109) and another group who had 10 to 19 years (n=110) of experience. The average number of years reported fishing was 11.98, while the median number of years reported fishing was 6 for respondents.

#### 3.8 Online Activity

We examined the number of anglers who use online media outlets and are potentially reachable through these media. Approximately half of respondents reported using some form of online media. The most frequent media platform used by respondents was YouTube (56%) followed by Facebook (42%).



Table 1. Angler characteristics

	Total
<b>Pier location</b>	<b>#</b>
Belmont	97
Cabrillo	93
Hermosa	49
Pier J	82
Redondo	95
Santa Monica	67
Venice	64
Seal	83
Rainbow	40
<b>Harbor</b>	
<b>Ethnicity</b>	<b>#</b>
Latino	211
Filipino	84
Korean	7
Native	4
American	59
African	69
American	7
	9
Caucasian/White	8
Cambodian	4
Chinese	187
Vietnamese	
Pacific Islander	
Other	
<b>Number of years of fishing experience</b>	
Mean	11.98
	(#)
<1 year	80
1-2 years	109
3-4 years	96
5-9 years	58
10-19 years	110
20-29 years	83
30-39 years	39
40-49 years	33
50+ years	22
<b>Primary language</b>	
English (%)	66
Spanish (%)	21
Tagalog (%)	6
Other (%)	7

<b>Survey language</b>	
English (%)	91
Spanish (%)	8
Other (%)	1
<b>Received outreach (% yes)</b>	
	40
<b>Online use</b>	
	%
Facebook	42
YouTube	56
<b>Gender (% male)</b>	93

## 4. Results

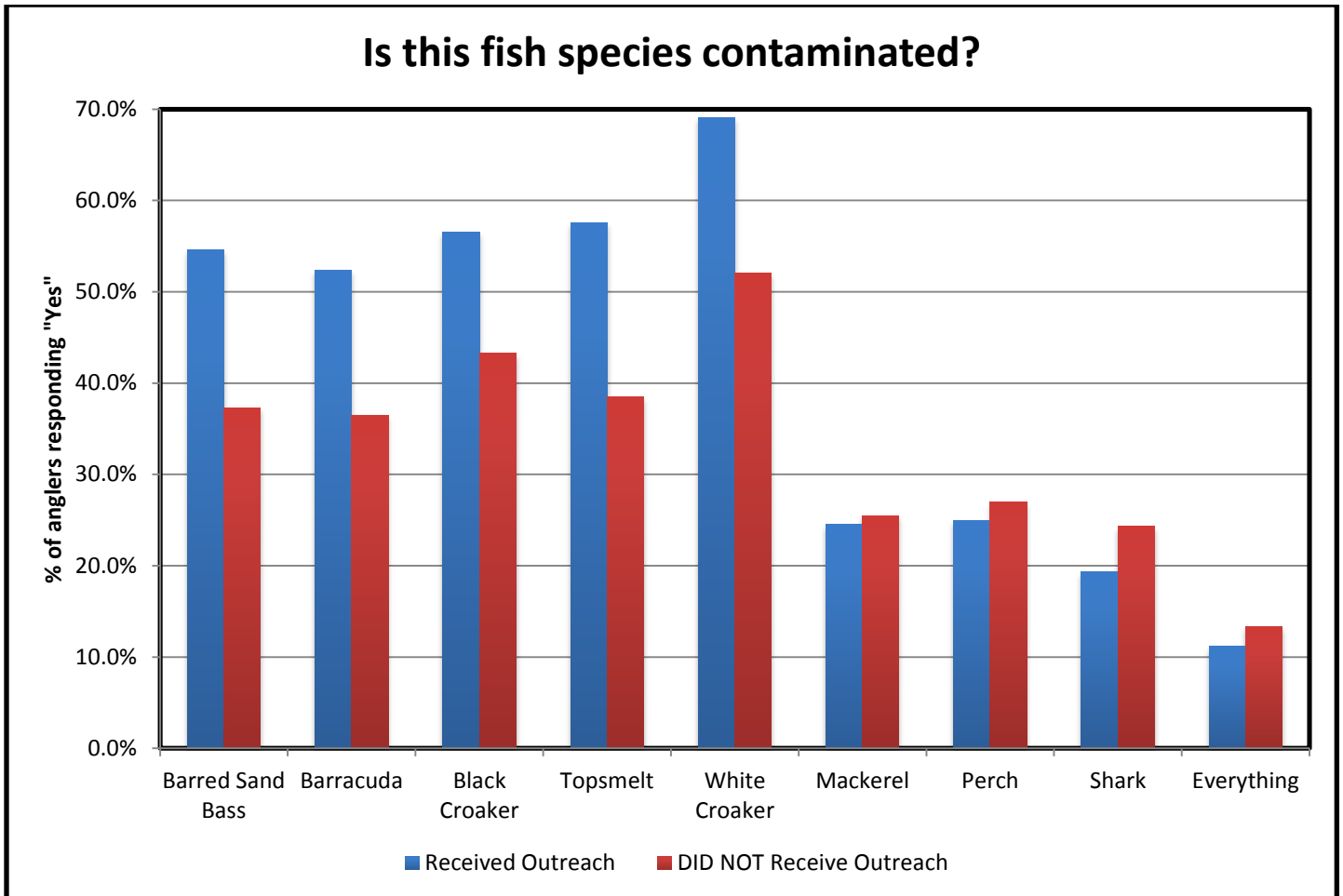
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Note that throughout the results sections, Chi-Square tests and Mann-Whitney U tests refer to statistical tests conducted to identify reliable statistical differences between groups (e.g., anglers who received outreach vs. those who did not), which allows us to draw reliable conclusions about the data. Also note that the references to “p” in tables refer to the statistical confidence level of the result that is being discussed. A smaller p-value corresponds to a higher level of confidence. For instance,  $p < .01$  means we can be 99% confident of the finding being discussed, and  $p < .0001$  means that we can be 99.99% confident. Also note, the references to “n”, refer to the sample size or simply number of individuals included in a given analysis.

### 4.1 Effects of Outreach on DNC Fish Contamination Awareness

While respondents across the entire sample reflected a high level of awareness (49% or higher) of DNC fish contamination, we were particularly interested in the effects of our outreach on level of contamination awareness. Toward that end, we examined awareness of contamination by outreach status. All five DNC fish species yielded significantly different results when assessed by outreach status. Significantly more fishermen who received the outreach reported awareness of the contamination among barred sand bass, barracuda, black croaker, topsmelt and white croaker relative to those who did not receive outreach. Among fish that are considered safe to eat, anglers who received outreach tended to correctly identify these fish as not being contaminated. Note, however, that the differences by outreach status on their ability to recognize non-DNC as not being contaminated were not statistically significant. These findings suggest some level of discrimination among DNC vs. non-DNC species.

Figure 1. Fish species contamination awareness



**Table 2. Awareness of contamination by outreach status:** Results from Nonparametric Mann-Whitney U Tests: NO outreach (n=400) vs. Outreach (n=269)

<b>Fish Species</b>	<b>Intervention Status</b>	<b>Frequency</b>	<b>Percentage</b>	<b>p value</b>
<b>Responding 'YES' to "Is this fish contaminated?"</b>				
<b>Barred Sand Bass</b>	NO outreach	149	37.3%	*.000 Significant difference between the two outreach groups
	Outreach	147	54.6	
	Total	296	49.8%	
<b>Barracuda</b>	NO outreach	146	36.5	*.000 Significant difference between the two outreach groups
	Outreach	141	52.4	
	Total	287	48.5%	
<b>Black Croaker</b>	NO outreach	173	43.3	*.001 Significant difference between the two outreach groups
	Outreach	152	56.5	
	Total	325	55.7%	
<b>Topsmelt</b>	NO outreach	154	38.5	*.000 Significant difference between the two outreach groups
	Outreach	155	57.6	
	Total	309	52.3%	
<b>White Croaker</b>	NO outreach	192	52.0	*.000 Significant difference between the two outreach groups
	Outreach	83	69.1	
	Total	275	46.2%	
<b>Mackerel</b>	NO outreach	102	25.5	.778
	Outreach	66	24.5	
	Total	168	28.4%	
<b>Perch</b>	NO outreach	108	27.0	.546
	Outreach	67	24.9	
	Total	175	30.0%	
<b>Shark</b>	NO outreach	97	24.3	.134
	Outreach	52	19.3	
	Total	149	25.1%	
<b>Everything</b>	NO outreach	53	13.3	.420
	Outreach	30	11.2	
	Total	83	15.1%	

#### 4.2 Intentions by Outreach Status

Another survey item asked anglers what they would do next time they caught a big [DNC species] fish. The purpose of this question was to assess their intentions with regulation-size DNC fish. Across the entire sample, irrespective of outreach status, the most common response provided for all fish species (DNC and non-DNC) was to throw it back. We examined the intentions results by outreach status. For intentions to eat DNC fish, results were in the desired direction for all species except barred sand bass, meaning that a smaller proportion of anglers who received outreach reported intending to eat DNC fish relative to anglers who did not receive outreach. Results for intentions to give fish to friends/family showed that anglers who received outreach were generally less likely to give contaminated fish to friends or family. This was true for topsmelt, white croaker, barracuda and black croaker. A higher proportion reported giving non-DNC fish to friends or family, including mackerel and perch. Results for intentions to throw DNC fish back were in the desired direction, such that a larger percentage of anglers who received outreach reported intending to throw DNC fish back relative to anglers who did not receive outreach. This was true across all DNC species. Additionally, a statistically significant difference was observed for white croaker: a significantly higher percentage of those who received outreach reported intending to throw back white croaker compared to those who did not receive outreach.

Figure 2. Which fish species anglers will throw back

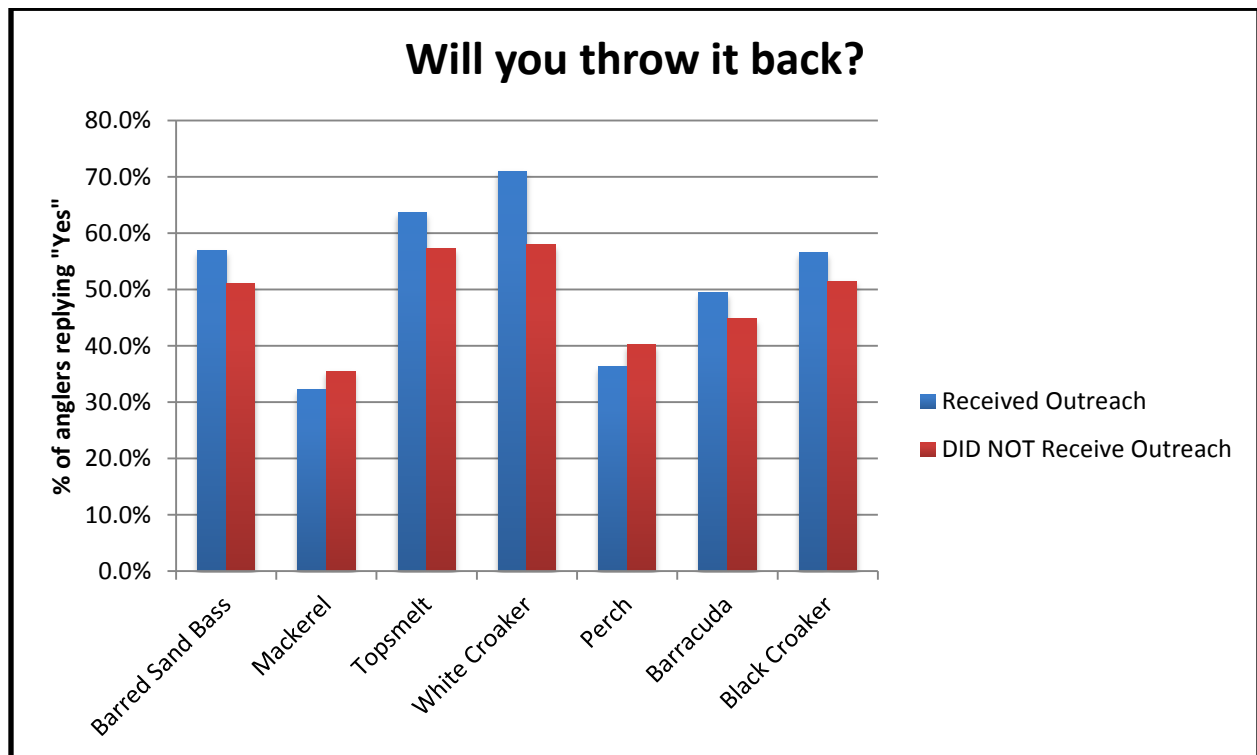


Figure 3. Which fish species anglers will give to friends/family

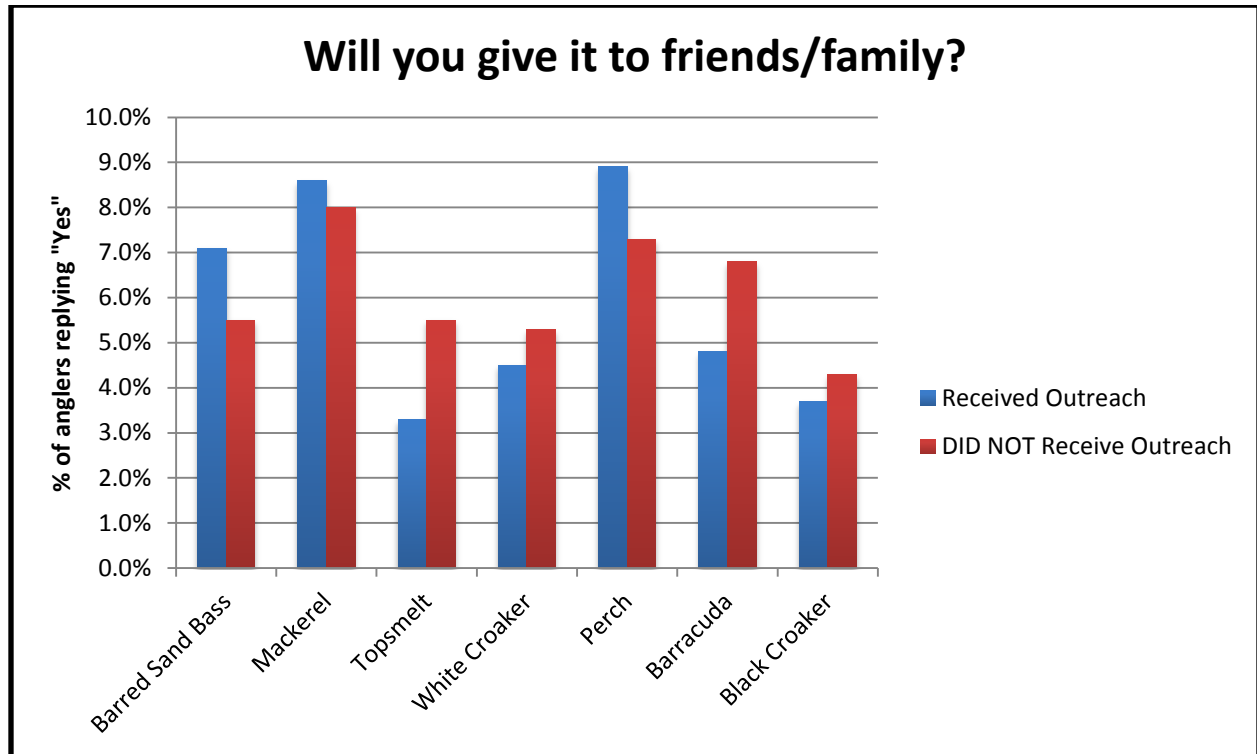
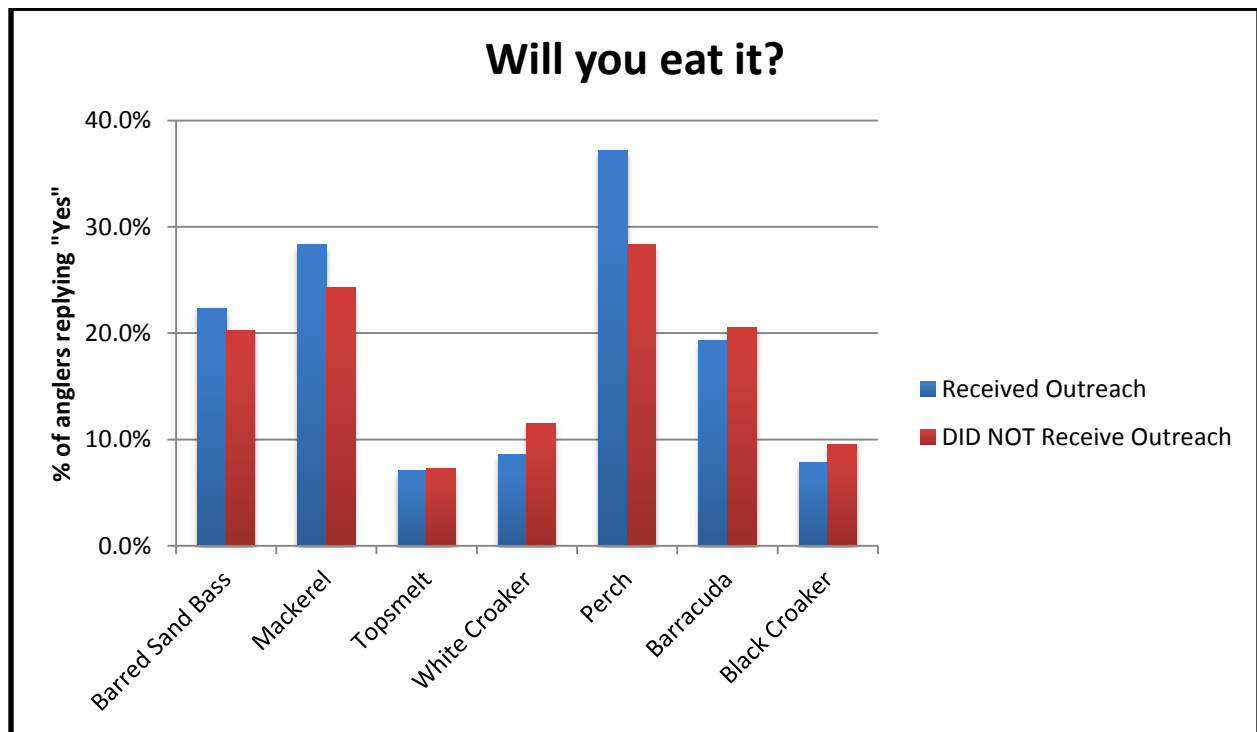


Figure 4. Which fish species anglers will eat



**Table 3. Intentions by outreach status ("Will you throw it back?"): Results from Nonparametric Mann-Whitney U Tests: NO outreach (n=400) vs. Outreach (n=269)**

<b>Fish Species</b>	<b>Intervention Status</b>	<b>Frequency</b>	<b>Percentage</b>	<b>p value</b>
<b>Responding 'YES' to "Will you throw it back?"</b>				
<b>Barred Sand Bass</b>	NO outreach	204	51.0%	.135
	Outreach	153	53.9	
	Total	357	53.4%	
<b>Mackerel</b>	NO outreach	142	35.5	.399
	Outreach	87	32.3	
	Total	229	34.2%	
<b>Topsmelt</b>	NO outreach	229	57.3	.102
	Outreach	171	63.6	
	Total	400	60.0%	
<b>White Croaker</b>	NO outreach	232	58.0	*.001 Significant difference between the two outreach groups
	Outreach	191	71.0	
	Total	423	63.2%	
<b>Perch</b>	NO outreach	161	40.3	.320
	Outreach	98	36.4	
	Total	259	38.7%	
<b>Barracuda</b>	NO outreach	179	44.8	.233
	Outreach	133	49.4	
	Total	312	46.6%	
<b>Black Croaker</b>	NO outreach	206	51.5	.203
	Outreach	152	56.5	
	Total	358	53.5%	



**Table 4. Intentions by outreach status ("Will you give it to family/friends?"): Results from Nonparametric Mann-Whitney U Tests: NO outreach (n=400) vs. Outreach (n=269)**

<b>Fish Species</b>	<b>Intervention Status</b>	<b>Frequency</b>	<b>Percentage</b>	<b>p value</b>
<b>Responding 'YES' to "Will you give it to family/friends?"</b>				
<b>Barred Sand Bass</b>	NO outreach	22	5.5%	.409
	Outreach	19	7.1	
	Total	41	6.1	
<b>Mackerel</b>	NO outreach	32	8.0	.800
	Outreach	23	8.6	
	Total	55	8.2	
<b>Topsmelt</b>	NO outreach	22	5.5	.194
	Outreach	9	3.3	
	Total	31	4.6	
<b>White Croaker</b>	NO outreach	21	5.3	.644
	Outreach	12	4.5	
	Total	33	4.9	
<b>Perch</b>	NO outreach	29	7.3	.433
	Outreach	24	8.9	
	Total	53	7.9	
<b>Barracuda</b>	NO outreach	27	6.8	.305
	Outreach	13	4.8	
	Total	40	6.0	
<b>Black Croaker</b>	NO outreach	17	4.3	.732
	Outreach	10	3.7	
	Total	27	4.0	

**Table 5. Intentions by outreach status ("Will you eat it?"): Results from Nonparametric Mann-Whitney U Tests: NO outreach (n=400) vs. Outreach (n=269)**

Fish Species	Intervention Status	Frequency	Percentage	p value
<b>Responding 'YES' to "Will you eat it?"</b>				
<b>Barred Sand Bass</b>	NO outreach	81	20.3	.523
	Outreach	60	22.3	
	Total	141	21.1	
<b>Mackerel</b>	NO outreach	97	24.3	.247
	Outreach	76	28.3	
	Total	173	25.9	
<b>Topsmelt</b>	NO outreach	29	7.3	.927
	Outreach	19	7.1	
	Total	48	7.2	
<b>White Croaker</b>	NO outreach	46	11.5	.219
	Outreach	23	8.6	
	Total	69	10.3	
<b>Perch</b>	NO outreach	113	28.3	*.015 Significant difference between the two outreach groups
	Outreach	100	37.2	
	Total	213	31.8	
<b>Barracuda</b>	NO outreach	82	20.5	.711
	Outreach	52	19.3	
	Total	134	20.0	
<b>Black Croaker</b>	NO outreach	38	9.5	.449
	Outreach	21	7.8	
	Total	59	8.8	

#### 4.3 Total Reported Catches by Species

Anglers reported how many fish they caught on the day they were interviewed. A total of 58 anglers caught at least one DNC fish. Topsmelt (155 total fish) was the most commonly caught DNC fish, followed by white croaker (70 total fish). Five anglers reported catching barracuda, 8 anglers reported catching barred sand bass, 2 anglers reported catching black croaker, 38 anglers reported catching topsmelt and 28 anglers reported catching white croaker.

#### 4.4 Bucket Counts and Plans with Caught DNC Fish by Species

Among anglers who caught and kept DNC fish on the day they were interviewed, surveyors observed and recorded the number of DNC fish retained. Anglers were also asked their plans for the fish. There was not very much data available due to the small number of anglers who retained DNC fish. As such, we were unable to analyze this set of questions based on outreach status.

#### 4.5 Non-DNC Fish Consumption Frequency

One of the message points conveyed during outreach is that the skinless fillet of all other non-DNC fish can be eaten once a week. This section evaluates anglers reported behaviors in this context. First, it is important to note that across the entire sample (regardless of outreach status) the majority of anglers (58%) reported that they DO NOT regularly eat non-DNC fish

caught between Santa Monica and Seal Beach Piers. When evaluated by outreach status, a greater proportion of anglers who received outreach (41.3%) reported eating non-DNC fish once a week or less, abiding by the recommendation. Similarly, a greater proportion of anglers who received outreach (45.7%) reported always eating the skinless fillet (also reflecting adherence to outreach recommendations).

Figure 5. Frequency of non-DNC fish consumption

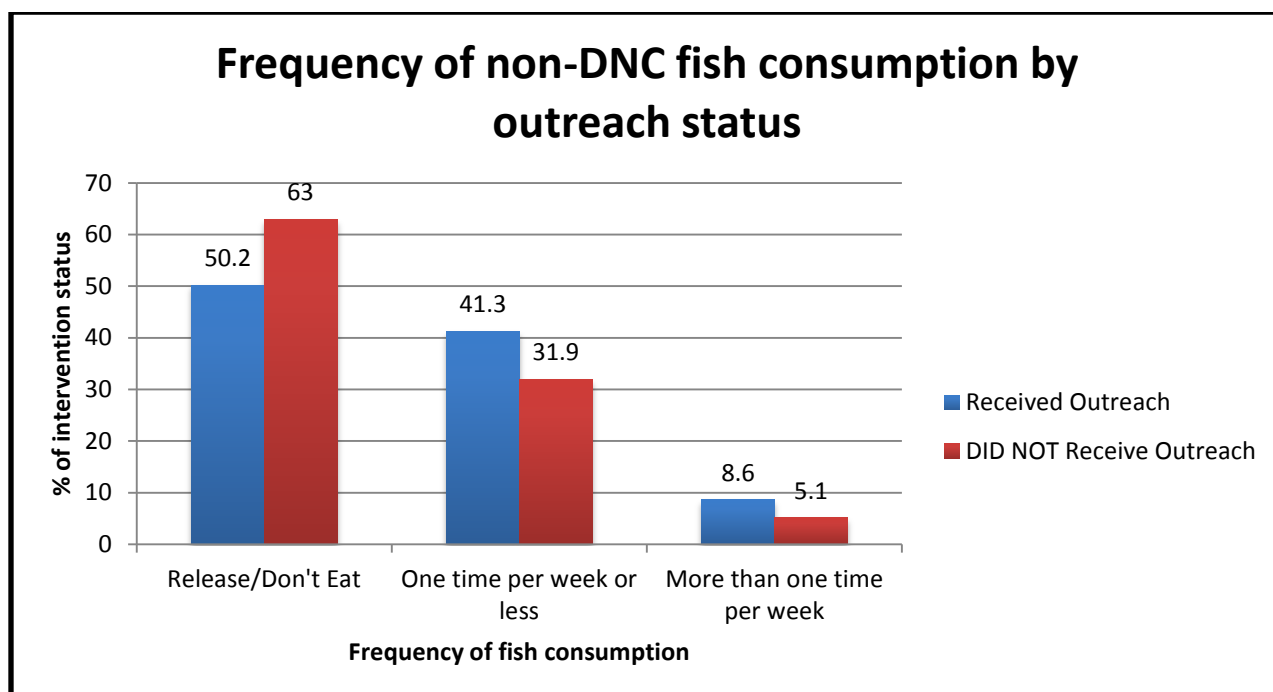


Table 6. Frequency of non-DNC fish consumption

	Received Outreach (n=269)	DID NOT Receive Outreach (n=400)
<b>Release/Don't Eat</b>		
%	50.2	63.0
n	135	252
<b>One time per week or less</b>		
%	41.3	31.9
n	111	127
<b>More than one time per week</b>		
%	8.6	5.1
n	23	20

Figure 6. Frequency of eating skinless fillet

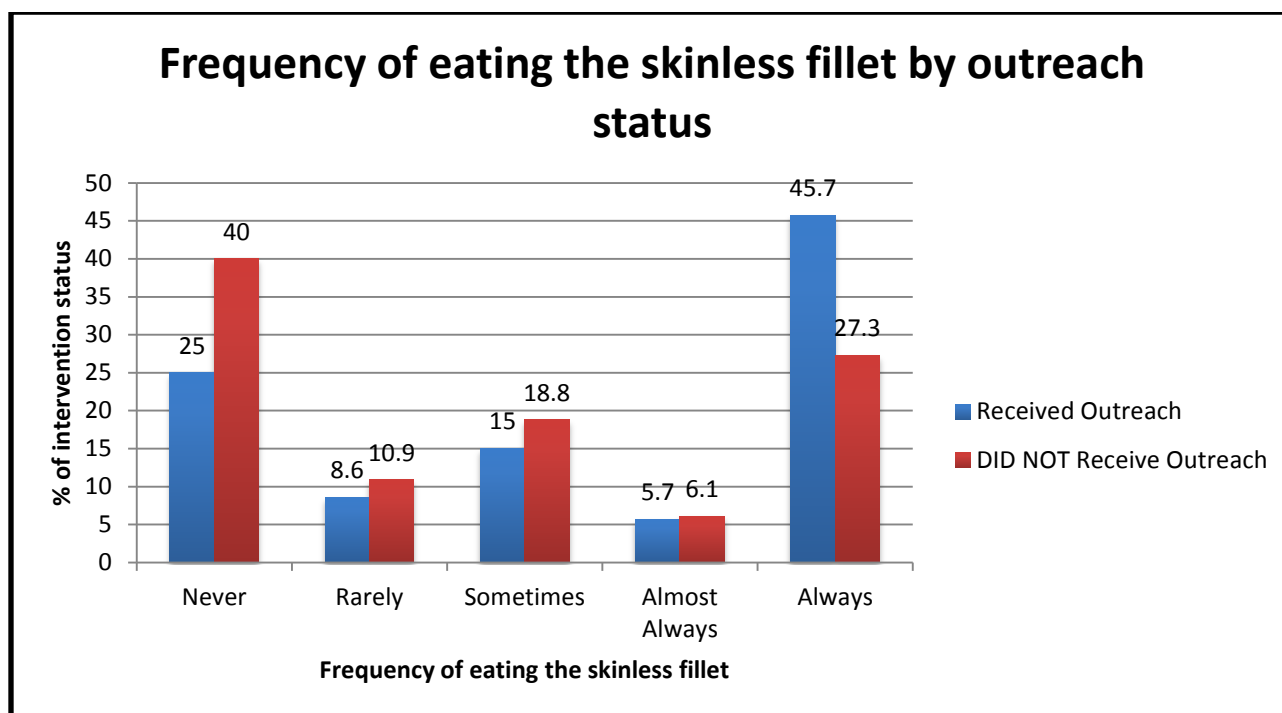


Table 7. Frequency of eating skinless fillet

	Received Outreach (n=269)	DID NOT Receive Outreach (n=400)
<b>Never</b>		
%	25.0	40.0
n	67	160
<b>Rarely</b>		
%	8.6	10.9
n	23	43
<b>Sometimes</b>		
%	15.0	18.8
n	40	75
<b>Almost Always</b>		
%	5.7	6.1
n	15	24
<b>Always</b>		
%	45.7	27.3
n	123	109

## 5. Conclusions

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Based on the demographic information yielded by the results of the survey, it may be beneficial to use information about the ethnic breakdown of anglers fishing at certain piers to be more efficient with data collection. For instance, Hermosa Pier has the highest proportion of Filipino anglers, while Cabrillo and Redondo Piers had no Filipino angler respondents. African Americans were represented most strongly at Rainbow Harbor and Caucasians were represented most at Seal Beach Pier. Understanding cultural differences by pier may yield insight into which particular piers may be more receptive to outreach interventions or by conducting outreach more effectively. It may be useful to learn how cultural practices (in regards to fish consumption/awareness) differ by pier to pier by looking at differences within ethnic group, or if the pier location tells more about the practices in regards to fish consumption/awareness. This may be useful in determining whether or not to target specific cultures when trying to educate the larger fishing demographic, or to target specific piers.

The majority of anglers primarily spoke English and Spanish and surveys were primarily conducted in English and Spanish. Tagalog was another well-represented primary language, yet very few surveys were conducted in Tagalog. It may be effective to hire a Tagalog-speaking survey collector to target Hermosa Pier, which has the highest rate of Filipino angler respondents.

Pier anglers who received outreach showed significantly greater awareness of DNC fish contamination across the five DNC species compared to anglers who did not receive outreach. There were no significant differences in awareness for non-DNC fish species. This suggests accurate discriminate knowledge between DNC and non-DNC fish contamination. Relative to the other DNC fish, fewer anglers correctly identified barracuda as being contaminated, suggesting room for improvement in future education efforts.

Anglers reported that topsmelt was the most frequently caught DNC fish, followed by white croaker. Outreach efforts may want to focus especially on these two fish, since these are the ones most frequently encountered. Very few fishermen kept DNC fish in their buckets (as evident in the differences in the bucket count and reported fish caught data), but fishermen were still more likely to have topsmelt and white croaker in their buckets than the other three DNC fish.

Across the entire sample, irrespective of outreach status, the most common intention reported for all fish species (DNC and non-DNC) was to throw it back. For DNC fish, the high-risk behaviors (eating and giving to friends/family) ranged from 7% reporting eating topsmelt to 21% reporting eating barred sand bass.

We also examined these results by outreach status. For intentions to eat DNC fish, results were in the desired direction for all species except barred sand bass, meaning that a smaller proportion of anglers who received outreach reported intending to eat DNC fish relative to anglers who did not receive outreach. It is important to note that barred sand bass is not a commonly caught pier fish, as it is more commonly caught by anglers fishing from boats. Barred sand bass is also considered a prize catch among anglers. So it may be worth exploring new outreach tactics specifically aimed at addressing intentions to consume this fish.

Results for intentions to give fish to friends/family showed that anglers who received outreach were generally less likely to give contaminated fish to friends or family, which was in the desired direction. This was true for topsmelt, white croaker, barracuda and black

croaker. A higher proportion also reported giving non-DNC fish to friends or family, including mackerel and perch.

Results for intentions to throw DNC fish back were in the desired direction, such that a larger percentage of anglers who received outreach reported intending to throw DNC fish back relative to anglers who did not receive outreach. This was true across all DNC species. Additionally, a statistically significant difference was observed for white croaker: a significantly higher percentage of those who received outreach reported intending to throw back white croaker compared to those who did not receive outreach. This aligns with awareness results showing that the most commonly/correctly identified DNC fish was also white croaker.

A number of the above findings point in a positive direction for the pier outreach program (such as contamination awareness levels, intentions to catch and release DNC fish as well as eat DNC fish). However, there is still room for programmatic improvements in specific areas (such as giving barred sand bass to friends and family, as well as intentions to eat barred sand bass). This report provides data that can substantiate shifting or revising outreach tactics to turn less desirable outcomes into more favorable ones.

## 6. Strengths and Limitations

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This project had a number of strengths. In the past, survey administration may have varied substantially across interviewer, along with issues that may have arrived by contracting data collection out to partner organizations. In an effort to address this, data collection, data entry, data accuracy screening and data analysis were all performed by SGA. Data accuracy rates were continually monitored with procedures in place to correct this potential limitation evident from prior years. The findings in this report should be considered in light of several limitations. Most of the data were obtained via self-report, which is subject to a number of known biases. Another limitation is that we were unable to differentiate between anglers who have received multiple outreach sessions and just a single outreach session. Future reports can implement a simple frequency count of outreach sessions.



Appendix A: Survey (administered July 2012-December 2012)



Monitoring Survey | FCEC Angler Outreach | July 13, 2012

Surveyor Name: \_\_\_\_\_ Day: \_\_\_\_\_ Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

HI, MY NAME IS \_\_\_\_\_ AND I'M FROM \_\_\_\_\_. I AM WORKING ON A RESEARCH PROJECT ABOUT PEOPLE'S FISHING EXPERIENCES IN THIS AREA. WOULD YOU BE WILLING TO ANSWER SOME QUESTIONS RELATED TO YOUR FISHING EXPERIENCES? THANK YOU. IT WILL ONLY TAKE ABOUT FIVE MINUTES. THE ANSWERS YOU GIVE WILL BE KEPT ANONYMOUS AND CONFIDENTIAL. YOUR RESPONSES CANNOT BE LINKED BACK TO YOU PERSONALLY. YOU DO NOT HAVE TO ANSWER ANY QUESTIONS YOU DO NOT WANT TO AND YOU MAY STOP THE INTERVIEW AT ANY TIME. I'D LIKE TO START BY ASKING YOU SOME INFORMATION ABOUT YOUR FISHING EXPERIENCES

Participation: Responded Refused

1. Screening Question: (If yes: Do NOT collect data)  
 Has someone conducted a survey with you about what kind of fish you eat in the past month? yes no

2. Has anyone reviewed this tip card with you? No Yes Don't know

3. How long have you been fishing (in your lifetime) between Santa Monica Pier and Seal Beach Pier? \_\_\_\_\_ years

4. How many hours have you been fishing today? \_\_\_\_\_ hours

**Today's Catch**

5. What were you fishing for today? \_\_\_\_\_

6. Now I'm going to ask you some questions about the fish you caught today.	Ask for each species & use fish pictures: How many [species] did you catch today?	For each species, only ask if caught at least 1: How many do you have in your bucket? Can I take a look?	What do you plan to do with this fish (gesture to bucket) that you kept today? (select ONE)			
	# caught	# bucket	Eat	Give to f/f	Bait	Other (describe)
Barracuda						
Barred sand bass						
Black croaker						
Topsmelt						
White croaker						
Other species #1						
Other species #2						

**Future Intentions, Awareness, & Typical Consumption**

7-13. Now I'm going to ask you what you would do with various fish that you might catch in the future. Next time you catch a big [species name], what will you do with it? Select ONE. (Interviewer: Recite each species. Show fish pictures to angler)

	Eat it	Give it to friends or family to eat	Throw it back	Use as bait	Other (describe)	I never catch that fish
7. Barred sand bass						
8. Mackerel						
9. Topsmelt						
10. White croaker						
11. Perch						
12. Barracuda						
13. Black croaker						

14. To your knowledge, is this fish contaminated if it is caught between Santa Monica Pier and Seal Beach Pier?

(Interviewer, recite each fish)

Barred sand bass	yes	no	White croaker	Yes	no	Topsmelt	yes	no
Black croaker	yes	no	Barracuda	Yes	no	Perch	yes	no
Mackerel	yes	no	Shark	Yes	no	(do not ask angler explicitly) Everything is contaminated yes no		

15. Aside from white croaker, barracuda, black croaker, barred sand bass and topsmelt, how often do you eat other fish that you catch between Santa Monica Pier and Seal Beach Pier? (If participant selects "Do not eat" skip Q 15)

Release/don't eat                      One time per week or less                      More than one time a week

16. When you eat these other fish that you catch between Santa Monica Pier and Seal Beach Pier, how often do you eat just the fillet, with the skin off?

Always              Almost always              sometimes              rarely              never

### Demographic Information

17. Do you use .....

Facebook?              Yes    No              Youtube?                      Yes    No

18. How would you describe your racial/ethnic group? (CHOOSE ONE)

Cambodian              Chinese                      Filipino                      Korean                      Latino/a                      Native American  
African American              Caucasian/White              Vietnamese              Pacific Islander              Other: \_\_\_\_\_

19. What language are you most comfortable speaking? (SELECT ONE)

English                      Mandarin                      Cantonese                      Korean                      Spanish                      Chamorro  
Khmer                      Tagalog/Filipino              Ilokano                      Vietnamese                      Other: \_\_\_\_\_

20. In what year were you born? \_\_\_\_\_

21. Angler ID. To enable long-term tracking of our outreach efforts, somebody may ask to survey you again in the future. When we are able to **connect your responses** from today's survey to one in the future, it provides better information about how our efforts are working and how we can improve. Please provide your initials (first and last name only) and birthdate. This enables us to link your responses **without being able to identify you.**

*Interviewer, if angler unsure which initials to use, repeat that we just need the first initial of first name and first initial of last name. If angler has multiple names, ask angler to provide the first initial of the first name and first initial of first last name.  
Example 1: John Smith = JS. Example 2: Maria Eugenia Garcia Alvarez = MG.*

Birthdate: \_\_\_\_/\_\_\_\_/\_\_\_\_              Initials: \_\_\_\_\_

22. What is your zip code? \_\_\_\_\_

### Complete questions 24 & 25 after surveying participant

23. Angler Gender (Circle One)              male              female              Don't know

24. Language survey conducted in:              English    Mandarin    Cantonese    Korean    Spanish    Tagalog    Vietnamese    Other: \_\_\_\_\_

Appendix B: Revised Survey (administered December 2012-June 2013)



Monitoring Survey | FCEC Angler Outreach | July 13, 2012

Surveyor Name: \_\_\_\_\_ Day: \_\_\_\_\_ Date: \_\_\_ / \_\_\_ / \_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

HI, MY NAME IS \_\_\_\_\_ AND I'M FROM \_\_\_\_\_. I AM WORKING ON A RESEARCH PROJECT ABOUT PEOPLE'S FISHING EXPERIENCES IN THIS AREA. WOULD YOU BE WILLING TO ANSWER SOME QUESTIONS RELATED TO YOUR FISHING EXPERIENCES? THANK YOU. IT WILL ONLY TAKE ABOUT FIVE MINUTES. THE ANSWERS YOU GIVE WILL BE KEPT ANONYMOUS AND CONFIDENTIAL. YOUR RESPONSES CANNOT BE LINKED BACK TO YOU PERSONALLY. YOU DO NOT HAVE TO ANSWER ANY QUESTIONS YOU DO NOT WANT TO AND YOU MAY STOP THE INTERVIEW AT ANY TIME. I'D LIKE TO START BY ASKING YOU SOME INFORMATION ABOUT YOUR FISHING EXPERIENCES

Participation: Responded Refused

yes no

- Has anyone reviewed this tip card with you? No Yes Don't know
- How long have you been fishing (in your lifetime) between Santa Monica Pier and Seal Beach Pier? \_\_\_\_\_ years
- How many hours have you been fishing today? \_\_\_\_\_ hours

Today's Catch

4. Did you catch any fish today? No (skip to #6-12) Yes

6. Now I'm going to ask you some questions about the fish you caught today.	Ask for each species & use fish pictures: How many [species] did you catch today?	For each species, only ask if caught at least 1: How many do you have in your bucket? Can I take a look?	What do you plan to do with this fish (gesture to bucket) that you kept today? (select ONE)			
	# caught	# bucket	Eat	Give to f/f	Bait	Other (describe)
Barracuda						
Barred sand bass						
Black croaker						
Topsmelt						
White croaker						

Future Intentions, Awareness, & Typical Consumption

6-12. Now I'm going to ask you what you would do with various fish that you might catch in the future. Next time you catch a big [species name], what will you do with it? Select ONE. (Interviewer: Recite each species. Show fish pictures to angler)

	Eat it	Give it to friends or family to eat	Throw it back	Use as bait	Other (describe)	I never catch that fish
6. Barred sand bass						
7. Mackerel						
8. Topsmelt						
9. White croaker						
10. Perch						
11. Barracuda						
12. Black croaker						

13. To your knowledge, is this fish contaminated if it is caught between Santa Monica Pier and Seal Beach Pier?  
(Interviewer, recite each fish)

Barred sand bass	yes	no	White croaker	Yes	no	Topsmelt	yes	no
Black croaker	yes	no	Barracuda	Yes	no	Perch	yes	no
Mackerel	yes	no	Shark	Yes	no	(do not ask angler explicitly) Everything is contaminated yes no		

14. Aside from white croaker, barracuda, black croaker, barred sand bass and topsmelt, how often do you eat other fish that you catch between Santa Monica Pier and Seal Beach Pier? (If participant selects "Do not eat" skip Q 15)

Release/don't eat                      One time per week or less                      More than one time a week

15. When you eat these other fish that you catch between Santa Monica Pier and Seal Beach Pier, how often do you eat just the fillet, with the skin off?

Always              Almost always              sometimes              rarely              never

### Demographic Information

16. Do you use .....

Facebook?              Yes    No              Youtube?                      Yes    No

17. How would you describe your racial/ethnic group? (CHOOSE ONE)

Cambodian              Chinese                      Filipino                      Korean                      Latino/a                      Native American  
African American              Caucasian/White              Vietnamese              Pacific Islander              Other: \_\_\_\_\_

18. What language are you most comfortable speaking? (SELECT ONE)

English                      Mandarin                      Cantonese                      Korean                      Spanish                      Chamorro  
Khmer                      Tagalog/Filipino              Ilokano                      Vietnamese                      Other: \_\_\_\_\_

19. Angler ID. To enable long-term tracking of our outreach efforts, somebody may ask to survey you again in the future. When we are able to connect your responses from today's survey to one in the future, it provides better information about how our efforts are working and how we can improve. Please provide your initials (first and last name only) and birthdate. This enables us to link your responses *without being able to identify you.*

*Interviewer, if angler unsure which initials to use, repeat that we just need the first initial of first name and first initial of last name. If angler has multiple names, ask angler to provide the first initial of the first name and first initial of first last name.*

*Example 1: John Smith = JS. Example 2: Maria Eugenia Garcia Alvarez = MG.*

Birthdate: \_\_\_\_/\_\_\_\_/\_\_\_\_              Initials: \_\_\_\_\_

20. What is your zip code? \_\_\_\_\_

21. Screening Question:

Has someone conducted this survey with you in the past month? Yes no

### Complete questions 22& 23 after surveying participant

22. Angler Gender (Circle One)              male              female              Don't know

23. Language survey conducted in:              English              Mandarin              Cantonese              Korean              Spanish              Tagalog              Vietnamese              Other: \_\_\_\_\_

Appendix C: Tip Card

FRONT SIDE

**Do Not Eat**

- White Croaker**
- Barred Sand Bass**
- Black Croaker**
- Topsmelt**
- Barracuda**

Some fish can be eaten with restrictions (see reverse).

Some fish caught in this area are contaminated with harmful chemicals and should not be eaten (see list on left).

Advice only applies to fish caught in the red area above.  
For areas and fish not featured here visit: [www.pvsfish.org/health-scsfa.php](http://www.pvsfish.org/health-scsfa.php)

**PROTECT THE HEALTH OF YOU AND YOUR CHILDREN**

*Join with other fishermen and follow the advice in this tip card*

[www.pvsfish.org](http://www.pvsfish.org)

Printed April 2010

**ONLY EAT THE SKINLESS FILLET**

**ONLY EAT THE SKINLESS FILLET 1 TIME A WEEK**

HERE ARE EXAMPLES OF SAFE FISH YOU CAN EAT

**ONLY EAT ONE SERVING PER WEEK**

**FOR ADULTS**

**FOR CHILDREN**

The recommended serving of fish is about the size of your hand.  
Give children smaller servings.

**QUEENFISH**

**HALIBUT**  
Minimum Size 22 Inches

**KELP BASS**  
Minimum Size 12 Inches

**SCORPIONFISH**  
Minimum Size 10 Inches

**PACIFIC SARDINE**

**SURFPERCH**

**PACIFIC MACKEREL**

**OPALEYE**

**ROCKFISH**

**CORBINA**

**SHOVELNOSE GUITARFISH**

Additional bag or size limits or other restrictions apply to these species.  
Please see California Department of Fish and Game Sport Fishing Regulations for more information.

Use this ruler to measure your fish

No minimum size limit for fish unless otherwise indicated

BACK SIDE