PALOS VERDES SHELF

Annual Angler Outreach Report

August 2023 – July 2024

United States Environmental Protection Agency

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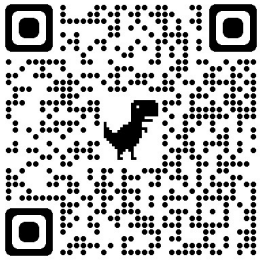
For more information about fish contamination from the Palos Verdes Shelf Superfund Site, please visit: www.pvsfish.org



For more information about California fish advisories, please visit: www.oehha.ca.gov/fish

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LIST OF ACRONYMS AND ABBREVIATIONS

AOP	Angler Outreach Program
DBS&A	Daniel B. Stephens & Associates, Inc.
DDT	dichloro-diphenyl-trichloroethane
DNC	Do Not Consume
EPA	U.S. Environmental Protection Agency
FCEC	Fish Contamination Education Collaborative
ID	Identification
PCB	polychlorinated biphenyl
QR	Quick Response

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SUMMARY

The purpose of the U.S. Environmental Protection Agency Palos Verdes Shelf institutional controls program is to protect Southern California's most vulnerable populations from the health risks associated with eating fish contaminated with polychlorinated biphenyls (PCBs) and dichloro-diphenyl-trichloroethane (DDT). This report presents data collected from August 2023 to July 2024 to evaluate program effectiveness and recommend program improvements. The Fish Contamination Education Collaborative (FCEC) conducted public outreach at local piers, bait shops, and community events to educate anglers about ways to reduce their exposure to PCBs and DDT by avoiding certain fish, such as the white croaker. Overall, the institutional controls program has been effective at reaching anglers and community members to increase awareness of fish contamination associated with the Palos Verdes Shelf Superfund Site.

A total of 9,699 anglers were contacted during outreach at nine piers off the coast of Los Angeles. As part of outreach efforts, a tip card summarizing outreach information was offered to anglers. The "Do Not Consume" (DNC) warning signs, posted around the piers, tip cards, and outreach team contributed most to angler awareness, suggesting that the combination of current outreach efforts are effective at educating local anglers about fish contamination. To build upon the effectiveness of these outreach efforts, the FCEC redesigned the tip card and DNC warning signage. The printed tip cards will begin to be distributed in Fall 2024, and new signage is planned by Spring 2025. Additionally, outreach and engagement training sessions were conducted with pier angler outreach teams to ensure that they have the skills to positively engage with anglers, effectively communicate complex information in an easy-to-understand manner, and utilize the FCEC outreach materials to educate anglers on ways to minimize their risk of exposure to PCBs and DDT. Ultimately, this will improve outreach efforts and angler awareness of fish contamination.

With the addition of four new bait shop locations in December 2023, the Bait Shop Outreach Program reached the goal of maintaining 40 active bait shop locations. During the July 2024 bait shop outreach event, the 40 locations requested additional educational outreach materials. Overall, the identification and tracking of bait shop turnover continues to be effective.

The FCEC participated in 15 local community events, reaching people from communities that may be more vulnerable to fish contamination. Outreach at community events continues to be successful in educating these communities about the risk of consuming contaminated fish. Despite community events being one of the less self-identified awareness sources among pier anglers, these events provide an opportunity to educate community members that may not participate directly in subsistence or sport fishing practices, yet still maybe consuming fish caught from the Palos Verdes Shelf. Continued research into which community events are more effective is recommended, including focusing on events with themes that are attractive to anglers. The FCEC acquired new display materials to maintain the professional appearance of the Booth in a Box setups that are presented at approved community outreach events. Display content and booth messaging are recommended for updates as some materials appear dated. The FCEC replaced or repaired 11 broken interactive fishing game fishing poles. Repairs

included adding stronger magnets to the fishing poles to improve game play; however, replacing the stuffed magnetic fish components that are worn and damaged is still required. The stuffed fish replacements will be replaced with stuffed versions of the fish species discussed in current outreach materials.

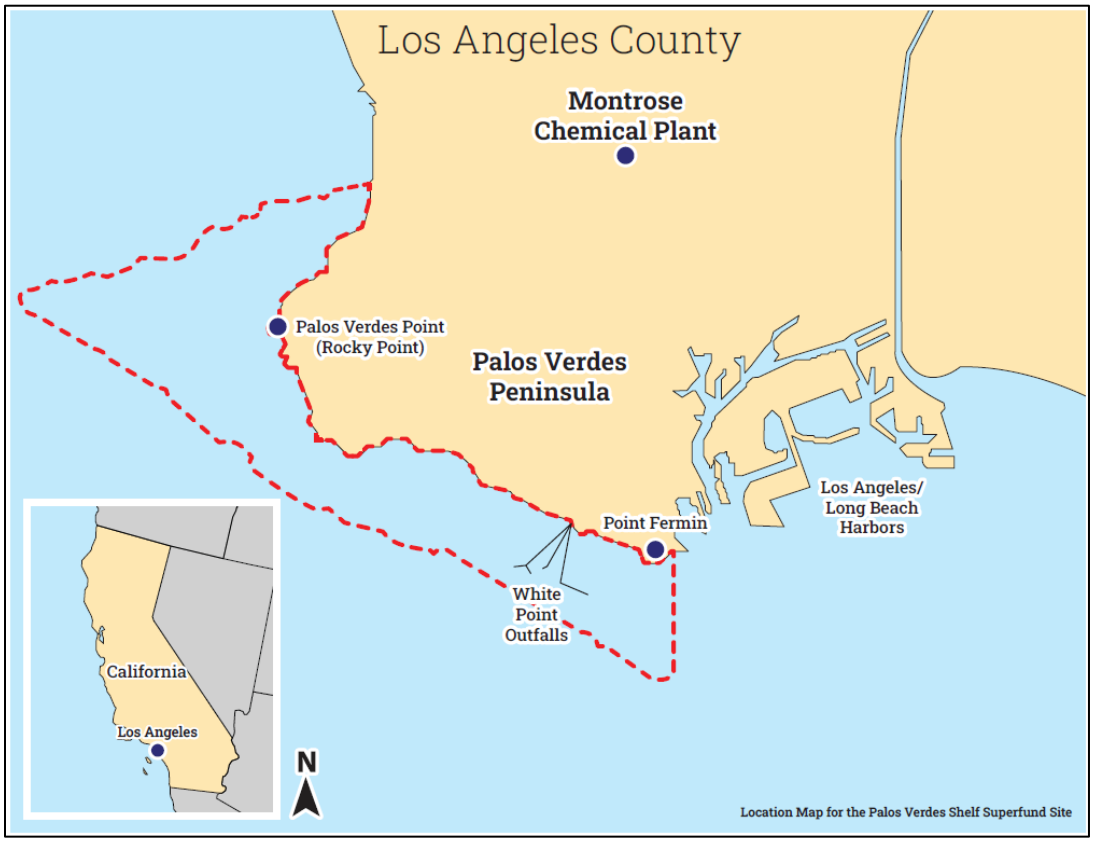
Historically, electronic outreach has not been effective at increasing awareness of fish contamination; however, ongoing efforts aim to increase the usefulness of the www.pvsfish.org website. The website lists upcoming FCEC events, serves as a repository of public information and resources, and provides a platform for the public to sign up to receive the semiannual newsletter. The FCEC has included Quick Response (QR) codes to the www.pvsfish.org website that direct users to the redesigned outreach materials to promote education and awareness through the website. Additionally, the FCEC has displayed QR codes to digital versions of translated tip cards as an alternative and sustainable option at some community outreach events. The FCEC also displays a QR code for newsletter signup at community outreach events, however it does not track the scan or use of QR codes. It is recommended that the FCEC continue to prioritize updates to the website to improve electronic outreach potential.

The semiannual FCEC Partner meetings continue to be an important forum for the agencies, outreach groups, and other involved entities to provide updates on project activities, share ideas, and discuss program improvements. Overall, the FCEC has effectively worked to inform the public and vulnerable communities regarding safe fishing practices and health risks associated with consumption of contaminated fish from the Palos Verdes Shelf Superfund Site.

1. INTRODUCTION

The Palos Verdes Shelf Superfund Site is part of the Montrose Chemical Corporation Superfund Site, located in Los Angeles County, California (Figure 1). The Palos Verdes Shelf became contaminated with polychlorinated biphenyls (PCBs) and dichloro-diphenyl-trichloroethane (DDT) from the inland Montrose Chemical plant and other industrial activities that discharged their waste into the ocean through the Los Angeles County sanitation sewer outfall pipes from 1953 to 1971 (Figure 1). Today, about 34 square miles (88 square kilometers; about half the size of Catalina Island) of ocean sediments on the Palos Verdes Shelf are contaminated with these legacy pollutants. Although the contaminated sediment is too deep for human contact, some fish in the area accumulate these organic pollutants at levels that make them unsafe to eat.

Figure 1. Map of Contaminated Sediment at the Palos Verdes Shelf Superfund Site



The U.S. Environmental Protection Agency (EPA) initiated institutional controls at the Palos Verdes Shelf Superfund Site in September 2001. Institutional controls refer to non-engineered measures, such as outreach and signage, that aim to prevent or reduce exposure to contaminants at a site. The purpose of the institutional controls program at Palos Verdes Shelf is to minimize human exposure to PCBs and DDT by reducing consumption of contaminated fish, particularly white croaker. The institutional controls program includes public education and outreach, fish monitoring, and enforcement of white croaker catch bans. In 2003, the EPA established the Fish Contamination Education Collaborative (FCEC) with representatives from

federal, state, and local agencies; non-government organizations; and community-based organizations to implement public outreach and education activities. In September 2009, the EPA selected an interim remedy for Palos Verdes Shelf Superfund Site that included the continuation and strengthening of the institutional controls program.

The institutional controls program aims to reduce human consumption of contaminated fish by increasing awareness and understanding of local contamination and fish advisories. The program has the following three main components: angler outreach, community outreach, and enforcement.

The Angler Outreach Program (AOP) engages anglers and communities that are vulnerable to fish contamination and disseminates educational materials (e.g., program tip cards, brochures, and comic books) that provide information and resources about contaminated fish species. In 2014, the EPA conducted the Palos Verdes Seafood Consumption Study to identify local demographic and subsistence subgroups within the general fishing population of the Palos Verdes Shelf area that may be disproportionately exposed to contaminants based on the types and quantity of fish species consumed, including consideration of cooking methods. The following four key communities were identified as more vulnerable to fish contamination from the Palos Verdes Shelf Superfund Site: the Chinese community in San Gabriel Valley, the Vietnamese community in Orange County, and the Hispanic and African American communities in Los Angeles County.

PCBs and DDT pose a significant risk to public health; they are listed on the EPA Integrated Risk Information System as probable human carcinogens and on the State of California's Proposition 65 list of pollutants known to cause cancer. Additionally, exposure to elevated levels of PCBs can result in skin irritation, liver disease, and endocrine disfunction. Exposure to elevated levels of DDT can negatively impact the nervous and endocrine systems and liver function. DDT exposure can also have negative impacts on child development. The EPA monitors PCB and DDT concentrations in white croaker and barred sand bass on the Palos Verdes Shelf to evaluate the effectiveness of natural recovery processes and improve modeling of contaminant fate and transport. While PCB and DDT concentrations in fish tissues have generally declined since the 1990s, concentrations in white croaker remain above the risk-based cleanup levels.

This Annual Angler Outreach Report summarizes outreach conducted between August 2023 and July 2024 through the following outreach activities:

- Angler outreach
- Bait shop outreach
- Electronic outreach
- Community event outreach
- FCEC Partners meetings

Additionally, this report presents results from previous years to assess overall trends in the program's outreach efforts and effectiveness.

2. OVERVIEW OF THE INSTITUTIONAL CONTROLS PROGRAM

The institutional controls program aims to prevent human exposure to Palos Verdes Shelf Superfund Site contamination by educating impacted communities about safe fishing practices and the health risks associated with eating contaminated fish.

2.1 ANGLER OUTREACH

While the contaminated sediment bed at Palos Verdes Shelf Superfund Site is too deep for direct human contact (40–200 meters; 130–650 feet), contaminants can build up in the food web, including in certain fish that are caught and consumed by the public. The EPA conducted Human Health Risk Evaluations and determined that exposure to PCBs and DDT through the consumption of seafood presented the greatest potential for adverse human health effects. In 2003, the EPA initiated the AOP, which aims to mitigate risk to human health by minimizing the consumption of contaminated fish.

Local organizations and environmental consulting firms perform regular in-person outreach at popular fishing piers along the coast of Los Angeles to educate anglers about the five contaminated fish that are unsafe to eat: white croaker, barred sand bass, topsmelt, black croaker, and barracuda. Angler outreach activities are conducted during the day at nine fishing piers located between Santa Monica Pier and Seal Beach Pier (Figure 2). In 2017, the FCEC expanded the AOP to include evening outreach at two popular fishing piers (Venice Pier and Redondo Beach Pier) to reach subsistence anglers who may fish after typical work hours. These piers were chosen based on previous observations that evening anglers frequent these piers and that the piers have safe evening access for the outreach team.

During this reporting period, the AOP underwent contractual changes affecting pier angler outreach efforts and subcontracted team members. Heal the Bay conducted pier angler outreach activities through the end of their contract period on April 12, 2024. Starting May 31, 2024, Daniel B. Stephens & Associates, Inc. (DBS&A) resumed pier angler outreach activities previously performed by Heal the Bay. During the transition period from Heal the Bay to DBS&A, the AOP paused activities at piers except for Cabrillo Pier. This gap in outreach was necessary to train new staff on angler engagement, site history, and outreach expectations. Cabrillo Marine Aquarium's support for the AOP through their outreach efforts at the Cabrillo Pier remained unaffected by this transition.

Angler outreach objectives include educating active anglers about fish contamination and local fish advisories, teaching them how to identify fish species, and explaining how to prepare fish to reduce contaminants. The outreach team also collects data, including whether the angler is an adult or child, their awareness of fish contamination, how they learned about fish contamination, the language(s) spoken during the conversation, their residence zip code, the types of fish they caught, and whether they retained or released their catch. The data collected during angler interviews is used to evaluate the effectiveness of the AOP.

In addition to active angler outreach, the EPA posts "Do Not Consume" (DNC) signs listing the five contaminated fish at various locations along the coast of Los Angeles (Figure 2). The EPA currently has 69 DNC signs posted across 17 coastal areas. These signs are monitored by the angler outreach teams during routine pier angler outreach activities. Nine DNC sign areas are monitored monthly, and eight additional locations are monitored annually. More details about the DNC sign program are provided in the Palos Verdes Shelf Annual DNC Sign Summary Report and can be found at www.pvsfish.org/partner-documents.

Figure 2. Map of Piers and Beaches with Posted "Do Not Consume" Fish Signs

2.2 BAIT SHOP OUTREACH

The FCEC supplies educational materials to angler retail and bait shops in Los Angeles and Orange Counties to increase angler awareness of fish contamination. These materials (e.g., tip cards in English, Spanish, Vietnamese, and Chinese) are displayed in the shops along with FCEC contact information to encourage ongoing education and communication. The goal is to display FCEC outreach materials at 40 angler retail stores and bait shops in areas where there is high

angler activity. Outreach is conducted twice per year to determine if bait shops participating in the outreach program are still in operation and if they need more materials. The FCEC prioritizes outreach to bait shops located near popular fishing piers and in areas with high pier angler use as determined through pier angler zip code data analysis.

2.3 ELECTRONIC OUTREACH

The EPA, in collaboration with the FCEC, maintains the Palos Verdes Shelf Superfund Site institutional controls website (www.pvsfish.org). The website serves as a public repository of documents and information, including FCEC meeting summaries and presentations, annual outreach and enforcement reports, and electronic versions of outreach materials. Additionally, the website hosts a sign-up page for the FCEC electronic newsletter, allowing people to request to receive the semi-annual newsletter by email. Regular maintenance of the FCEC website includes updating the event calendar, uploading new FCEC documents, distributing the newsletter, updating maps, and responding to inquiries submitted through the "Contacts" page.

2.4 COMMUNITY EVENT OUTREACH

The EPA, in collaboration with the FCEC, conducts outreach at local community events to increase awareness of fish contamination and fish advisories. Outreach is performed by local organizations including Boat People SOS and Chinese Christian Herald Crusades, as well as an environmental consulting firm, DBS&A. Outreach efforts prioritize communities that are more at risk and vulnerable to fish contamination. Outreach efforts at the community events often reach out to women and children, as they are less likely to be reached by pier outreach activities and may be at a higher risk of health affects if they consume contaminated fish. Community outreach partners participate in up to 20 local events per year to educate attendees about the risks of eating fish contaminated with PCBs and DDT from the Palos Verdes Shelf. FCEC members utilize the Booth in a Box, which is a collection of display materials that provide Palos Verdes Shelf contamination history and potential health risk information. The Booth in a Box contains tablecloths and table runners for a professional appearance, outreach materials such as tip cards and fish identification (ID) cards, and a magnetic fishing game to attract families to the booth. FCEC participation at these events provides opportunities to engage with community members and share educational outreach materials to help both adults and children understand local fish contamination and identify fish that are safe to eat.

2.5 FISH CONTAMINATION EDUCATION COLLABORATIVE PARTNERS MEETING

The EPA hosts two FCEC meetings per year to provide updates on program messaging, outreach and enforcement activities, and DNC sign conditions. These meetings also serve as platforms for members to provide feedback and recommendations, exchange information, and discuss any issues related to the program. The FCEC meetings were originally held in-person; however, following the COVID-19 pandemic, the meetings have transitioned to a hybrid format to allow for increased attendance and accessibility.

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3. DATA COLLECTION AND ANALYSIS APPROACH

3.1 ANGLER OUTREACH

Local organizations and environmental consulting firms conduct angler outreach during the day at nine fishing piers located within the contaminated sediment area between Santa Monica Pier and Seal Beach Pier (Figures 1 and 2). Evening outreach is generally conducted at Venice Pier and Redondo Beach Pier one day per week from 4:00 p.m. to 8:00 p.m.

During this reporting period, Heal the Bay conducted daytime angler outreach three days per week at eight piers (Santa Monica Pier, Venice Pier, Hermosa Beach Pier, Redondo Beach Pier, Rainbow Harbor, Pier J, Belmont Pier, and Seal Beach Pier) through April 12, 2024. Daytime outreach by Heal the Bay was conducted on Fridays, Saturdays, and Sundays from 10:00 a.m. to 2:00 p.m. Heal the Bay typically visited four piers up to three times per week on a rotating weekly schedule, conducting daytime outreach at each of the eight pier locations up to six days per month. Heal the Bay's evening outreach was conducted on Saturday evenings from 4:00 p.m. to 8:00 p.m. at Venice Pier and Redondo Beach Pier. Heal the Bay's final evening outreach shift was April 6, 2024.

On May 31, 2024, DBS&A began conducting daytime pier angler outreach activities at the eight pier locations previously served by Heal the Bay. Prior to initiating pier angler outreach activities, DBS&A received Palos Verdes Shelf site-specific overview and information training, including discussion of FCEC educational outreach materials, project history and current activities, local advisories, and site contaminant education. Pier outreach teams also received training for conducting angler engagement in a manner that establishes rapport while effectively communicating details about the risks of consuming contaminated fish and ways to reduce risk. DBS&A typically conducts daytime angler outreach activities three days per week, with schedule variations to the day of the week and the time of day to allow assessment of angler activity trends and identify times of higher angler populations at the piers. This changing schedule approach will be reevaluated after one year (in June 2025). Pier angler outreach is typically conducted once at each of the eight piers on a weekly basis. DBS&A began conducting evening angler outreach on June 1, 2024. DBS&A is varying the scheduled day of the week for evening outreach to allow assessment of angler activity trends while continuing outreach between 4:00 p.m. and 8:00 p.m. at Venice Pier and Redondo Beach Pier.

Cabrillo Marine Aquarium conducts weekly daytime angler outreach at Cabrillo Pier; however, the day of the week and timing varies depending on staff schedules. The difference in outreach frequency between the outreach teams is noteworthy, as Cabrillo Marine Aquarium's outreach was conducted roughly twice as often as Heal the Bay's based on pier locations until April 2024. In some cases, this makes it difficult to directly compare the data collected at the Cabrillo Pier to the other eight pier locations. As DBS&A is now conducting pier angler outreach at the other eight piers on a weekly basis, this difference in frequency has been addressed effectively as of May 31, 2024.

During pier outreach, the outreach team focuses on approaching anglers that are actively fishing. Typical angler interactions begin with a casual greeting and introduction of outreach staff. If the angler is willing to participate, the team explains that some fish are contaminated with harmful chemicals and that eating these fish can pose risks to their health. The outreach staff typically provides the angler with one or more FCEC tip card(s) and explains how anglers can reduce their risk by following local fish advisories and avoiding the five DNC fish. The outreach team may also highlight fish that are safer to eat and ways to cook fish that can reduce potential exposure. During discussions with anglers, the outreach team records the following data:

- Whether the angler was an adult or child.
- Whether the angler agreed to speak with the outreach team.
- Whether the angler had been previously contacted by the outreach team.
- Whether the angler was aware of the contamination, and if so, how they became aware of the contamination (i.e., DNC signs, tip card, outreach team, internet, community events, media, friends/family, or other/not specified).
- The language(s) spoken during the conversation.
- The number of tip cards distributed and in which languages (English, Spanish, Chinese, and Vietnamese).
- The zip code in which the angler lives, if provided.
- The type and quantity of any fish caught or released.

These outreach data are used to determine the impact and effectiveness of the AOP. The total number of anglers contacted is tallied monthly to track progress toward the annual goal of 11,600 pier anglers contacted. The FCEC monitors the effectiveness of angler outreach by tracking the percentage of anglers that were aware of local fish contamination. The FCEC also tracks the languages spoken by anglers to determine if the available tip card translations (English, Spanish, Vietnamese, and Chinese) remain appropriate for the current angler community. Outreach staff recorded angler responses in English, Spanish, Vietnamese, and Chinese, and noted other languages where possible. Tracking the primary and alternate languages of bilingual and multilingual respondents has been identified as a potential data gap. During this reporting period, standardization of the outreach tracking formats, including tracking of primary, secondary, and additional respondent languages, was implemented in June 2024. Reporting of bilingual and multilingual respondents will be included in the next annual reporting period.

3.2 BAIT SHOP OUTREACH

Bait shop outreach is conducted in the cities of Huntington Beach, Seal Beach, Long Beach, San Pedro, Redondo Beach, Hermosa Beach, Manhattan Beach, Hawthorne, Marina Del Rey, Venice, Culver City, and Santa Monica (Figure 3). DBS&A conducted in-person bait shop outreach activities in December 2023 and July 2024. These outreach activities include assessing bait shop inventories of FCEC outreach materials (tip cards in English, Spanish, Chinese, and Vietnamese), recording any need for tip card replacement, and collecting any other pertinent observations from bait shop representatives. Additionally, the FCEC contact email address (info@pvsfish.org)

and website (www.pvsfish.org) are given to bait shops so that they can request additional materials or ask questions throughout the year.

During each visit, DBS&A collects the following data: the number of bait shops that closed and opened in each location, the number of bait shops that requested outreach materials, and the number of materials distributed in each language.

Figure 3. Map of Active Bait Shops that Display Fish Contamination Education Collaborative Outreach Materials

3.3 ELECTRONIC OUTREACH

Historically, the FCEC website has had low navigation rates. The EPA paused recording browsing data in 2023. While the FCEC Facebook page remains active, the EPA has paused social media posting activities due to the level of effort and minimal effectiveness in reaching the public. The EPA actively responds to inquiries submitted by the public through the www.pvsfish.org contact email and webpage. Additionally, the EPA regularly updates the www.pvsfish.org website and posts a newsletter and upcoming FCEC community events on the website.

3.4 COMMUNITY EVENT OUTREACH

DBS&A, Chinese Christian Herald Crusades, and Boat People SOS attend up to 20 community events per year. During each community event, outreach partners set up the FCEC Booth in a Box and distribute informational materials while educating event attendees about fish contamination from the Palos Verdes Shelf. Event attendees are encouraged to sign up for the semi-annual FCEC newsletter through using the displayed Quick Response (QR) code. The QR code was developed in order to direct users to the newsletter sign up page that is part of the www.pvsfish.org FCEC website. Community outreach partners document the communities engaged, event information (e.g., date, time, location), number of event attendees, number of FCEC booth visitors, number of outreach materials distributed, attendee impressions of the outreach materials, activities that draw the most interest, and observations made by outreach partners or community members attending the event. The FCEC uses these data to determine the effectiveness of each community event and inform future events for FCEC participation.

4. RESULTS

4.1 ANGLER OUTREACH

The annual goal for the angler outreach team was to engage with a minimum of 11,600 pier anglers. In total, the outreach team contacted 9,699 anglers, falling short of the goal by 1,901 anglers; this is due in part to subcontractor transition activities. The outreach team encountered 8,064 anglers during daytime outreach and 1,635 anglers during evening outreach. Table 1 (day) and Table 2 (evening) summarize the total number of anglers contacted by the outreach team per month and include anglers who were and were not willing to speak. As discussed in Section 3.1, transition of pier angler outreach subcontractors occurred during the months of April and May 2024. This transition impacted the total number of anglers contacted during this period, and the schedule differences of the two subcontractors may have broad implications on outreach data (e.g. the number of anglers contacted and awareness of contamination). Prior to the contract change, Heal the Bay conducted outreach on the same set days and times of the week (Fridays, Saturdays, and Sundays from 10:00 a.m. to 2:00 p.m.). In contrast, DBS&A now conducts outreach at each pier on variable days and times of the week. Additionally, the evening outreach data for November 2023 is not available and is discussed in further detail in Section 4.1.4. Other notable data quality impacts are discussed in the following sections and in Section 5.1.2.

Table 1. Number of Daytime Anglers Contacted per Month

Date	Belmont	Cabrillo	Hermosa	Pier J	Rainbow Harbor	Redondo	Santa Monica	Seal Beach	Venice	Total
Aug 2023	261	85	63	73	25	191	178	96	131	**1,103**
Sep 2023	344	82	66	99	48	202	142	96	90	**1,169**
Oct 2023	151	48	47	116	42	153	138	83	76	**854**
Nov 2023	114	109	29	50	18	69	46	42	33	**510**
Dec 2023	37	51	17	40	11	55	68	13	45	**337**
Jan 2024	42	111	23	42	16	100	76	22	39	**471**
Feb 2024	119	103	31	55	10	96	59	59	61	**593**
Mar 2024	153	69	39	71	22	97	51	62	59	**623**
Apr 2024	--	99	23	--	--	84	63	--	37	**306**
May 2024	13	174	--	--	5	--	--	--	--	**192**
Jun 2024	177	223	77	43	39	150	51	104	37	**901**
Jul 2024	102	299	58	78	30	131	87	99	121	**1,005**
Pier Total	**1,513**	**1,453**	**473**	**667**	**266**	**1,328**	**959**	**676**	**729**	**8,064**

Notes:
-- = No data available due to transition of pier angler outreach subcontractors.

Table 2. Number of Evening Anglers Contacted per Month

Date	Redondo	Venice	Total
23-Aug	98	64	**162**
23-Sep	80	58	**138**
23-Oct	101	54	**155**
23-Nov	NA	NA	**NA**
23-Dec	51	49	**100**
24-Jan	102	40	**142**
24-Feb	127	62	**189**
24-Mar	119	47	**166**
24-Apr	59	22	**81**
24-May	--	--	**--**
24-Jun	164	89	**253**
24-Jul	170	79	**249**
Pier Total	**1,071**	**564**	**1,635**

Notes:
NA = Data not available. Discussion provided in Section 4.1.4.
-- = No data available due to transition of pier angler outreach subcontractors.

4.1.1 Number of Daytime Anglers Reached

Heal the Bay contacted 5,209 daytime anglers through April 12, 2024; DBS&A contacted 1,402 daytime anglers from May 31, 2024 through July 31, 2024; and Cabrillo Marine Aquarium contacted 1,453 daytime anglers for a total of 8,064 daytime anglers (Table 1). The total number of daytime anglers contacted by the outreach teams is shown in Figure 4. In general, daytime angler activity was consistent with past years, where angler numbers increased in the spring and summer and declined in fall and winter. As mentioned in Section 3.1, pier angler outreach efforts were transitioned to DBS&A in May 2024. As a result of this transition, the outreach numbers for the months of April and May 2024 are not representative of standard outreach efforts. By June 2024, DBS&A's outreach efforts were fully operational, and the number of anglers contacted aligned with expectations based on previous years. The transition period is displayed on Figure 4 to help clarify the timeframe impacted by the transition.

The most popular pier for daytime fishing was Belmont Pier, making up 18.8 percent of the total daytime anglers encountered. Redondo Pier (16.5 percent) and Santa Monica Pier (11.9 percent) were also popular fishing piers for daytime anglers. Cabrillo Pier accounted for 18 percent of the anglers contacted during daytime outreach efforts; however, differences in outreach frequencies at Cabrillo Pier versus the other pier locations prevent a direct comparison to other pier locations. Rainbow Harbor continues to be the least popular pier for fishing, comprising 3.3 percent of the total anglers contacted during daytime outreach activities. The total count of daytime anglers is recorded regardless of willingness to engage with the outreach team. Therefore, Figure 4 data include total anglers encountered during daytime outreach; both those who agreed and did not agree to speak with the outreach team.

Figure 4. Total Number of Daytime Anglers per Month

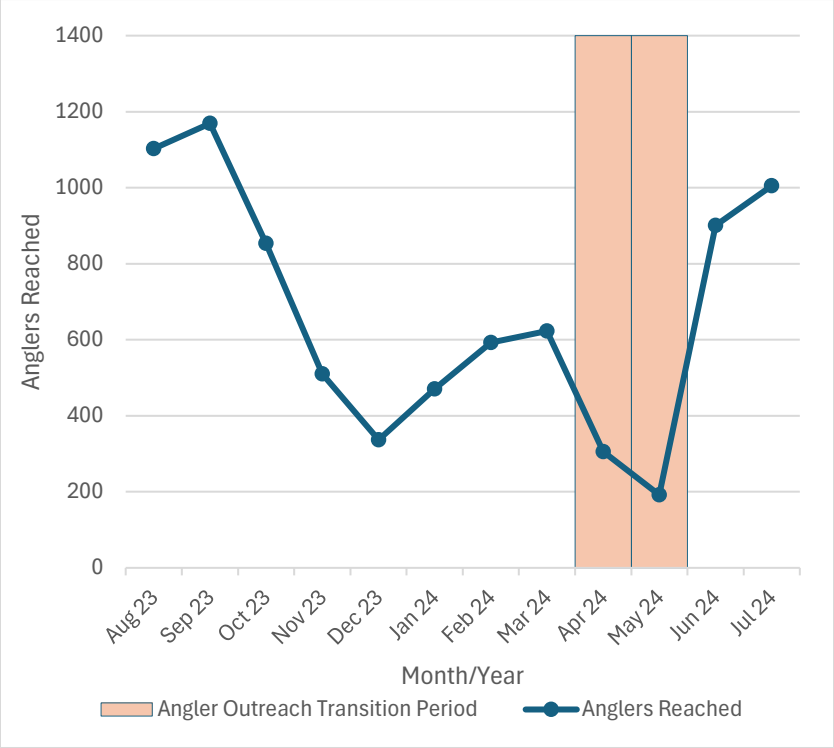

Table 3 summarizes for each pier, the percentage of daytime anglers that were reportedly new or repeat anglers out of the total number of daytime anglers. This calculation is based on the total number of daytime anglers (8,064), and includes those who were willing to speak, and those who were unwilling to speak or otherwise did not provide this data.

As shown in Table 3, the proportion of new respondents was highest at Cabrillo Pier (48.4 percent) and lowest at Venice Pier (36.2 percent). The other seven piers averaged between 38 percent and 47 percent of new respondents. Though there are differences in outreach frequency at Cabrillo Pier and other piers, the proportion of new respondents to repeat respondents is not likely impacted by this difference since it is calculated as a percent of total anglers contacted at individual pier locations. Rainbow Harbor had the highest relative proportion of repeat respondents (54.9 percent), while Cabrillo Pier had the lowest proportion of repeat respondents (24.9 percent). The remaining piers averaged between 44 percent and 54 percent for repeat daytime respondents.

Not shown in Table 3 (or other tables), is a review of the subset of daytime angler data, specifically the percentage of new or repeat anglers who agreed to speak (7,161 anglers). For this subset of daytime anglers, 45.4 percent had not been previously contacted by the outreach team and are reported as “new” respondents. In addition, a total of 54.4 percent of daytime anglers had reportedly discussed fish contamination and are reported as “repeat” respondents. The remaining less than 1.0 percent of daytime anglers (who otherwise agreed to speak) declined to or did not provide this type of information.

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Table 3. Percent of New and Repeat Respondents during Daytime Outreach[1]

Date	Belmont		Cabrillo		Hermosa		Pier J		Rainbow Harbor		Redondo		Santa Monica		Seal Beach		Venice		Monthly Average	
	New	Repeat	New	Repeat	New	Repeat	New	Repeat	New	Repeat	New	Repeat	New	Repeat	New	Repeat	New	Repeat	New	Repeat
23-Aug	22.2	73.2	56.5	16.5	33.3	66.7	41.1	58.9	4.0	80.0	34.6	60.7	21.9	74.7	28.1	67.7	21.4	71.0	**29.2**	**63.3**
23-Sep	21.2	71.5	59.8	22.0	21.2	75.8	24.2	68.7	22.9	75.0	25.2	67.3	17.6	79.6	31.3	57.3	20.0	70.0	**27.1**	**65.2**
23-Oct	17.9	75.5	47.9	35.4	31.9	68.1	9.5	86.2	23.8	73.8	25.5	72.5	26.8	68.1	25.3	68.7	38.2	59.2	**27.4**	**67.5**
23-Nov	41.2	44.7	49.5	27.5	48.3	34.5	52.0	40.0	33.3	61.1	30.4	60.9	23.9	63.0	50.0	38.1	42.4	45.5	**41.2**	**46.1**
23-Dec	40.5	54.1	41.2	21.6	88.2	11.8	52.5	37.5	27.3	72.7	40.0	50.9	61.8	30.9	38.5	61.5	24.4	66.7	**46.0**	**45.3**
24-Jan	47.6	50.0	45.0	25.2	43.5	39.1	42.9	52.4	25.0	75.0	55.0	30.0	46.1	36.8	63.6	36.4	48.7	38.5	**46.4**	**42.6**
24-Feb	49.6	42.9	36.9	34.0	71.0	25.8	58.2	32.7	60.0	40.0	31.3	47.9	39.0	37.3	62.7	33.9	45.9	36.1	**50.5**	**36.7**
24-Mar	47.7	44.4	34.8	21.7	35.9	59.0	33.8	62.0	54.5	45.5	38.1	53.6	39.2	54.9	48.4	46.8	42.4	49.2	**41.7**	**48.6**
24-Apr	--	--	62.6	10.1	43.5	56.5	--	--	--	--	29.8	66.7	44.4	54.0	--	--	32.4	67.6	**23.6**	**51.0**
24-May	84.6	7.7	50.0	27.0	--	--	--	--	100	--	--	--	--	--	--	--	--	--	**78.2**	**11.6**
24-Jun	63.8	27.1	44.8	27.4	42.9	50.6	48.8	37.2	51.3	41.0	64.7	23.3	62.7	23.5	74.0	15.4	40.5	48.6	**54.9**	**32.7**
24-Jul	57.8	30.4	51.2	30.1	55.2	24.1	56.4	33.3	53.3	40.0	57.3	26.7	60.9	18.4	72.7	11.1	41.3	41.3	**56.2**	**28.4**
Pier Average	**41.2**	**47.4**	**48.4**	**24.9**	**46.8**	**46.5**	**38.1**	**50.9**	**38.0**	**54.9**	**39.3**	**51.0**	**40.4**	**49.2**	**45.0**	**43.7**	**36.2**	**54.0**	**41.5**	**44.9**

Notes:

[1] Pier-specific and average values are in percentages. The percentage of new and repeat respondents may not add up to 100 percent as some contacted respondents decline to speak or did not otherwise provide this information. The values represent the percentage of anglers at each pier that have never been interviewed by outreach personnel (New) versus anglers who were previously interviewed by outreach personnel (Repeat) out of the total number of anglers encountered at each pier.

-- = No data available due to transition of pier angler outreach subcontractors.

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4.1.2 Daytime Angler Awareness of Fish Contamination

Table 4 represents the subset percentages of daytime anglers who were willing to speak to the outreach team and reported awareness out of the total number of daytime anglers encountered at each pier. Across the nine piers, roughly 58 percent of anglers were aware of local fish contamination. This represents a decrease from the previous reporting period, when 69 percent of daytime anglers reported being aware of the contamination. Anglers fishing at Rainbow Harbor had the highest awareness rate of any pier, with 77.1 percent of anglers indicating that they were already aware of fish contamination. Angler awareness was lowest at Cabrillo Pier with just 31.8 percent reporting to be aware of fish contamination. The collection of awareness data relies on whether an angler is willing or unwilling/unable to speak to the outreach team. If the angler's awareness cannot be confirmed as "aware", for the purposes of Table 4 calculations, they are still included in the total angler data used to calculate percent aware.

Table 4. Percent of Daytime Anglers that were Aware of Fish Contamination[1]

	Pier									
Date	**Belmont**	**Cabrillo**	**Hermosa**	**Pier J**	**Rainbow Harbor**	**Redondo**	**Santa Monica**	**Seal Beach**	**Venice**	**Monthly Average**
Aug 2023	83.9	24.7	93.7	83.6	80.0	78.0	75.8	85.4	74.1	**75.5**
Sep 2023	82.6	41.5	97.0	75.8	89.6	83.2	94.4	83.3	81.1	**80.9**
Oct 2023	84.1	45.8	87.2	91.4	81.0	85.0	73.9	84.3	67.1	**77.8**
Nov 2023	61.4	34.9	58.6	58.0	94.4	73.9	73.9	71.4	63.6	**65.6**
Dec 2023	62.2	25.5	64.7	70.0	100	65.5	45.6	76.9	68.9	**64.4**
Jan 2024	76.2	28.8	56.5	66.7	100	48.0	55.3	59.1	48.7	**59.9**
Feb 2024	45.4	37.9	67.7	74.6	80.0	60.4	50.9	42.4	49.2	**56.5**
Mar 2024	61.4	29.0	74.4	69.0	63.6	58.8	58.8	53.2	57.6	**58.4**
Apr 2024	--	16.2	87.0	--	--	67.9	54.0	--	67.6	**32.5**
May 2024[2]	38.5	32.8	--	--	80.0	--	--	--	--	**16.8**
Jun 2024[2]	49.7	31.8	67.5	62.8	79.5	65.3	47.1	30.8	62.2	**55.2**
Jul 2024[2]	58.8	33.1	60.3	46.2	76.7	50.4	43.7	42.4	57.0	**52.1**
Pier Average	**58.7**	**31.8**	**67.9**	**58.2**	**77.1**	**61.4**	**56.1**	**52.4**	**58.1**	**58.0**

Notes:

[1] Pier-specific and average values are in percentages. The values represent the percentage of anglers at each pier that were reportedly aware of the fish contamination divided by the total number of daytime anglers at the pier(s).

[2] There are potential data quality concerns; outreach staff may not have been consistently differentiating between angler familiarity with the outreach program, and angler awareness of contamination and health risks. This data quality concern is limited to anglers reporting repeat engagement. See Section 5.1.2 for further discussion.

-- No data available due to transition of pier angler outreach subcontractors.

Among new daytime anglers willing to speak, 34.8 percent reported being aware. The remaining 65.2 percent of these anglers either reported being unaware or did not provide this information. Among repeat daytime anglers, less than 1 percent were reportedly not aware of fish contamination issues and more than 99 percent reported awareness.

4.1.3 Sources of Daytime Angler Awareness

To identify the most effective outreach strategies, outreach teams asked anglers how they originally learned about local fish contamination (i.e., DNC signs, tip card, outreach team, internet, community events, media, friends/family, or other/not specified). The Table 5 data are derived from the subset of total daytime anglers that were willing to speak and reported awareness. Table 5 summarizes the categories of sources of information that contributed to their awareness of the contamination.

The DNC signs were the most reported source of information about fish contamination, with 47.4 percent of anglers attributing their awareness of fish contamination to DNC signs during this reporting period. Among new anglers reportedly aware of contamination, DNC signs were the most commonly reported source of awareness. The pier outreach team was also commonly cited as a source of angler awareness (31.0 percent), as well as the tip cards (15.5 percent). The outreach team and the tip cards were reported by anglers as distinct awareness sources. However, these two sources are likely more connected to each other than the other awareness sources, as the outreach teams consistently distributed tip cards during their outreach activities. In other words, anglers may be citing the tip card as their source of awareness, despite receiving the tip card from the outreach team during their interaction at the pier. However, since tip cards are also distributed through designated local bait shop locations and community events, the two awareness sources are reported separately. This is reviewed in more detail in the discussion and recommendations on data quality associated with reported angler awareness (Section 5.1.2).

Table 5. Sources of Daytime Angler Awareness[1,2]

Pier	Pier Signage	Tip Card	Pier Outreach Team	Internet	Events	Media	Friends/ Family	Other/Not Specified
Belmont	58.0	16.5	19.6	0.7	--	1.3	1.8	2.2
Cabrillo	4.1	0.6	78.4	0.2	--	12.1	--	4.5
Hermosa	59.1	23.2	16.6	--	--	0.3	--	0.8
Pier J	42.7	15.0	36.3	--	--	1.3	--	4.8
Rainbow Harbor	53.4	20.4	20.8	0.9	--	--	1.4	3.2
Redondo	46.0	23.5	26.7	0.5	--	1.9	0.2	1.2
Santa Monica	56.6	11.4	29.0	1.1	--	0.9	0.3	0.6
Seal Beach	61.6	13.4	20.1	1.0	--	1.0	--	2.9
Venice	41.4	12.1	41.4	0.6	--	1.5	--	3.0
Percent (Total Sources)	**47.8**	**15.5**	**31.0**	**0.6**	**0.0**	**2.2**	**0.5**	**2.3**

Notes:

[1] Angler awareness from May through July has potential data quality concerns; outreach staff may have made assumptions regarding source of awareness during this period. This potential data quality concern is limited to anglers reporting repeat engagement. See Section 5.1.2 for further discussion.

[2] Source values are in percentages. The values represent the percentage of anglers at each pier that became aware of contamination from each outreach source.

-- = Outreach location had no anglers that identified this awareness source.

During this reporting period, anglers reported DNC signage slightly less than the previous period (47.8 percent this period versus 52 percent from August 2022 to July 2023). Anglers reported less awareness from tip cards, dropping from 21 percent in the previous reporting period to 15.5 percent this period. During this reporting period, the outreach team saw an increase in the number of anglers reporting them as an awareness source, from 21 percent in the previous reporting period to 31 percent this period. This increase may or may not be due to the change in angler outreach scheduling from Heal the Bay's schedule to DBS&A's schedule (discussed in Sections 3.1 and 4.1). Sources that did not contribute to angler awareness as much as DNC signs and the outreach team include the following: media (2.2 percent), internet (0.6 percent), friends/family (0.5 percent), and community events (0.0 percent). Additionally, not all anglers who report awareness report their awareness source fitting into the categories above or at all, so these anglers source data are included as "other/not specified" (2.3 percent).

4.1.4 Number of Evening Anglers Reached

During this reporting period, evening outreach activities were impacted by two separate issues. As discussed in previous sections, pier angler outreach was transitioned from Heal the Bay to DBS&A during April and May 2024 of this reporting period. This resulted in a gap in outreach from April 6, 2024 to May 31, 2024. Additionally, during the month of November 2023, Heal the Bay did not conduct evening outreach due to staffing issues. Evening pier angler outreach activities conducted at Venice Pier and Redondo Beach Pier contacted a total of 1,635 anglers; despite several periods of inactive outreach, this is a higher number of evening anglers

contacted this period compared to last period (1,462 anglers). This suggests an overall increase in evening angler populations at Venice Pier and Redondo Beach Pier.

This increase may be a result of the change in angler outreach scheduling from Heal the Bay's set schedule to DBS&A's variable schedule (discussed in Sections 3.1 and 4.1). With the gaps in data during both the winter and spring months of this reporting period, the typical seasonal fluctuations noted during previous reporting periods were somewhat difficult to assess. Generally, angler populations during the unimpacted months appeared consistent with previous reporting periods and displayed expected seasonal fluctuations, where angler population decreased from August through December and increased from January to July. These trends are consistent with daytime fluctuations reported above.

Table 6 summarizes for each pier, the percentage of evening anglers that were reportedly new or repeat anglers out of the total number of evening anglers. This calculation is based on the total number of evening anglers (1,635), and includes those who were willing to speak and those who were unwilling to speak or otherwise did not provide this data. On average, 49 percent of evening anglers contacted were new respondents and 39 percent were repeat respondents (Table 6). It is not likely that the data presented in Table 6 is impacted by the gaps in outreach since the proportion of new respondents to repeat respondents is calculated as a percent of total anglers contacted at individual pier locations. These percentages are similar to the 2022–2023 reporting year in which 54 percent of anglers were new and 31 percent were repeat respondents.

Table 6. Percent of New and Repeat Respondents during Evening Outreach[1]

Date	Redondo		Venice		Monthly Average	
	New	Repeat	New	Repeat	New	Repeat
23-Aug	44.9	37.8	46.9	31.3	45.9	34.5
23-Sep	47.5	32.5	50.0	36.2	48.8	34.4
23-Oct	35.6	62.4	40.7	44.4	38.2	53.4
23-Nov	NA	NA	NA	NA	NA	NA
23-Dec	41.2	58.8	57.1	42.9	49.2	50.8
24-Jan	69.6	24.5	65.0	20.0	67.3	22.3
24-Feb	65.4	26.0	41.9	45.2	53.6	35.6
24-Mar	38.7	52.9	25.5	55.3	32.1	54.1
24-Apr	55.9	40.7	36.4	54.5	46.1	47.6
24-May	--	--	--	--	--	--
24-Jun	48.8	33.5	70.8	19.1	59.8	26.3
24-Jul	53.5	24.1	44.3	43.0	48.9	33.6
Pier Average	**50.1**	**39.3**	**47.9**	**39.2**	**49.0**	**39.3**

Notes:

[1] Pier values are in percentages. The percentage of new and repeat respondents will not add up to 100 percent as a portion of contacted respondents declined or otherwise did not provide this information.

NA = Data not available. Discussion provided in Section 4.1.4.

-- = No data available due to transition of pier angler outreach subcontractors.

4.1.5 Evening Angler Awareness of Fish Contamination

Table 7 summarizes the percentage of evening anglers who responded that they were aware of fish contamination. On average, 51.5 percent of anglers reported being aware of local fish contamination. This is a decrease from the previous reporting year in which 72 percent of anglers contacted reported awareness of fish contamination.

The collection of awareness data relies on whether an angler is willing or unwilling to speak to the outreach team. If the angler's awareness cannot be confirmed as "aware", for the purposes of Table 7 calculations, they are not considered aware, yet are included in the total angler data. Table 7 represents the subset percentages of evening anglers who were willing to speak to the outreach team and reported awareness out of the total number of evening anglers encountered at each pier.

Table 7. Percent of Evening Anglers that were Aware of Fish Contamination[1]

Date	Redondo	Venice	Monthly Average
23-Aug	70.4	62.5	66.5
23-Sep	65.0	55.2	60.1
23-Oct	76.2	51.9	64.0
23-Nov	NA	NA	NA
23-Dec	58.8	42.9	50.8
24-Jan	32.4	25.0	28.7
24-Feb	29.1	48.4	38.8
24-Mar	52.9	57.4	55.2
24-Apr	40.7	54.5	47.6
24-May[2]	--	--	--
24-Jun[2]	42.4	55.7	50.6
24-Jul[2]	51.9	51.2	49.0
Pier Average	**51.9**	**51.0**	**51.5**

Notes:
[1] Pier and average values are in percentages. The values represent the percentage of anglers at each pier that were reportedly aware of the fish contamination divided by the total number of evening anglers at the pier(s).
[2] There are potential data quality concerns; outreach staff may not have been consistently differentiating between angler familiarity with the outreach program, and angler awareness of contamination/health risks. This data quality concern is limited to anglers reporting repeat engagement from May through July 2024. See Section 5.1.2 for further discussion.
NA = Data not available. Discussion provided in Section 4.1.4.
-- = No data available due to transition of pier angler outreach subcontractors.

Among new evening anglers willing to speak, 28.1 percent reported being aware. The remaining 71.8 percent of these anglers either reported being unaware or did not provide this information. Among repeat evening anglers willing to speak, roughly 1.6 percent of anglers reported being unaware of fish contamination (or did not provide this information) and 98.4 percent of anglers reported awareness.

4.1.6 Sources of Evening Angler Awareness

Table 8 provides a summary of the sources of information leading to angler awareness of local fish contamination. The pier signage (48.7 percent) and the pier outreach teams (31.5 percent) continue to be the most effective sources of information for increasing angler awareness of fish contamination. Note the discussion and recommendations in Section 5.1.2 on data quality associated with reported angler awareness. Tip cards (17.4 percent) were attributed to angler awareness of contamination less often than in previous reporting periods. However, since the outreach teams typically hand out tip cards during outreach activities, tip cards could potentially be associated with the outreach teams. This association may impact angler response reporting between these two sources. When evaluating tip cards and outreach teams as possible overlapping awareness sources, the combined total awareness reported for tip cards and outreach teams in the previous reporting period was 41.7 percent compared to 49.3 percent during this year. Other sources reported were the media (0.7 percent), the internet (0.4 percent), and other/not specified (0.9 percent). These results are consistent with the previous reporting year, in which DNC signage contributed the most (57.5 percent) to angler awareness.

Table 8. Sources of Evening Angler Awareness[1,2]

Pier	DNC Signs	Tip Card	Outreach Team	Internet	Community Events	Media	Friends/ Family	Other/Not Specified
Redondo	49.3	15.7	32.3	0.4	--	0.4	--	1.9
Venice	48.1	19.0	31.5	0.3	--	1.0	--	0.0
Percent (Total Average Sources)	**48.7**	**17.4**	**31.9**	**0.4**	**0.0**	**0.7**	**0.0**	**0.9**

Notes:

[1] Angler awareness from May through July has potential data quality concerns; outreach staff may have made assumptions regarding source of awareness during this period. This potential data quality concern is limited to anglers reporting repeat engagement. See Section 5.1.2 for further discussion.

[2] Source values are in percentages. The values represent the percentage of anglers at each pier that became aware of contamination from each outreach source material.

-- = o anglers that identified this awareness source.

4.1.7 Angler Geographic Distribution and Languages Spoken

During pier outreach activities the outreach team asked anglers if they were willing to provide their residential zip code. During this reporting period, 42 percent of daytime anglers (3,415 anglers out of 8,064) and 38 percent of evening anglers (617 anglers out of 1,635) provided their zip codes. The total number of daytime and evening anglers each include anglers who were willing to speak and those who were not willing to speak. There were several instances where anglers unwilling to speak to the outreach team about other topics still provided zip codes to the outreach team.

Most anglers came from zip codes within Los Angeles County (85 percent of daytime anglers and 91 percent of evening anglers), which is consistent with previous reporting years. Daytime anglers also came from Orange County (6 percent), San Bernardino County (2.5 percent), Riverside County (2 percent), and out of state and other counties in California (4.5 percent).

Evening anglers also came from Orange County (2.3 percent), Riverside County (2.3 percent), and out of state or other counties in California (4.4 percent).

Figures 5 and 6 depict the geographical distributions and frequencies of zip codes reported by daytime and evening anglers, respectively. To determine the language distribution spoken by anglers per county, only those responses that include both a language designation and the associated residential zip code were used for analysis. The most frequently reported zip codes for daytime anglers were San Pedro 90731 (230 respondents), Los Angeles 90012 (204 respondents), and Lakewood 90712 (67 respondents), all in south Los Angeles. Four additional zip codes had 50 or more respondents, all of which were in Los Angeles County. The most frequently reported zip codes for evening anglers were Los Angeles 90001 (38 respondents) and Redondo Beach 90277 and 90278 (40 respondents total). Nine additional zip codes in Los Angeles County had 10 to 14 respondents. The analysis shown in Figures 5 and 6 focus on data from Los Angeles and neighboring counties.

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Figure 5. Geographic Distribution of Daytime Anglers per Zip Code

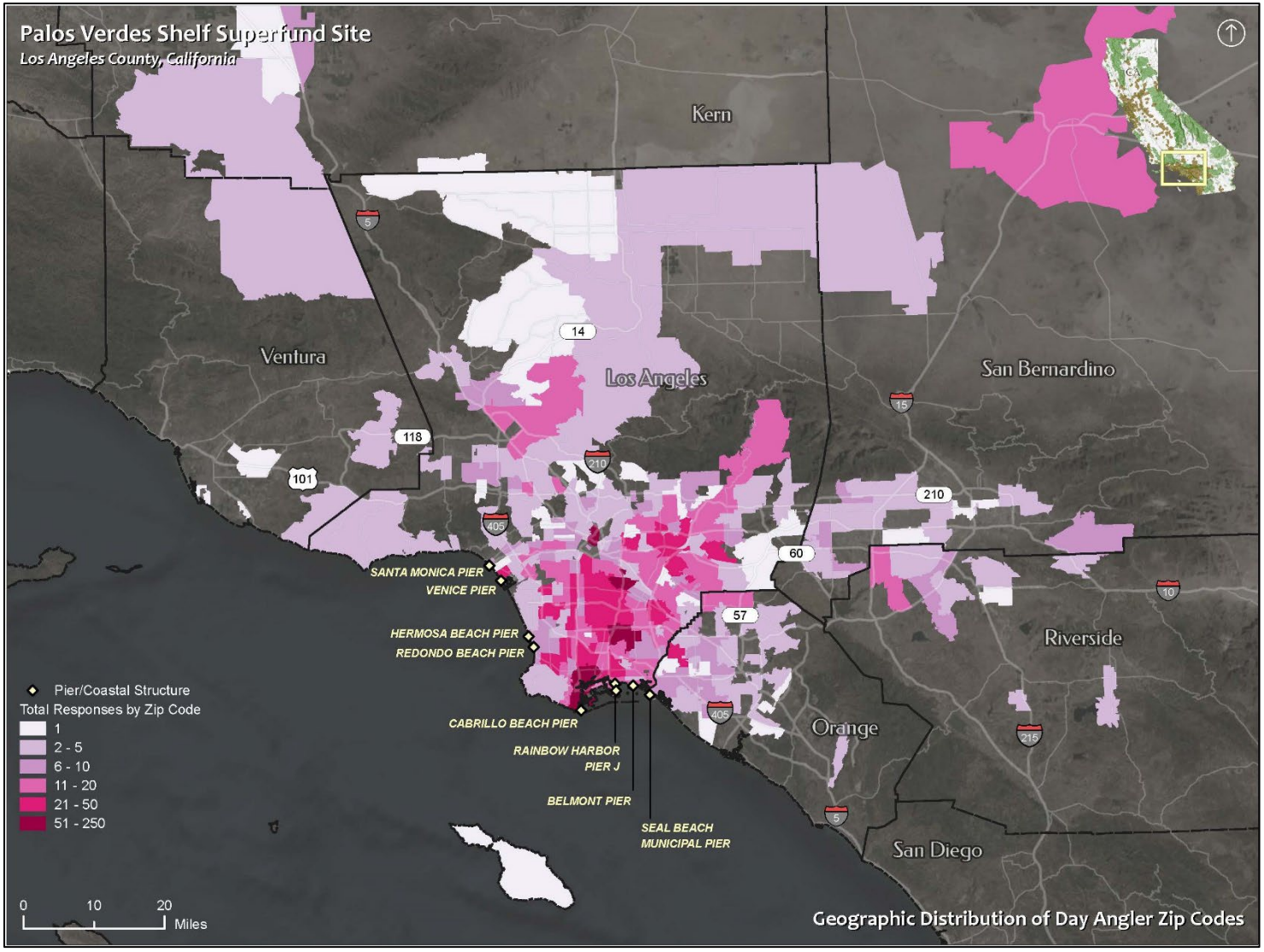
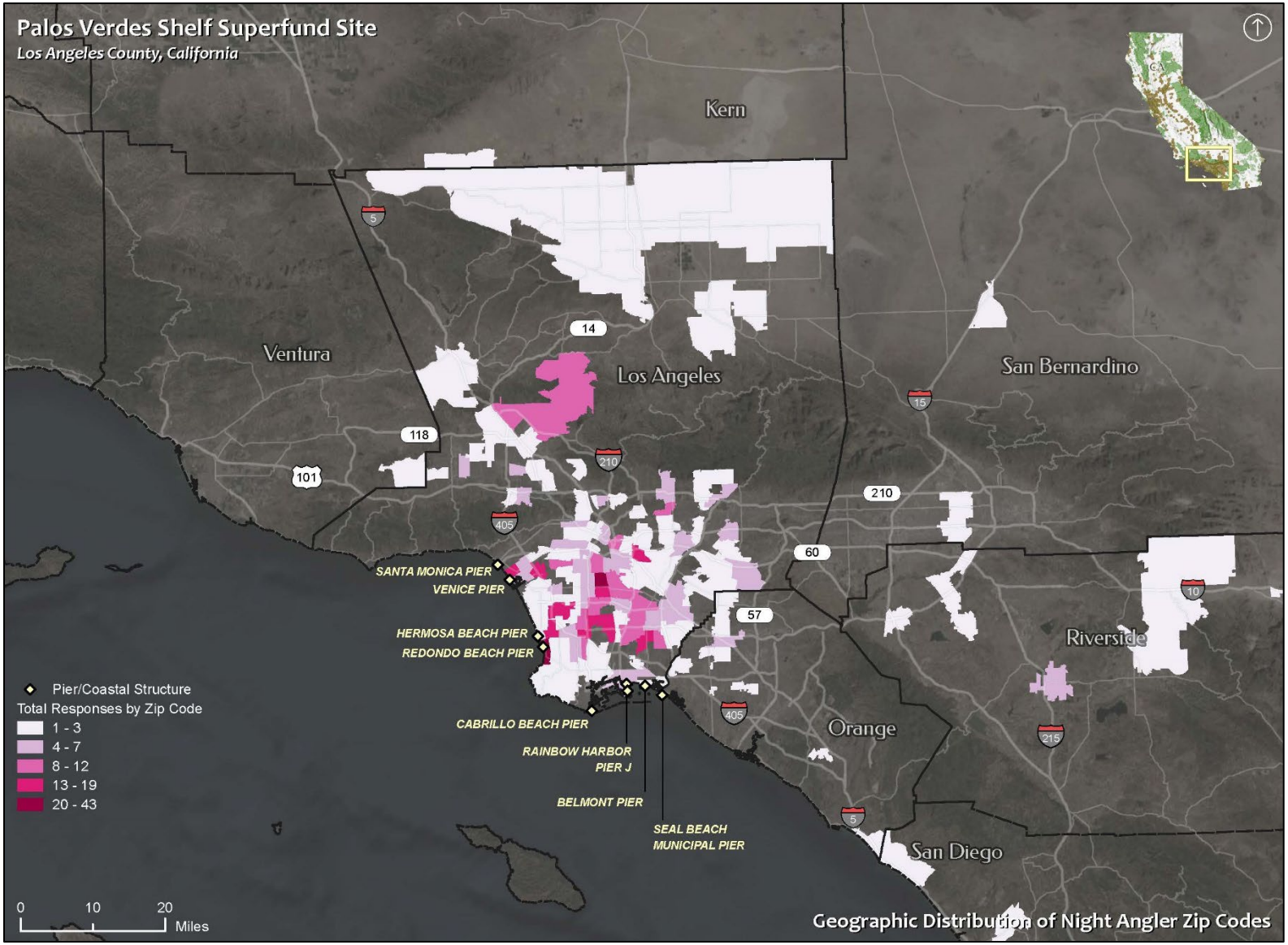


Figure 6. Geographic Distribution of Evening Anglers per Zip Code



The outreach team recorded angler responses during daytime and evening outreach activities in English (7,774 anglers), Spanish (734 anglers), Chinese (35 anglers), Vietnamese (6 anglers), Russian (1 angler), Arabic (3 anglers), Korean (1 angler), Tagalog (1 angler), and Ukrainian (2 anglers). Languages were recorded based on respondent-provided information or their request for tip cards in languages other than English. As noted above in this section, not every respondent was willing to provide their residential zip code, and therefore not every respondent is represented in the language distribution analysis.

Language data is typically able to be collected for anglers willing, unwilling, or unable to speak to the outreach team. A total of 35 anglers who are included in the "not willing to speak" category are more accurately reported as having a language barrier that prevented outreach. The dataset in Table 9 includes the language distribution of anglers during this reporting period. Table 9 presents the language spoken by anglers at each pier for English, Spanish, Chinese, and Vietnamese languages. Across all piers during daytime outreach activities, 91.6 percent of anglers spoke English, 7.8 percent spoke Spanish, 0.4 percent spoke Chinese, and 0.1 percent spoke Vietnamese. During evening outreach at Venice Pier and Redondo Beach Pier, 87.1 percent of anglers spoke English, 12.3 percent of anglers spoke Spanish, and 0.5 percent of anglers spoke Chinese. There were no recorded Vietnamese responses during evening outreach.

Table 9. Languages Spoken during Pier Angler Outreach – by Pier[1]

Pier	Daytime				Evening		
	English	Spanish	Chinese	Vietnamese	English	Spanish	Chinese
Belmont	92.1	7.5	0.4	--			
Cabrillo	88.8	9.3	0.6	0.6			
Hermosa	96.2	2.9	0.9	--			
Pier J	95.5	4.3	0.2	--			
Rainbow Harbor	95.6	4.4	--	--			
Redondo	93.7	6.2	0.1	--	90.0	9.2	0.7
Santa Monica	83.6	15.3	1.0	--			
Seal Beach	97.6	2.4	--	--			
Venice	87.9	12.1	--	--	81.5	18.5	--
Language Totals	**91.6**	**7.8**	**0.4**	**0.1**	**87.1**	**12.3**	**0.5**

[1] Source values are in percentages. The values represent the percentage of anglers at each pier that became aware of contamination from each outreach source material.

[2] The percentages may not add up to 100 percent because a small portion of respondents reported a language other than English, Spanish, Chinese, or Vietnamese (see 4.1.7 text for Russian, Arabic, Korean, Tagalog, and Ukrainian).

-- = No anglers were identified as speakers at this pier.

4.2 FISH SPECIES REPORTED DURING ANGLER OUTREACH

The outreach team collected data on the types and quantity of fish caught by anglers (Table 10). Note that not all species included are technically categorized as "fish" (e.g., octopus, crab, sea star). Mackerel (570 recorded) and sardine (120 recorded) were the most frequently recorded species of fish caught. Both mackerel and sardine are included on the list of fish that

have been identified as safer to eat. Fish that are included on the DNC list were also recorded during outreach activities, as follows: topsmelt (246 recorded), white croaker (44 recorded), barred sand bass (27 recorded), and barracuda (2 recorded). Based on data presented in Table 10, the fish included on the DNC list represent 19.2 percent of the total number of fish reportedly caught. This shows that DNC-listed fish were caught more frequently in 2023–2024 than in the last reporting period. The 2022–2023 reporting period saw a total of 298 DNC fish reportedly caught (6.5 percent of 4,578 fish caught), whereas this period had a total of 319 DNC fish reportedly caught (19.2 percent of 1,664 fish caught).

Table 10. Fish Species and Number Caught by Anglers Interviewed during Pier Outreach

Fish Listed as "Do Not Consume"			
Topsmelt	246	Barracuda	2
White Croaker	44	Black Croaker	0
Barred Sand Bass	27		
Fish Identified as Safer to Eat			
Mackerel	570	Halibut	24
Sardine	120	Rockfish	22
Jacksmelt	87	Yellowfin Croaker	19
Kelp/Calico Bass	51	Shovel Nose Guitarfish	15
Sargo	48	Corbina	6
Other Documented Catch			
Surf Perch	45	Leopard Shark	4
Scorpionfish	30	Opaleye	3
Herring	23	Black Perch	3
Bonito	22	Butterfish	3
Sea Stars	22	Thresher Shark	2
Crab unidentified	18	Perch	2
Salema	14	Octopus unidentified	2
Ray unidentified	12	White Seabass	2
Lizard Fish	9	Not specified	167

4.3 BAIT SHOP OUTREACH

Prior to the December 2023 bait shop outreach, the EPA added the following four new bait shop locations to the program, bringing the total number of bait shops in the program up to 40 locations:

- Andy's Sports & Tackle Supply (Lynwood, California)
- Fisherman's Supplies (Lawndale, California)
- Young's Tackle (Bellflower, California)
- Big 5 Sporting Goods (Huntington Park, California)

In December 2023, DBS&A conducted outreach at 40 bait shops and retail locations, distributing additional FCEC outreach materials to 21 shops, including 748 English, 338 Spanish,

50 Chinese, and 125 Vietnamese tip cards. Table 11 summarizes distribution of outreach materials from the December 2023 outreach effort.

Table 11. Bait Shop Distribution December 2023

Store Name	Number of Distributed Tip Cards			
	English	Spanish	Chinese	Vietnamese
7 Eleven (2)	50	0	0	0
Andy's Sports & Tackle Supply	50	25	0	0
ARCO AM/PM	0	10	0	0
Bay Market	5	3	0	0
Big 5 Sporting Goods (Huntington Park)	50	25	0	0
Charkbait	0	25	0	25
Del Rey Landing	50	0	0	0
Family Deli and Grocery	50	0	0	0
Fishermen's Hardware	50	25	50	25
Fisherman's Supplies	50	25	0	25
Jimmy Caivo Bait & Tackle	50	25	0	25
M&P Liquor	18	0	0	0
Magnolia Liquor Jr. Market / Supreme Liquor	25	25	0	0
Pacific Wilderness	0	25	0	0
Redondo Food Mart	50	25	0	0
Rosa's Liquor Market	25	25	0	0
Sav-On Tackle	50	0	0	0
West Beach Liquor Store	50	25	0	25
West Marine (1)	25	25	0	0
West Marine (4)	50	0	0	0
Young's Tackle	50	25	0	0

Typically, the first round of bait shop outreach each year occurs in May or June. After reviewing the bait shop inventories and distribution from the December 2023 event, along with the recognized seasonal patterns in angler activity, bait shop outreach was postponed until July 2024 to provide materials closer to the peak angling season.

In July 2024, tip cards were distributed by DBS&A to each of the 40 bait shops participating in the bait shop outreach program. A total of 1,950 English, 694 Spanish, 900 Chinese, and 950 Vietnamese tip cards were distributed to the bait shops. A detailed list of bait shops and the number of tip cards distributed is summarized in Table 12.

Table 12. Bait Shop Distribution July 2024

Store Name	Number of Distributed Tip Cards			
	English	Spanish	Chinese	Vietnamese
7 Eleven (2)	50	18	25	25
ABC Fine Wine	50	18	25	25
Andy's Sports & Tackle Supply	50	18	25	25
ARCO AM/PM	50	18	25	25
Baja Fishing Tackle (Formerly Baja Fish Gear)	50	18	25	25
Bay Market	50	18	25	25
Best Bait and Tackle	50	18	25	25
Big 5 Sporting Goods (Culver City)	50	18	25	25
Big 5 Sporting Goods (Huntington Park)	50	18	25	25
Big Fish Bait & Tackle	50	18	25	25
Catalina Liquor & Deli	50	18	25	25
Chaeil Fishing Tackel USA Inc.	50	16	10	25
Charkbait	50	18	25	25
Dawn to Dusk Liquor	25	12	0	0
Del Rey Landing	50	18	10	25
El Don Liquor Store	50	18	25	25
Family Deli and Grocery	50	18	25	25
Fishermen's Hardware	50	18	25	25
Fisherman's Supplies	50	18	10	25
Gaffey Liquor	50	18	25	25
Hello Liquor	50	18	25	25
Jimmy Caivo Bait & Tackle	50	18	25	25
Liquor Depot	50	18	25	25
M&P Liquor	25	0	0	0
Magnolia Liquor Jr. Market / Supreme Liquor	50	18	20	25
Mahi Tackle-Sport Fishing Supplies	50	18	25	25
Mr. C's Liquor	50	18	25	25
Pacific Edge Bait and Tackle	50	18	25	25
Pacific Wilderness	50	18	25	25
Redondo Food Mart	50	18	25	25
Rosa's Liquor Market	50	18	25	25
Sav-On Tackle	50	18	25	25
Seal Beach Liquor Store	50	18	25	25
Stanley's Liquor Jr. Market	50	18	25	25
West Beach Liquor Store	50	18	25	25
West Marine (1)	50	18	25	25
West Marine (2)	50	18	25	25
West Marine (3)	50	18	25	25
West Marine (4)	50	18	25	25
Young's Tackle	50	18	25	25

Currently, there are 40 bait shops and retail locations that participate in the program (Figure 3). A combined total of 2,698 English, 1,032 Spanish, 950 Chinese, and 1,075 Vietnamese tip cards were distributed to the bait shops during the December 2023 and July 2024 outreach activities.

4.4 ELECTRONIC OUTREACH

The website serves as a public repository of FCEC documents, outreach materials, and electronic newsletter. Electronic outreach efforts consist of website maintenance, newsletter mailing list management, and newsletter distribution. In June 2024, the EPA distributed an electronic newsletter to 48 people via email, including 7 members of the public who signed up on the www.pvsfish.org website and 41 members of FCEC partner organizations or the EPA. While the number of community members who signed up for the newsletter is low, the number of recipients may increase now that a QR code sign-up sheet is regularly displayed at community events. Note that currently QR code scan data is not collected on site users, and therefore the metrics related to the number of downloads and sign-ups are not able to be easily evaluated or reported.

4.5 COMMUNITY OUTREACH EVENTS

Table 13 provides a summary of community outreach events, outreach material distributions for events attended during this reporting year, and the estimated number of people who visited the FCEC outreach booth at each event. The FCEC participated in 15 local community events. Boat People SOS attended five events with themes dedicated to the Vietnamese community; Chinese Christian Herald Crusades attended two events with themes dedicated to the Chinese community; and DBS&A attended eight events with themes dedicated to children, environmental education, and the Hispanic and African American communities. In total, an estimated 102,095 people attended the 15 local community events where FCEC outreach booths were set up, with an estimated 4,096 people visiting the FCEC outreach booths. Outreach staff distributed 1,814 tip cards, 1,439 brochures, 1,011 comic books, 1,787 fish ID cards, and 15 curriculum guides.

Boat People SOS distributed 564 informational outreach materials during five events, including 55 informational brochures, 365 tip cards, 94 comic books, and 50 fish ID cards. Except for the tip cards, most outreach materials distributed were in English. All the comic books, informational brochures, and fish ID cards were distributed in English. Of the 365 tip cards distributed, 89 percent were in Vietnamese and 11 percent were in English.

Chinese Christian Herald Crusades distributed 3,300 informational outreach materials during two events, including 1,100 informational brochures, 1,100 tip cards, and 1,100 fish ID cards. Most outreach materials distributed were in Chinese. Of the 1,100 tip cards distributed, 84.5 percent were in Chinese and 15.5 percent were in English. Of the 1,100 informational brochures distributed, 84.5 percent were in Chinese and 15.5 percent were in English. All 1,100 fish ID cards were in English.

DBS&A distributed 2,211 informational outreach materials during three events, including 349 tip cards, 917 “What’s the Catch” comic books, 15 “What’s the Catch” curriculum guides,

284 informational brochures, and 646 fish ID cards. Most outreach materials distributed were in English. Of the 349 tip cards distributed, 79.6 percent were in English, 13.2 percent were in Spanish, 4.3 percent were in Chinese, and 2.9 percent were in Vietnamese. Of the 917 “What’s the Catch” children’s comic books distributed, 86.3 percent were in English, 8.6 percent were in Spanish, and 5.1 percent were in Chinese. Additional outreach materials distributed included 646 fish ID cards, with 81.1 percent in English, 14.1 percent in Spanish, and 4.8 percent in Chinese. Of the 284 informational brochures distributed, 80.6 percent were in English, 10.2 percent were in Spanish, 5.3 percent were in Chinese, and 3.9 percent were in Vietnamese. Fifteen English curriculum guides were given to educators interested in implementing lessons about local fish contamination.

During this reporting period, the EPA replaced worn out Booth in a Box display materials and broken fishing game components. Replacement of one trifold display board, three tablecloths, three table runners with FCEC and EPA logos, and 11 fishing game fishing rods with improved magnets were provided to community outreach partners for use at events.

Table 13. Outreach Materials Distributed at Community Events

Event	Community Outreach Partner	Event Date	Outreach Booth Attendees	Distributed FCEC Outreach Materials				
				Tip Cards	Brochures	Comic Books	Fish ID Cards	Curriculum Guide
City of Garden Grove National Night Out	BPSOS	Aug 2025	130	80	--	--	--	--
BPSOS — Community Wellness Fair	BPSOS	Aug 2025	115	115	20	10	17	--
Vietnamese Alliance Church — Community Health Fair	BPSOS	Aug 2025	50	40	--	4	8	--
Nhan Hoa Comprehensive Health Care Clinic Annual Health and Wellness Fair	BPSOS	Sep 2025	181	125	35	30	25	--
Aquarium of the Pacific 22nd Annual Baja Splash Festival	DBS&A	Sep 2025	400	51	43	130	107	--
Lummis Day/626 Golden Streets Arroyo Fest 2023	DBS&A	Oct 2025	150	37	27	65	82	--
Cabrillo Marine Aquarium — Annual Whale Fiesta	DBS&A	Feb 2025	200	30	9	58	35	--
2024 San Gabriel Lunar Lantern Festival	CCHC	Feb 2025	1,500	1,000	1,000	--	1,000	--
Aquarium of the Pacific — African American Festival	DBS&A	Feb 2025	100	28	28	97	63	5
42nd Annual USVA Tet Festival	DBS&A	Feb 2025	500	52	52	69	63	--
Aquarium of the Pacific — Noche de Estrellas	DBS&A	Mar 2025	100	15	15	39	31	0
Dieu Ngu Temple — Health and Resource Fair	BPSOS	Mar 2025	70	5	0	50	0	--
Aquarium of the Pacific — Annual Children's Festival	DBS&A	Mar 2025	200	73	73	110	84	0
CCHC Annual Walkathon and Carnival	CCHC	Apr 2025	100	100	100	--	100	--
Aquarium of the Pacific — Earth Day Teen Climate Fest	DBS&A	Apr 2025	300	63	37	349	181	10
Total	**15 events**		**4,096**	**1,814**	**1,439**	**1,011**	**1,796**	**15**

Notes:
-- = These materials were available for the public andwere not distributed at the event
FCEC = Fish Contamination Education Collaborative
BPSOS = Boat People SOS
CCHC = Chinese Christian Herald Crusades
DBS&A = Daniel B. Stephens & Associates, Inc.

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5. DISCUSSION AND RECOMMENDATIONS

5.1 ANGLER OUTREACH

5.1.1 Program Oversight

The PV Shelf Human Health Risk Assessments determined that eating fish contaminated with DDT and PCB presents the greatest risk to human health. The primary goal of the AOP is to minimize the consumption of contaminated fish. Sections 5.1.1 through 5.1.5 discuss various aspects of the angler outreach conducted during this reporting period, and Section 5.1.6 provides recommendations for program improvements. The EPA is committed to improving and strengthening the AOP to meet the objectives of the institutional control selected in the Interim Record of Decision.

Daytime and evening angler activity over the last three reporting periods (August 2021 – July 2022, August 2022 – July 2023, and August 2023 – July 2024) showed little variation in the number of anglers reached, those aware of contamination, and new respondents (Figures 7 and 8). Many local anglers regularly fish from the piers and have been contacted by FCEC outreach staff.

The EPA conducts non-routine field oversight of outreach activities and provides feedback to the outreach teams. These opportunities allow for timely identification and resolution of data quality issues and promote improvement of angler outreach activities. Performing angler outreach oversight is an important part of data quality assurance, ensuring that outreach activities are effective and their implementation supports the goals of the institutional control program.

5.1.2 Data Quality

During oversight activities, the EPA identified specific data quality concerns associated with outreach staff making assumptions for repeat anglers on the tally sheets used during outreach. From May through July 2024, outreach staff may not have been consistently or adequately differentiating between angler familiarity with the outreach program and with angler awareness of contamination and health risks. Additionally, the pier outreach team has reportedly marked the awareness source as “AOP team” without directly asking anglers how they became aware of the contamination at the Palos Verdes Shelf Superfund Site. These data quality concerns are limited to anglers reporting repeat engagement, and are the result of outreach members not asking separate and specific questions, as well as not routinely engaging on contamination awareness topics during angler outreach.

Because it is not possible to discern which data are or are not affected for this reporting period, all repeat angler “awareness” data from May through July 2024 should be considered potentially biased and should not be used in decision making regarding the effectiveness of pier angler outreach. Recommendations to correct these data quality issues with angler awareness are discussed in Section 5.1.6.

5.1.3 Outreach to Daytime and Evening Anglers

The outreach program is a key part of the awareness of local fish contamination from the Palos Verdes Shelf Superfund Site, and the existing goals should be maintained with the incorporation of all recommendations outlined in Section 5.1.6. During this reporting period, the AOP contacted a total of 9,699 anglers (8,064 daytime anglers and 1,635 evening anglers). Of these 9,699 anglers, 1,105 declined to participate in engagement (11.4 percent) and 8,594 agreed to participate in engagement (88.6 percent). This reporting year and the last several years of data show that the outreach activities have not been able to meet the previously stated program goal of reaching 11,600 anglers annually.

While the goal is 100 percent tracking of each metric during angler engagement, in some cases not all data are provided by each responsive angler. The incomplete recording of data is due in part to angler hesitancy to answer all questions, or a change in willingness to speak about specific things during outreach. Therefore, full data are not always able to be obtained. The hesitancy of some anglers to provide certain information during this reporting period may be partially attributable to the following:

- Transition to new outreach program personnel (no established rapport)
- Outreach personnel lacking any FCEC or Palos Verdes Shelf AOP identification
- Outreach personnel lacking visible and professional tools that may increase credibility and public trust (digital tablets)

There were a total of 4,077 new anglers reached in this reporting period (Figures 7 and 8), with 3,255 individuals reported during daytime outreach and 822 individuals reported during evening outreach. New anglers represent roughly 47.4 percent of the total number of anglers who agreed to speak. When they reported contamination awareness, new anglers reported the most frequent awareness source as DNC signage. Combined daytime and evening angler awareness data show that a total of 5,852 anglers are reportedly aware of fish contamination; this represents 60.3 percent of total anglers encountered during all pier outreach activities during this reporting period. *Note that this calculation includes all anglers that did and did not agree to speak.*

Figure 7. Number of Daytime Anglers Reached during Pier Outreach (2022–2024)

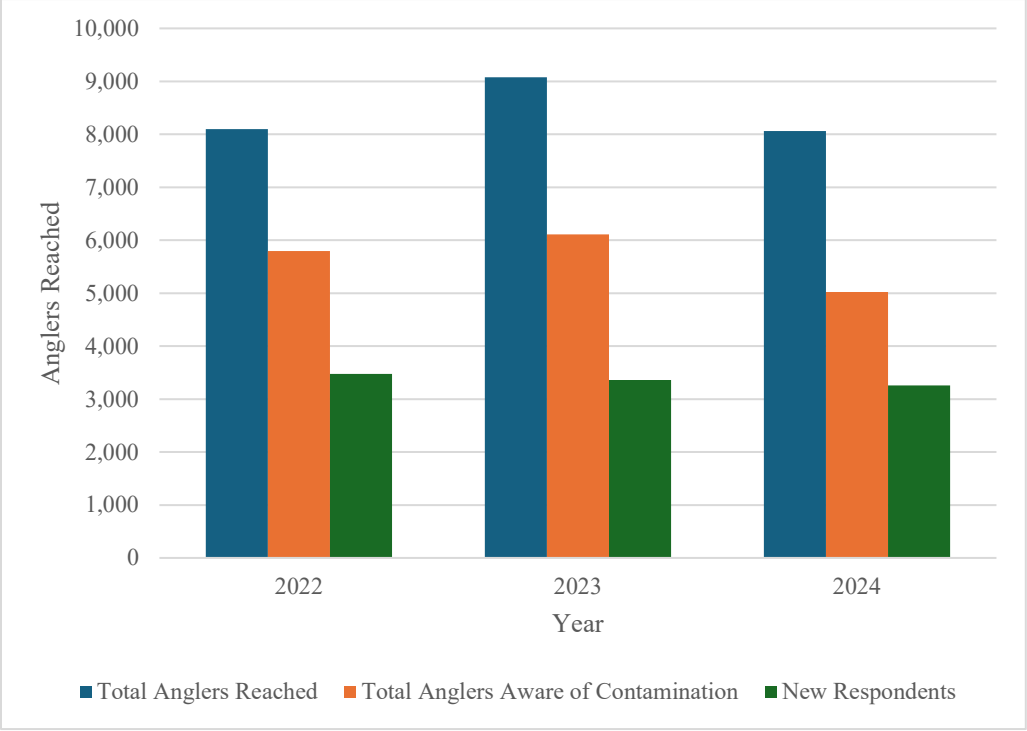
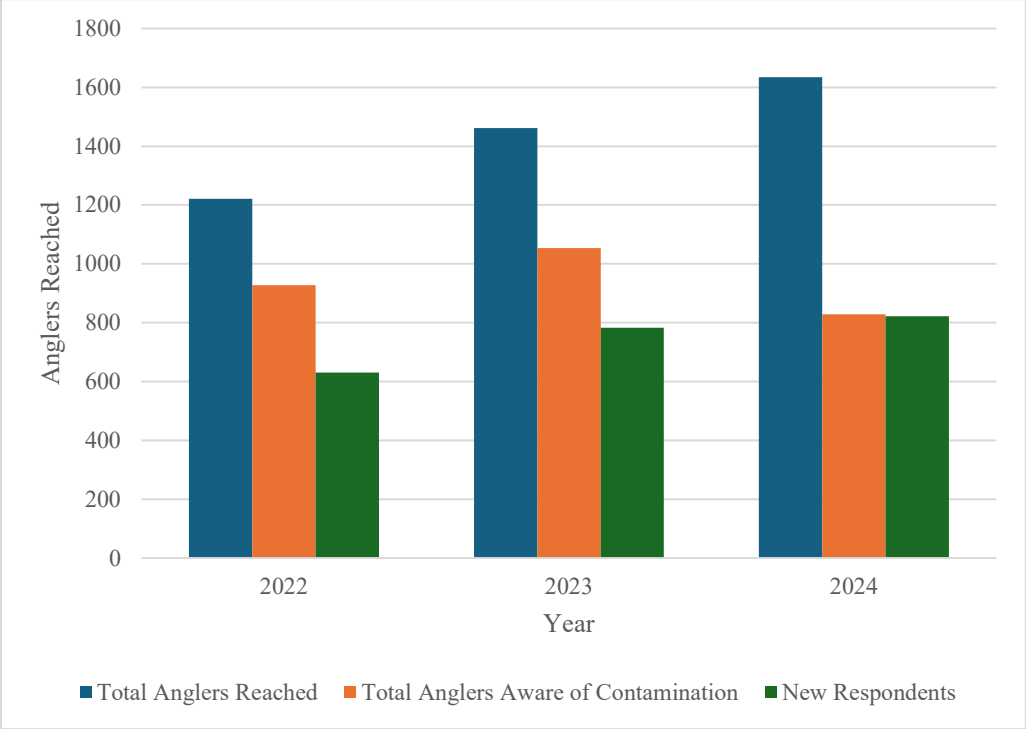


Figure 8. Number of Evening Anglers Reached during Pier Outreach (2022–2024)



5.1.4 Angler Awareness

Angler outreach aims to increase awareness of local fish contamination and fish advisories so that anglers can make informed decisions about the fish that they eat. Data quality concerns related to repeat angler awareness will be resolved as indicated in Section 5.1.6.

Continued pier outreach activities are needed to ensure that new and repeat anglers coming to affected piers to fish are aware of fish contamination that may pose risks to their health. This outreach must include specific discussions of ways to reduce their risk through species selection and safer preparation methods. The information collected from anglers also helps the EPA assess and improve the Palos Verdes Shelf institutional controls program to protect human health while long-term remedies are evaluated. These data are used to track important variables that may impact the success of the program (e.g., trends in fishing activities, languages spoken, and popular fish species caught).

Data from angler outreach and enforcement of white croaker catch bans indicate that anglers are not catching or keeping as many white croaker since reporting began. This indicates that the focused efforts to increase angler awareness of the health risks of consuming white croaker are successful in reducing consumption. However, the enforcement data show that downward trends are not occurring for other DNC fish species. It is important for angler outreach to emphasize the potential health risks of consuming other DNC fish species as well as the white croaker.

Outreach staff at Belmont Pier and Redondo Beach Pier consistently reach the most anglers each year (Figure 9). While Figure 9 shows the annual number of anglers reached at Cabrillo Pier, this data cannot be directly compared to the other pier locations since angler outreach efforts occur approximately twice as frequently at Cabrillo Pier. DBS&A's schedule for angler outreach activities at the eight other pier locations has been tailored to address the difference in outreach frequency and improve data comparability.

Figure 10 presents the percentage of daytime anglers aware of fish contamination for the 2022–2024 period. Note that a subset of the 2024 awareness data has data quality concerns discussed in Section 5.1.2. The declining percentage of anglers at Cabrillo Pier who were aware of the fish contamination may be due to an increase in new anglers visiting the pier. A recommendation during the previous reporting period suggested that program efforts may benefit from conducting outreach on different days and times of the week to engage with different angler populations and raise awareness at those locations. This recommendation was implemented following the transition of outreach activities to DBS&A. The outreach schedule has started testing different days and times of the week to identify periods with higher angler populations, while also aiming to engage angler populations that may have been overlooked in the previous weekend-focused outreach activities. Rainbow Harbor and Hermosa Beach Piers typically reach the fewest anglers each year, with awareness typically recorded among the highest across the nine pier locations.

Figure 9. Number of Daytime Anglers Reached per Pier (2022–2024)

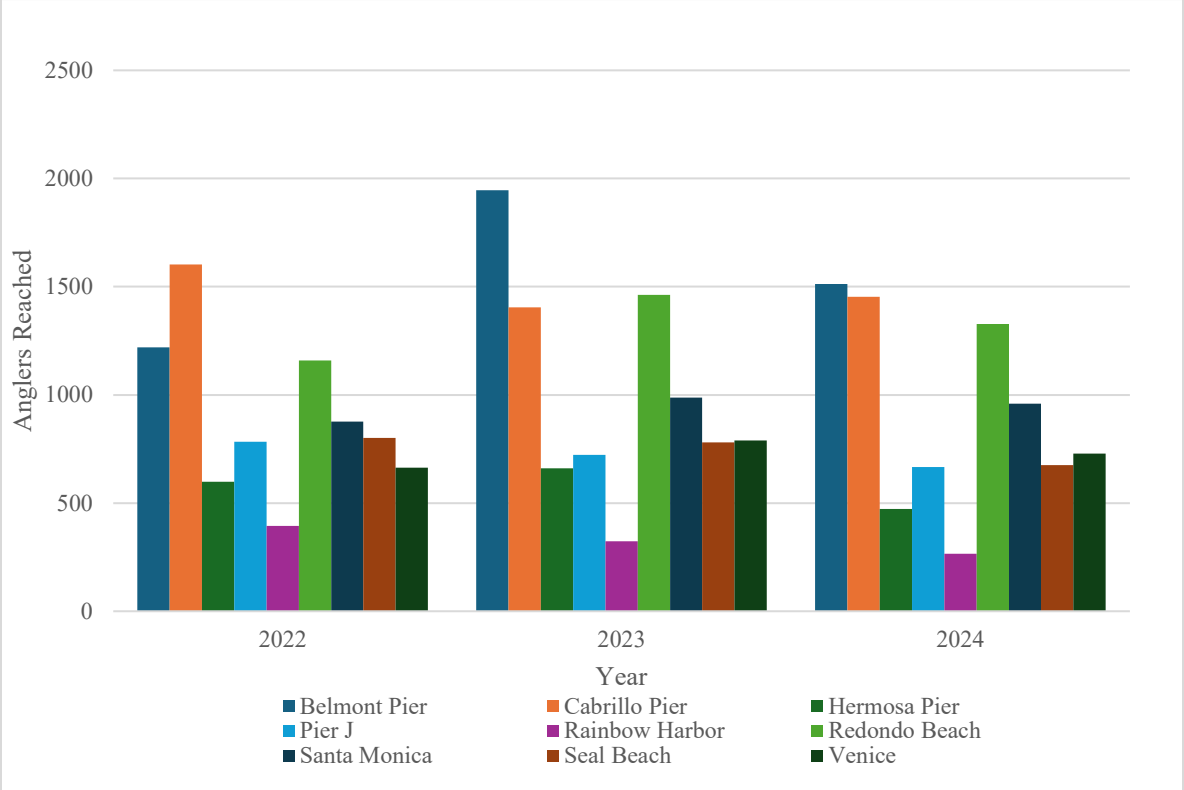
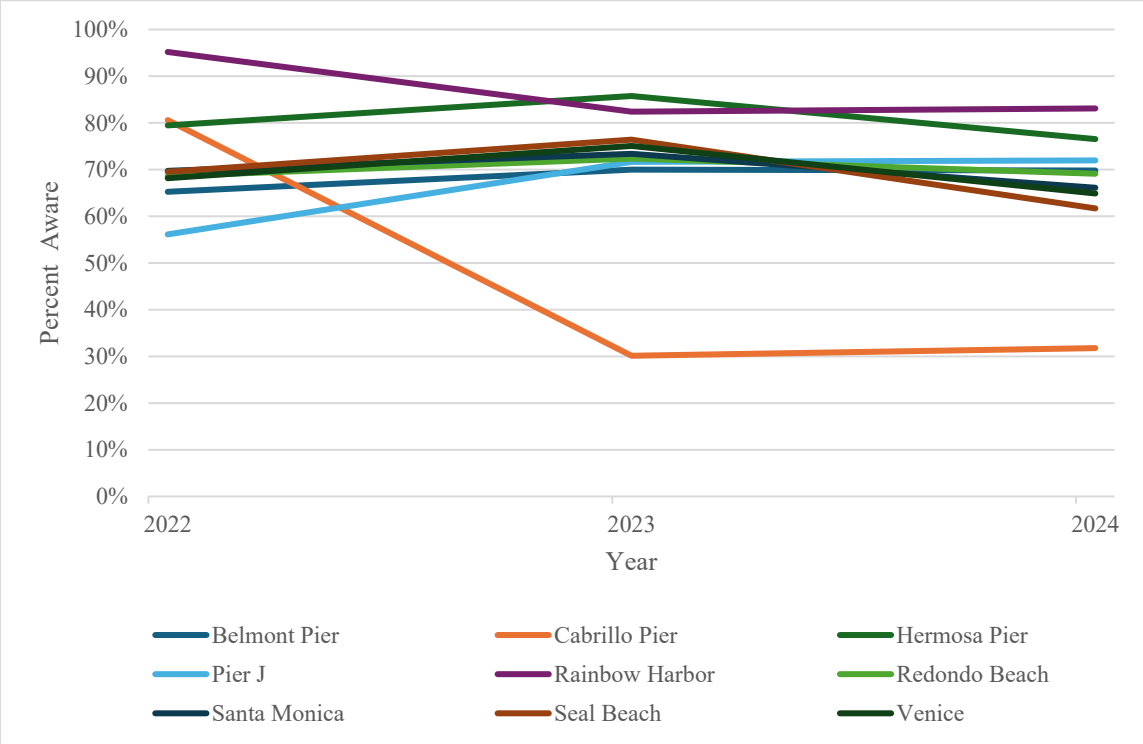


Figure 10. Percentage of Daytime Anglers Aware of Fish Contamination per Pier (2022–2024)



Results show that evening outreach reaches different angler communities and is an important component of educating anglers about local fish contamination. Evening angler outreach at Venice Pier and Redondo Beach Pier has seen an overall increase in anglers contacted since 2022 (Figure 11). Despite the two significant periods of inactive evening angler outreach discussed in Section 4.1.4, the overall number of evening anglers contacted this period was higher than both the previous reporting periods. Evening angler awareness levels have decreased since the 2022 reporting period (Figure 12). It is recommended that the FCEC maintain and improve evening outreach at both Venice Pier and Redondo Beach Pier, with a particular focus on raising awareness about contamination and associated risks. Additionally, the increase in evening angler populations and decrease in fish contamination awareness reporting further support the previous recommendation to add and expand evening outreach to connect with different angler populations. In 5 of 12 months, more anglers were contacted per day during evening outreach than daytime at the two piers where both daytime and evening outreach occur, so increasing the level of evening outreach may be an effective way to reach more new anglers.

Figure 11. Number of Evening Anglers Reached per Pier (2022–2024)

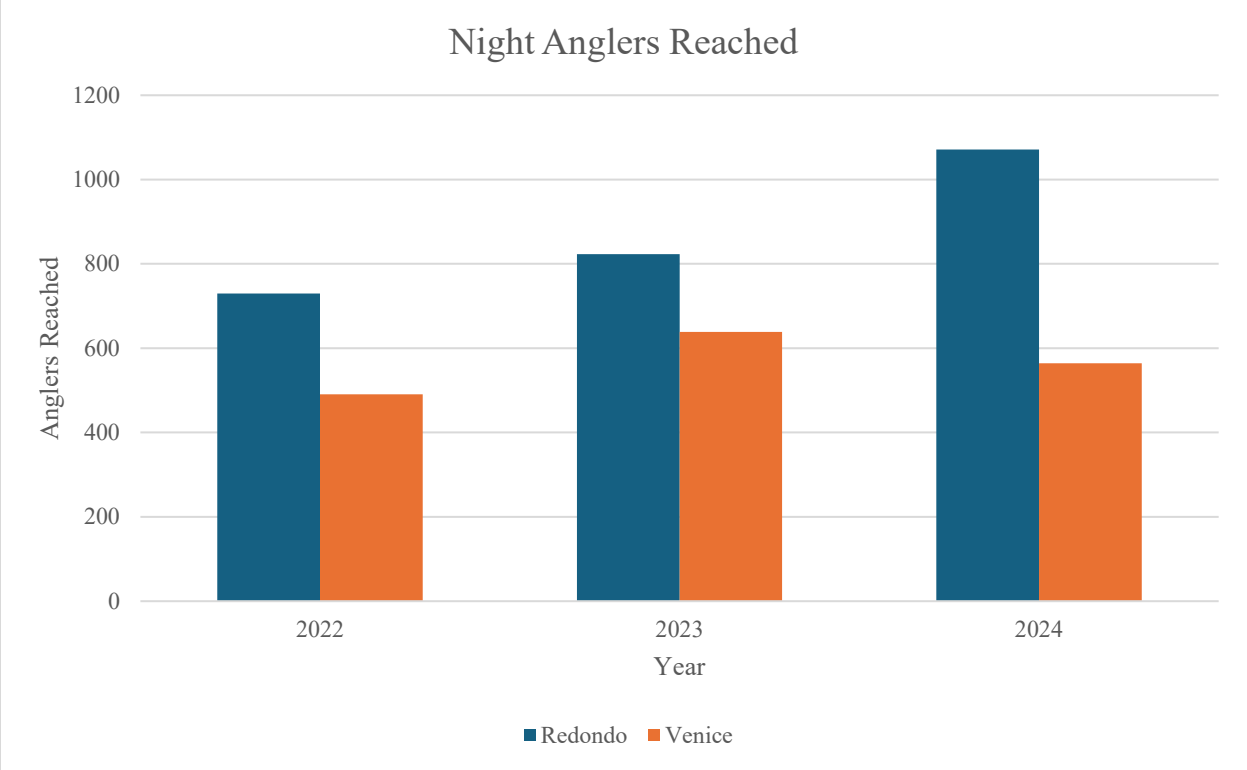
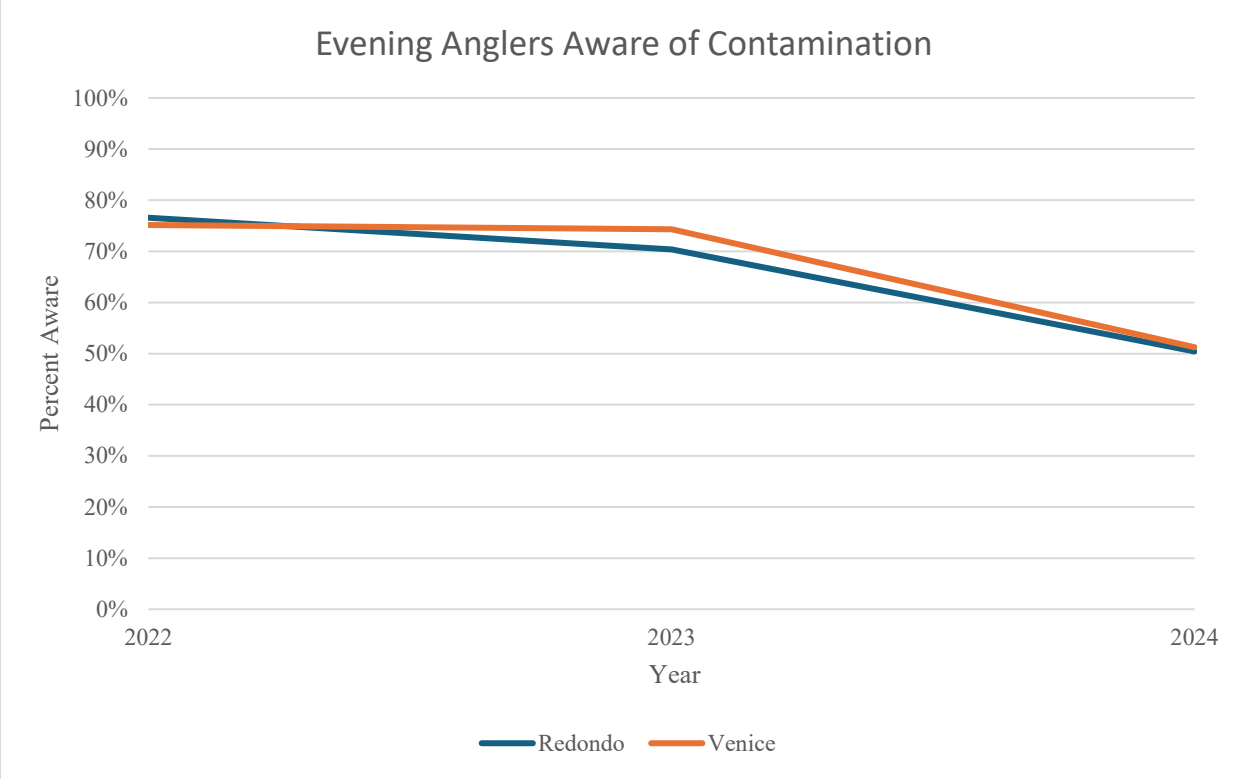


Figure 12. Percentage of Evening Anglers Aware of Fish Contamination per Pier (2022–2024)



5.1.5 Angler Outreach Materials

In 2024, the most common languages spoken by anglers were English, Spanish, Chinese, and Vietnamese. English was the primary language spoken during both day and evening angler outreach. Spanish-speaking anglers were observed during both daytime and evening outreach, with a considerable increase in Spanish-speaking respondents during evening outreach noted since the previous reporting period. During this period, 11 percent of evening anglers spoke Spanish, compared to the previous reporting period, in which no Spanish-speaking anglers were reported during evening outreach. Chinese-speaking anglers were observed during both daytime and evening outreach activities, though in lower proportions than reported last period. The lower proportion of Chinese-speaking anglers may be attributed to the increase in Spanish-speaking anglers. This period's results for evening outreach show a realignment with the evening outreach pilot program results of 2017, in which more Spanish-speaking anglers than Chinese-speaking anglers were reported. Vietnamese respondents were recorded during daytime outreach activities this period in contrast to the previous reporting period; however, Vietnamese-speaking anglers were not observed during evening outreach activities, which is consistent with previous reporting periods. It is recommended that angler language monitoring be continued to better understand fluctuations in the proportions of recorded languages.

Data collected on angler languages are limited to information gathered through bilingual outreach staff and tip cards translated from English into Spanish, Chinese, and Vietnamese. Historically, these results did not indicate if the English responders spoke only English or if they were bilingual or multilingual. While the data indicate that most anglers spoke English, it is

possible that bilingual and multilingual respondents may not have been recorded. During the previous reporting period, it was recommended that the FCEC track the number of bilingual and multilingual anglers by asking anglers to provide their primary and alternative languages. In June 2024, standardization of the outreach tracking formats, including tracking of primary, secondary, and additional respondent languages, was implemented. Reporting of bilingual and multilingual respondents will be included in the next annual reporting period.

The zip code analyses highlight communities that may be more vulnerable to contamination through the consumption of fish with elevated levels of PCBs and DDT. The data show that most anglers are coming from local communities in south Los Angeles County (Figures 5 and 6). The spatial distribution for daytime anglers differed from that of evening anglers, which shows more daytime anglers travel from inland communities further from the coast. Most anglers fishing in the evening were from Los Angeles County. Overall, the angler zip code data provide important inferences about communities that may be more vulnerable to fish contamination. These data help identify areas on which to focus for community events and bait shop outreach to educate people that may be eating contaminated fish. It is recommended that the FCEC continue to collect these data to inform other areas of the institutional controls program.

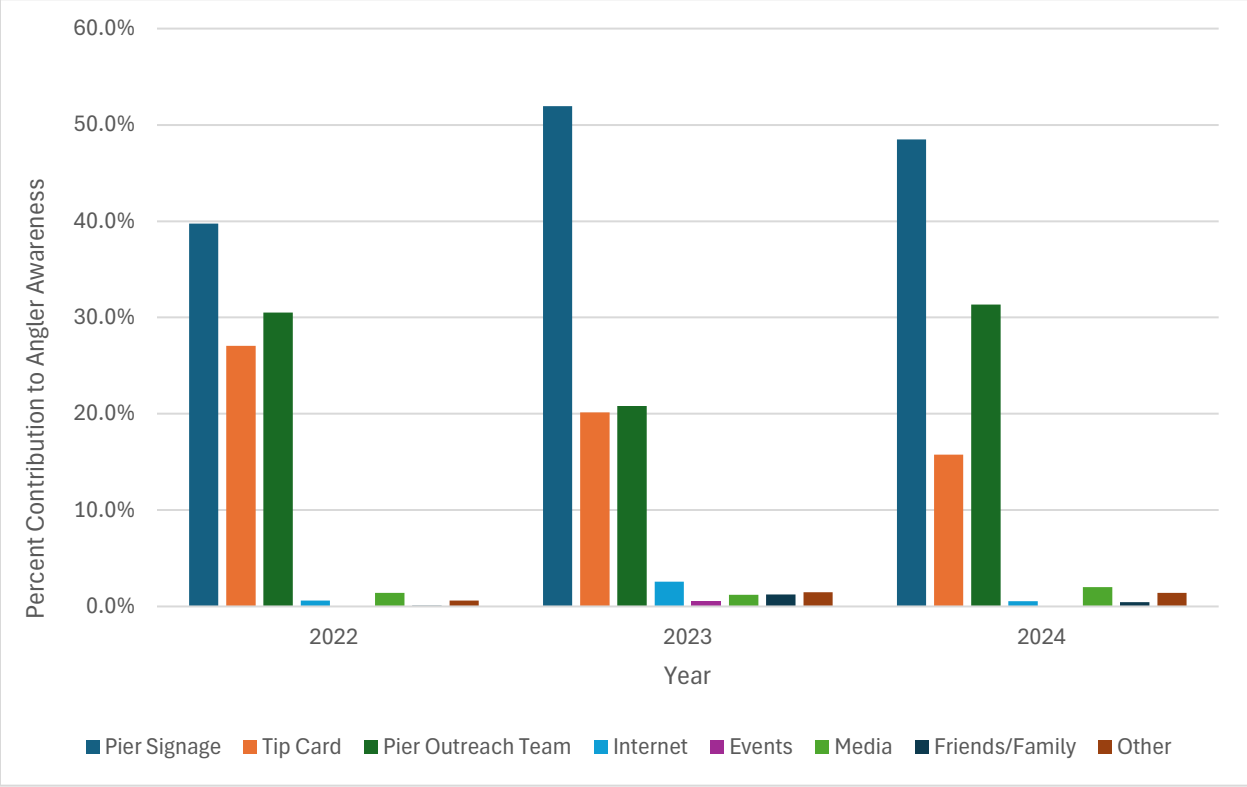
The incidence of anglers catching fish species on the DNC list has been documented and indicates that DNC fish species are being caught less often than those known to be safer to eat when consumed in recommended weekly servings with appropriate portioning. The recorded number of fish caught by anglers this period was less than was reported during the previous period. This may be due to anglers not reporting catches to new outreach personnel. Fish species tracking is dependent on the willingness of anglers to share this information as well as the outreach team's consistency with inquiring about and recording this information during angler conversations. Annual outreach personnel training activities reinforce the importance of consistent data gathering and include ways to improve engagement and rapport with anglers. It is recommended that tracking of fish species is continued in support of the goal of encouraging behavior changes to reduce human exposure to PCBs and DDT. This data will continue to be included in future reports. It is anticipated that increasing public familiarity with outreach staff, providing staff IDs linked to the FCEC, and using electronic forms during angler outreach will help the EPA better assess trends in fish species caught and kept by anglers fishing from the piers.

The DNC warning signage, tip cards, and outreach team were most effective at increasing pier angler awareness of fish contamination from the Palos Verdes Shelf. As noted in Section 4.1.3, the tip cards and outreach team are closely connected, as the outreach teams consistently distributed the tip cards during their activities. This close relationship makes it challenging to link angler awareness of risks associated with consumption of DNC tissue to these sources independently, as inquiring about them may bias the responses. However, the strong correlation between the two sources suggests that active angler outreach efforts have led to higher overall awareness. As a recommended improvement to the outreach team efforts, they will receive training on the importance of specifically documenting instances where an angler received outreach materials, and outreach data collection forms will be modified to prevent any association of having received the materials equating to knowledge of risks associated with DNC fish consumption.

The FCEC finalized new designs for both the tip card and the DNC signage during this reporting period. The new tip card design features updated information about PCBs and DDT, highlights safer fish options based on commonly caught local species, and provides guidance on reducing potential exposure through various cooking methods and by eating only skinless fillets. Additionally, the new tip card includes a QR code for easier navigation to more information online at www.pvsfish.org. Translation of tip cards into Spanish, Chinese, and Vietnamese was also finalized this period. The EPA introduced the new tip card design through FCEC outreach activities in late 2024. Additionally, the EPA plans to replace the old DNC signage at piers where angler outreach activities are routinely conducted with the new DNC sign design in 2025. Updates to other outreach materials are planned for 2025. The goal of redesigning and updating these materials is to ensure that the public can easily access information about fish contamination and resources to stay informed about FCEC activities. Ultimately, this will improve outreach efforts and angler awareness of fish contamination.

For reporting periods ending in 2022, 2023, and 2024, Figure 13 summarizes the annual percentage of anglers who learned about fish contamination from each outreach material source. The percentage is representative of both daytime and evening anglers combined. Anglers have consistently attributed their awareness of fish contamination to DNC signage more often than to the other outreach material sources.

Figure 13. Sources of Information that Contributed to Angler Awareness of Fish Contamination (2022–2024)



5.1.6 Angler Outreach Recommendations

In the short term, it is recommended that the EPA continues Palos Verdes Shelf angler outreach at the nine fishing piers located within the contaminated sediment area between Santa Monica Pier and Seal Beach Pier (Figures 1 and 2). It is especially necessary to continue the level and type of outreach performed for white croaker, which data shows has been effective. However, the FCEC should plan to reevaluate the currently programmed pier angler outreach locations and determine if there are changes needed to better reach anglers more effectively. For example, it would be beneficial for the FCEC to reevaluate outreach frequency at Rainbow Harbor, which has consistently reported low numbers of anglers and high levels of awareness, as well as consider adding other recreational fishing locations not currently receiving outreach.

The 2023–2024 Annual Enforcement Report details the efforts of California Department of Fish and Wildlife wardens to enforce the white croaker catch ban and educate recreational anglers and commercial fisheries on the risks of fish contamination. The report identifies several piers and beaches where California Department of Fish and Wildlife wardens have encountered DNC fish, yet which are not among the nine fishing piers focused on by the AOP teams. These sites are a good starting point for consideration of where new outreach locations may be effectively added to the program.

Data Quality

To specifically prevent the identified data quality issues with angler awareness (detailed in Section 5.1.2), the following are recommended:

- Provide outreach personnel with specific engagement training to help reduce the potential for introducing bias or assumptions in data collection, and provide clear messaging and outreach question formats geared toward achieving data completeness and accuracy. This could include onboarding and annual refresher trainings that educate staff about how data should be recorded on the tally sheets and the importance of accurate reporting to inform program decisions.
- Outreach staff will ensure that all data recorded on the AOP tally sheet comes directly from the anglers in response to a direct question from the AOP team.

Electronic Angler Outreach Forms

To aid in a programmatic goal of reaching more anglers annually, and to better understand outreach and educational needs, it is recommended that the AOP team transition to the use of electronic forms (e-forms) during outreach with standardized data fields. E-forms would allow all metrics to be analyzed in real-time and provide opportunities for more consistent evaluation and management of the following:

- Analyzing data for annual reporting
- Recording the number of minutes outreach staff are spending with each angler
- Identifying the piers that would benefit from more outreach materials in specific languages

- Geotagging locations on the pier where anglers are fishing to better decide where to install DNC signage
- Predicting which, if any, demographics or pier locations are more likely to report "catch and release" or retention/consumption of catch
- Collecting geolocated photographs
- Tracking health and safety

EPA and FCEC Actions

Upon starting angler outreach, the DBS&A team provided feedback that having a program ID would aid in the development of trust and rapport with members of the public while performing outreach activities. It is recommended that outreach team members be provided with a lanyard style badge that includes the FCEC logo and title of "Outreach Educator" to alleviate angler concerns about who the outreach teams represent.

AOP Team Actions

Ensuring outreach team members possess the skills and knowledge necessary for successful community engagement and education is necessary to support the goal of increased fish contamination awareness and reduce health risks. Establishing rapport and trust with individual anglers encourages changes in behaviors that reduce risks associated with exposure to fish contamination, and helps alleviate angler hesitancy while interacting with the outreach teams. Outreach teams have received feedback from oversight activities, and are correcting data quality issues to ensure they are collecting unbiased data and asking questions to avoid assumptions. In some cases, outreach staff were unable to record all answers due to engaging in an ongoing conversation, and getting responses from anglers that are inconsistent and do not fit within the paper form's allotted fields.

5.2 BAIT SHOP OUTREACH

Two bait shop outreach events were conducted during this reporting year, one in December 2023 and one in July 2024. These outreach events successfully restocked the bait shops and retail locations, listed in Section 4.3, that requested additional FCEC educational outreach materials. Prior to the December 2023 bait shop outreach event, the EPA established four new locations for outreach to bring the total number of bait shops and retail locations participating in the outreach program up to the goal of 40 shops. During the July 2024 outreach event, every bait shop location requested additional tip cards in various languages, demonstrating that distribution of outreach materials through local bait shops is an effective way to disseminate educational materials to angling communities. Following the July 2024 outreach efforts, 40 shops continue to actively participate in the program, meeting the program objective of maintaining 40 shops total. Overall, the identification and tracking of bait shop turnover continues to be effective.

5.3 ELECTRONIC OUTREACH

Electronic outreach was limited to distributing the semi-annual e-newsletter to FCEC partners and referring people to the www.pvsfish.org website during angler and community outreach events. It is recommended that the FCEC continue to update the www.pvsfish.org website, especially as QR codes have been added to new outreach materials that will connect the public directly to the website and various outreach materials. Establishing the www.pvsfish.org website as an extension of the outreach materials provided to the community may promote education and awareness efforts. Additionally, it is recommended that updates to the Frequently Asked Questions and local advisories sections be completed, as well as format and layout changes to the home page be implemented to include clear directions to the resources available on the site.

5.4 COMMUNITY EVENT OUTREACH

Community events remain an effective way to reach community members with a health risk potential related to consumption of contaminated fish. Outreach partners are actively researching events that would increase the efficacy of the FCEC outreach program and provide important information about fish contamination to impacted communities. The EPA utilizes the zip code analyses to help inform decisions and approvals of community outreach events based on event locations relative to known higher angler populations. Despite community events being one of the least influential awareness sources among pier anglers, community events provide an opportunity to educate vulnerable communities that may not participate directly in subsistence or sport fishing practices, yet may still be consuming fish caught from the Palos Verdes Shelf. It is recommended that community outreach partners continue to collaborate with other community organizations to diversify events and reach more anglers and their families in the Los Angeles area, including children and Spanish, Chinese, Vietnamese, and African American communities. Additionally, the outreach program may benefit from participating at events aimed towards the angling community and their families.

Community partners continue to display sign-in sheets at community events; however, the FCEC developed a QR code that allows event attendees to sign up for the semi-annual newsletter online and also connects them with the www.pvsfish.org website for more information about the Palos Verdes Shelf Superfund Site. Displaying the QR code at outreach events is more effective than using handwritten sign-up sheets as it eliminates the step of transferring handwritten information, which is often difficult to decipher, into electronic mailing lists. Additionally, users are able to download electronic outreach materials, review the event calendar for upcoming outreach activities, and access local advisories, frequently asked questions, and FCEC contact information. Previous sign up sheets and current QR code use by community members is not currently tracked or evaluated for any part of the PV Shelf outreach program.

The “What’s the Catch” children’s comic book and the fishing game activity have been successful at attracting families to the FCEC booth. During this reporting period, new Booth in a Box display materials were provided to outreach partners (tablecloths and logoed table runners), and replacement fishing game fishing poles were distributed to outreach partners.

The fishing game fish poles were outfitted with stronger magnets to improve the ability of users to catch the larger stuffed fish that are part of the game. Outreach partners have reported that the new magnets for the fishing game's poles have improved the ability to catch the larger stuffed fish. However, the wire frame of the basket from which the fish are caught is still intermittently interfering with game play. It is recommended that an alternative fishing game basket be explored to minimize interruptions to game play due to magnets sticking to the basket frame. It is also recommended that the fish species that are a part of the game should include the five DNC fish species and the safer to eat fish species listed on the updated tip card. In addition, it is recommended that the FCEC restore and replace the remaining fishing game components (e.g., magnetic stuffed fish, fish species represented, and fishing baskets). Additionally, the FCEC should consider updating the FCEC Booth in a Box content (e.g., displayed posters and messaging).

Connecting with educators may be an effective way to educate children about local fish contamination to help increase the visibility of the FCEC program. It is recommended that the FCEC engage with Los Angeles County Unified School District to establish potential opportunities for educators to utilize the FCEC curriculum guide. Additionally, the FCEC should consider asking the school district to include FCEC QR codes for online outreach materials and/or the FCEC semi-annual newsletter in their district communications to the public (e.g., school and district newsletters). During previous reporting periods, staff from the Aquarium of the Pacific in Long Beach and Los Angeles County Zoo expressed interest in collaborating with the FCEC to produce permanent displays about Palos Verdes Shelf fish contamination. Additionally, a Los Angeles Parks superintendent previously expressed interest in having the FCEC participate in more children's educational events. These recommended new avenues for expanding community outreach can be evaluated by the FCEC and EPA during future meetings.

5.5 FISH CONTAMINATION EDUCATION COLLABORATIVE PARTNERS MEETINGS

The most recent FCEC meeting was held on17 April 2024 and was attended by 19 partners representing the EPA, state and local agencies, non-profit organizations, and local community groups. Topics included EPA program updates, updates on pier angler outreach activities, community outreach events, enforcement activities, and discussions regarding outreach material redesign efforts and goals. The hybrid format allows more FCEC partners to attend regular meetings. The EPA recommends continuing hosting hybrid FCEC events while encouraging in-person attendance, when possible, to maximize collaboration among the stakeholders. The next FCEC meeting will be held on Thursday, December 12, 2024.

End Document