

Posting Fish Consumption Advisories



*A Model Protocol of Steps and Best-Practices to Plan and Execute a Volunteer Event
to Post State-Issued Fish Consumption Advisories*

October 2017 Update





ABOUT THE SIERRA FUND

The Sierra Fund (TSF) is a nonprofit community organization dedicated to working in the spirit of service to the Sierra Nevada. We use the tools of science, policy, outreach and capacity building to pursue our mission to protect and restore ecosystem and community resiliency in California's headwaters.

Since 2006, The Sierra Fund has worked to identify, articulate, assess and implement ways to address the lasting cultural, environmental and human health impacts of California's Gold Rush. For the last decade we have been overwhelmingly successful in characterizing the problem, involving the community, and raising public awareness. In 2008 we released *Mining's Toxic Legacy*, the first comprehensive report detailing the impacts of historic mining, data gaps, and recommendations for action. Since then, we have conducted educational presentations in all 22 counties of the Sierra Nevada, held a biennial Reclaiming the Sierra (RTS) conference to convene experts and stakeholders, and released scientific studies to show the extent of contamination and human exposure. Key studies include our *Gold Country Recreational Trails and Abandoned Mines Assessment* (2010), *The Gold Country Angler Survey* (2011; update to be released in 2018), *Environmental Health Outreach Program Report* (2014), and *Humbug Creek Watershed Assessment and Management Recommendations* (2015). Copies of these documents as well as more information about our work may be obtained online at www.sierrafund.org or by contacting The Sierra Fund directly.

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Overview

Mercury is a contaminant prevalent in aquatic ecosystems across the United States (Herger and Edmond, 2012; Wentz et al., 2014). In a methylated form it has the capacity to enter the food web, both biomagnifying and bioaccumulating as it moves up through the trophic levels (Davis et al., 2007; May et al., 2000; State Water Resources Control Board (SWRCB), 2010; Wentz et al., 2014; Wiener and Suchanek, 2008). In the state of California, watersheds in regions where historic mercury or gold mining activity occurred are especially impacted by mercury, with many listed as impaired for mercury under Section 303(d) of the Clean Water Act (Central Valley Regional Water Quality Control Board (CVRWQCB), 1998; SWRCB, 2010). Data indicate that some fish in mining impacted regions can have very high levels of mercury (>1 ppm) in their tissue, potentially posing a threat to public health (May et al., 2000). Consumption of contaminated fish is the main route of human exposure to mercury (Carrasco et al., 2011; Engelberth et al., 2013; Lepak et al., 2009; May et al. 2000; Wiener and Suchanek, 2008). Providing fish consumption advice through state-issued advisories is a strategy used by public health agencies to limit human exposure to mercury-contaminated fish.

In 2015, The Sierra Fund (TSF) launched our “Post It Day” project to ensure that state-issued fish consumption advice is posted at applicable Sierra Nevada water bodies in SWRCB Region 5. The project specifically sought to remedy the lack of accessible information about mercury in locally caught fish in the Yuba and Bear River watersheds, while creating a model protocol that can be replicated in other mercury-impacted areas of the Sierra Nevada and California as a whole. Over the last three years, TSF’s Post It Day Project has used an innovative approach to inform and involve stakeholders in Grass Valley and Nevada City to participate in a volunteer event resulting in the posting of state-issued fish consumption advisories at the locations where people are fishing. Since 2015, 60 volunteers have directly posted nearly 100 locations at over 20 water bodies in five watersheds. Of these, nine target waterbodies have been posted with advice in both Spanish and English.

The following document outlines a model protocol for posting fish consumption advisories issued by the California Office of Environmental Health Hazard Assessment (OEHHA) based on the results of this project. This document quantifies the results of the efforts and analyzes lessons learned. It makes step-by-step recommendations for implementing the protocol, and suggests the appropriate level of implementation. This document has been posted online at The Sierra Fund’s website and has been distributed digitally to organizations, tribal leadership and local government officials, as well as local agencies (environmental health and planning offices) in other areas of the Sierra Nevada that are facing a similar problem with mercury-contaminated water bodies.

Background

Mercury in California

In contrast to the Eastern United States, where mercury is associated with coal-based energy generation, in California, past gold and mercury mining activities constitute the primary source

of mercury in the aquatic environment (Davis et al., 2007; Lim et al., 2013, p. 7; Domagalski, 2001). Of the nine regional water quality boards in California, Region 5 (Central Valley Regional Water Quality Control Board) is the most significantly impacted by legacy mining activities and lakes with high mercury levels in bass have been found primarily in this region (Lim et al., 2013). At the height of the California Gold Rush, gold processing was the primary use of mercury in the United States (Wiener and Suchanek, 2008). Much of the 26 million pounds of mercury that was used in gold mining operations in California was lost to the environment (Alpers et al., 2005; Churchill, 1999; Wentz et al., 2014). The rate of mercury loss during gold processing has been estimated to be 10 to 30 percent per season and, as a result, mine sites are often associated with contaminated sediments (Alpers et al., 2005). All told, as much as 6,000 metric tons of mercury was lost to the California environment during legacy mining activities (Wentz et al., 2014, p. 33). See Figure 1.

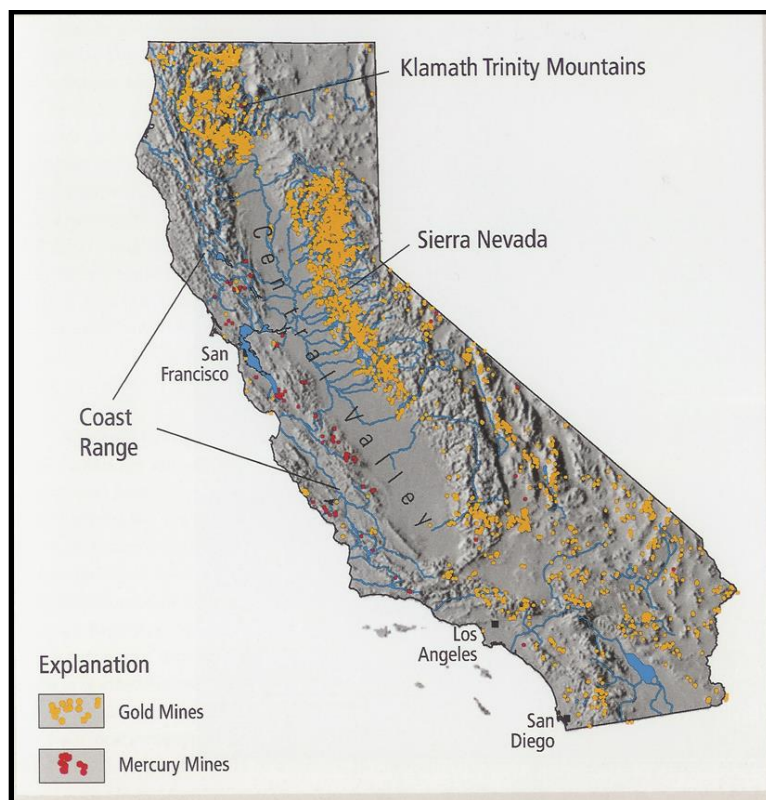


Figure 1: Map of Legacy Gold and Mercury Mines in California: Mercury mines occur primarily in the Coast Range. Mercury was imported to the Sierra Nevada for use in processing at gold mines. Map Source: USGS Fact Sheet 2005_3014_v1.1.

Within the state of California, numerous abandoned mine sites continue to release mercury-contaminated sediment in the present day (Wentz et al., 2014; Wiener and Suchanek, 2008; California Department of Conservation (CDOC), 2000). There are hundreds of mines, mine features (including tunnels, adits, tailing sites, and debris control dams), and sediment deposits in watersheds that have yet to be assessed or cleaned up (Davis et al, 2007). Many of California's lakes, rivers, and reservoirs are impacted by mercury and many water bodies with fish consumption advisories are in mining-impacted systems (Davis et al. 2008; Lim et al., 2013;

Wiener and Suchanek, 2008). Research has found that there is a positive correlation between mercury bioaccumulation in aquatic ecosystems and the intensity of historic hydraulic mining (Alpers et al., 2017; Hunerlach et al., 1999).

Fish consumption represents the primary pathway for human exposure to mercury in most populations (Carrasco et al., 2011; Engelberth et al., 2013; Lepak et al., 2009; May et al., 2000; Wiener and Suchanek, 2008). Consequently, accurate and abundant fish tissue data are key to assessing exposure risk. In the United States, mercury contamination is the reason for the vast majority of fish and wildlife consumption advisories (Wentz et al., 2014; Wiener and Suchanek, 2008). In 2006, mercury was responsible for 80%, or 3,080, of all fish consumption advisories posted in the U.S. (Wiener and Suchanek, 2008).

Mercury and Human Health

Mercury is a developmental neurotoxin with human health impacts that are numerous and well-documented (Adams and Denton, 2008; OEHHA, 2008; Lepak et al., 2009; Lim et al., 2013; Wentz et al., 2014; Wiener and Suchanek, 2008). Exposure to mercury is linked to adverse outcomes that can include damage to the brain, nervous system, kidneys, immune system, and cardiovascular health (Engelberth et al., 2013; Stern and Korn, 2011). Methylmercury exposure is especially dangerous for pregnant women because the compound easily passes through the placenta and the blood-brain barrier (Adams and Denton, 2008). The effects of mercury exposure most frequently cited are neurological impacts on fetuses during the third trimester (Wentz et al., 2014). Children whose nervous systems are still developing are also considered sensitive populations for mercury exposure (OEHHA, 2008; Lepak et al., 2009; Lim et al., 2013; Wiener and Suchanek, 2008). As such, concerns about methylmercury exposure tend to focus on the potential for neurotoxicity during fetal and early childhood development (Lepak et al., 2009; Wiener and Suchanek, 2008).

Fish Consumption Advisories

One public health strategy to reduce mercury exposure is fish consumption advisories. Fish consumption advisories delineate parameters for the safe consumption of fish based on the level of contamination. Advisory information is communicated in terms of species, demographic group, and the recommended maximum number of meals of mercury-contaminated fish species that can safely be eaten per week or month. Advisories can be “an important management tool because adverse health consequences can be averted while avoiding potentially large clean-up costs” (Jakus et al., 1998, p. 1019). However, “advisories are considered voluntary recommendations regarding fish consumption and are not subject to regulation” (Scherer et al., 2008, p. 1604). Furthermore, some research suggests that even where advice is posted it may not have the intended impact because “many anglers and fish consumers are not knowledgeable about risk messages, advisory content rationale, or suspected health risks” (Beehler et al., 2003, p. 100).

Due to the fact that the populations with the greatest mercury exposure risk are fetuses and children under 18 years of age, the consumption guidelines are more restrictive for children and women of childbearing age. Data on children were used to provide the scientific basis for

the current chronic reference dose (RfD) for methylmercury that was developed by the United States Environmental Protection Agency (USEPA) (IRIS, 2001; Wentz et al., 2014). A chronic reference dose is “an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure for a chronic duration (up to a lifetime) to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime” (IRIS, 2011).

Other at-risk groups include Native Americans, anglers (individuals who fish regularly for subsistence or sport), and ethnic minorities (in particular Asian populations). These groups “often have rates of fish consumption many times higher than that of the general United States population, making them more vulnerable to exposure from this pathway” (Judd et al., 2015, p. 2428). Furthermore, subsistence fisherman may have fewer options for obtaining healthy protein sources and may rely on supplementing their food budget with locally caught fish. Recently it has been suggested that the inability of California Native American tribes to safely consume fish in historic quantities due to mercury contamination may constitute a violation of the Clean Water Act because these populations are being prevented from enjoying the full designated beneficial use-values of their local water bodies (Shilling et al., 2014). In fact, the existence of state-issued fish consumption advisories should be taken as an indication that pollutants are having an impact on the fishing beneficial use of water bodies in California (Davis et al., 2007).

In July 2017, the USEPA and the State Water Resources Control Board (SWRCB) strengthened protections for populations with high rates of fish consumption by passing new statewide water quality objectives to limit mercury in fish tissue with the goal of protecting human health and that of fish-consuming wildlife. The standards designate three specific beneficial use categories to account for tribal cultural, tribal subsistence, and non-tribal subsistence fishing.

Within the state of California, OEHHA is the public health agency responsible for the development of fish consumption advisories. When developing fish consumption advisories based on mercury, OEHHA compares mercury concentrations (often the arithmetic mean) in fish tissue for each species (by species) to the Advisory Tissue Levels (ATLs) for methylmercury (OEHHA, 2008). ATLs “provide a number of recommended fish servings that correspond to the range of contaminant concentrations found in fish and are designed to prevent consumers from being exposed to more than the average daily reference dose for non-carcinogens” (OEHHA, 2008). Most advisories that OEHHA issues are for a specific site, such as a bay, river, or reservoir. OEHHA issues site-specific fish consumption advisories for water bodies with sufficient fish tissue data. Site-specific data are preferred in developing fish advisories because they more accurately represent the conditions of a water body, its fish species population, and their contaminant concentrations.

OEHHA has also issued a Statewide Advisory for Eating Fish from California’s Lakes and Reservoirs Without Site-Specific Advice (the “Statewide Advisory”). The Statewide Advisory applies to all lakes and reservoirs that lack sufficient data, or have yet to be evaluated. It was developed using samples from hundreds of water bodies across the state where advisories had not been issued at that time (Lim et al., 2013). Because of the uncertainty related to the mercury levels in fish caught from these water bodies, OEHHA used a more health-protective

approach in developing the Statewide Advisory, and developed advice using the 90th percentile value of the mean mercury concentration in fish tissue rather than the average (Lim et al., 2013). See Figures 2 and 3 for the Statewide advisory and an example of a site-specific advisory issued by OEHHA.

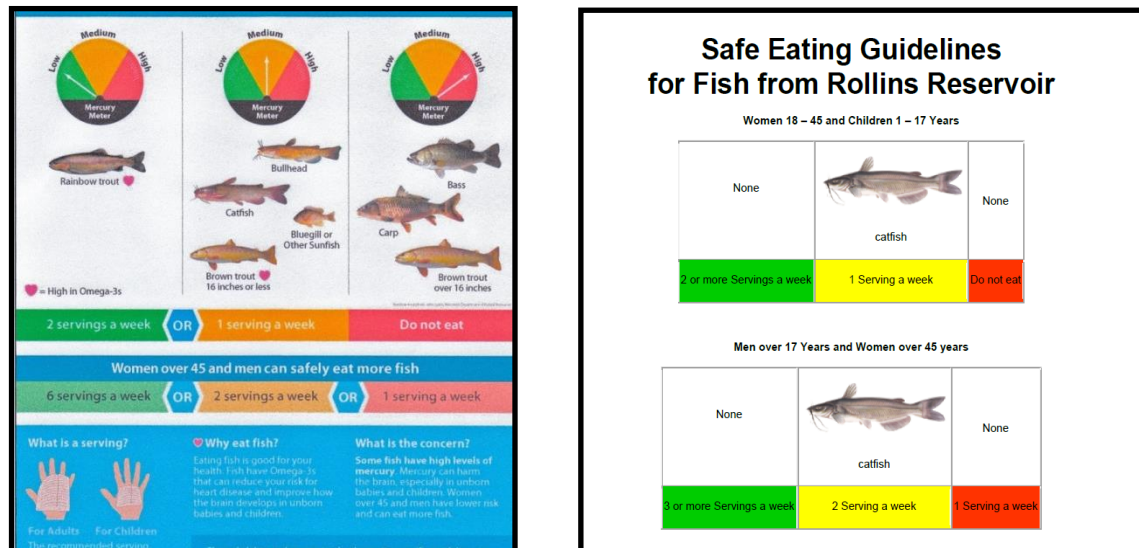


Figure 2 (l) Statewide Advisory and Figure 3 (r) Site-Specific Advisory: The Statewide Advisory (l) developed by OEHHA applies to all California lakes and reservoirs that lack site-specific advice. Site-specific advice has been issued for Rollins Reservoir (r), however, there were only sufficient data for advice to be issued for one species, Catfish. Figure Source: <https://oehha.ca.gov/fish/advisories>.

The Post-It Day Project

Angler survey research conducted by The Sierra Fund indicates that in the Gold Country, mercury-contaminated local water bodies are frequented by anglers who consume their catch and feed it to their families (The Sierra Fund, 2011). Sierra Nevada anglers may be at risk for mercury exposure due to a lack of access to key information. This information gap hinges on the fact that no water body owner or operator is required to post the state's advice. The Sierra Fund's "Post-It Day" event, launched in 2015 with funding from the CalEPA Environmental Justice Small Grants Program, aims to raise public awareness about the dangers of consuming mercury-contaminated fish and increase the amount and accessibility of information on local fish consumption. This event consists of an annual one-day volunteer led effort to post state-issued fish consumption advisories at local water bodies where they apply.

The overarching goal of the project is to provide anglers with information about the three critical components of fish consumption advisories: (1) species of fish being consumed; (2) population group consuming the fish (women 18 to 45 years (typically considered childbearing age) and children 1 to 17 years; and women over 45 years and men); and (3) frequency of consumption. Anglers who have access to and understand fish consumption advisories are armed with the tools that they need to enjoy low-mercury local fish as a healthy addition to their diet.

The core activities conducted as part of the Post-It Day project were specifically designed to be achieved by community-based organizations. Nevada County, where this pilot project was launched, has a history of citizen-based activism around environmental issues. Thousands of residents have stepped up to advocate for Wild and Scenic status for local rivers, to save state parks, and to participate in annual river clean-ups. However, despite the engagement of the local environmental activist community, the threats to public health and the environment that result from mercury from historic mining have until recently not been acknowledged. Collaboration between four community-based organizations (The Sierra Fund, South Yuba River Citizens League, Wolf Creek Community Alliance, and Sierra Native Alliance) has both increased the number of stakeholders able to articulate and use accurate information about local fish consumption, and strengthened local commitment to addressing mercury contamination of publically accessible water bodies.

Over three years the Post-It Day pilot project resulted in over 200 fish consumption advisory signs directly posted, over 100 fish consumption advisory signs delivered to water body owners and operators for internal posting, the translation of five regional site-specific advisories into Spanish, and the development of a model posting protocol that can be adopted locally and in other communities. The eight step model posting protocol is described below. Methods for increasing the available information on mercury in fish through the development of targeted educational materials are described beginning on page 17. The outcomes of The Sierra Fund's three consecutive years of Post-It Day events (2015 - 2017) and related fish mercury projects are quantified and evaluated in the final section of this document. Best practices and lessons learned are described and recommendations are made for implementing this protocol to post state-issued fish consumption advisories in other regions of the state.

Protocol

Introduction

This protocol is intended for water bodies that are Clean Water Act 303(d) listed as impaired for mercury and for which the Office of Environmental Health Hazard Assessment has issued site-specific fish consumption advice or are included under the Statewide Advisory. The protocol provides direction for organizations interested in coordinating and executing one-day volunteer events to post a large number of popular fishing locations with applicable fish consumption advice.

CWA 303(d) list status can be checked here:

https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2012.shtml

OEHHA fish consumption advisories can be checked here:

<https://oehha.ca.gov/fish/advisories>

STEP 1: Identify Partners and Contact Key Stakeholders

Identify partners and contact key stakeholders in advance to provide broad, community-based support for the project. The first step is to identify project partners and key stakeholders. Efforts to post-state issued fish consumption advisories may appeal to organizations that address watershed issues, public health, environmental justice, water recreation and fishing. These individuals and groups should be contacted at the initiation of the project so that they are empowered and involved from the outset. Efforts should be made to identify and include vulnerable populations and those who serve them in the dialogue (for example health care professionals serving families, local fishing clubs, and Tribal leaders). These groups likely already have a distinct community base from which event volunteers may be recruited. To this end, it is prudent to include at least one membership-driven organization to enable effective volunteer solicitation.

Key Outcomes: A diverse contingent of partners and stakeholders who are supportive of the project.

STEP 2: Identify Posting Locations

Collaboratively identify posting locations with project partners and key stakeholders. Stakeholders should collaborate on the identification of water bodies to target for posting of OEHHA-issued fish consumption advisories including the Statewide Advisory for Eating Fish from California's Lakes and Reservoirs Without Site-Specific Advice, Statewide Advisory for California Coastal Locations Without Site-Specific Advice, Advisory for Fish that Migrate (caught in California river, bays, and coastal ocean waters) and/or site-specific advice that has been issued by OEHHA. Collective brainstorming of a comprehensive inventory of possible posting locations should be narrowed based on two parameters:

1. 303(d) listing for mercury impairment;
2. Feasibility, including geographic distance and accessibility by vehicle.

To ensure broad community support for the project, posting locations should be vetted with community leaders, local anglers, recreation specialists (state parks, county parks and recreation), and local tribal representatives, all of whom may have extensive knowledge of the watersheds and the region. Regional angler surveys whereby fisherman are queried about their catch and consumption patterns can provide valuable data to inform posting efforts and the Department of Fish and Wildlife should be consulted about the availability of angler surveys. Upon completion of a list of targeted water bodies, the landowner of each water body should be identified and specific proposed posting locations at public access points for each targeted water body should be identified. Examples of potential posting locations include campground kiosks, trailhead informational boards, boat ramps, restrooms and fish cleaning stations. Areas that have existing infrastructure for sign posting and are heavily trafficked by anglers should be included. If time or resources for posting are limited sites may be prioritized based on level of infrastructure (presence of bathrooms, boat ramps, campgrounds and gates/kiosks) as significant infrastructure indicates a high level of use and thus greater visibility of posted information.

Indirect posting at marinas, sporting goods stores, and bait and tackle shops can increase visibility of information and should be considered if resources are available. Preliminary work to identify preferred posting locations facilitates the process to schedule meetings with the appropriate individuals and agencies to secure permission to post.

Key Outcomes: List of locations to post with accompanying maps (GIS or google earth); list of landowners to contact; packet of information for local officials and landowners including: organizational information, information on OEHHA-issued fish consumption advisories, example advisories, existing angler survey data (if available), and background on local statutes (if any) regarding posting state-issued fish consumption advisories.

STEP 3: Engage Community Members and Recruit Volunteers

Engage and educate community members about the project. Concurrent with Steps 1 and 2, project partners should reach out to community members to provide information on locally caught fish and to attract volunteers for the one-day event. To achieve this, project information including examples of fish consumption advisories, lists of mercury impaired water bodies, and a brief description of the project intent and timeline should be made available to relevant community organizations. Such groups include additional members of the local environmental community, fishing clubs, Lions and Rotary Clubs, and youth groups. Whenever possible, public presentations should be made to these groups in order to educate a diverse range of community stakeholders about legacy mercury pollution and to attract volunteers to take action to protect public health.

Key Outcomes: 15-20 minute presentation about the project; contact information for leaders of relevant community groups; list-in-progress of volunteers for Post-It Day event.

STEP 4: Confirm State-Issued Advisories to Use

Contact OEHHA staff to confirm applicable advisories for use in project. OEHHA issues fish consumption advisories for the state of California; this information is posted on their website (<https://oehha.ca.gov/fish/advisories>). The Statewide Advisory for California's Lakes and Reservoirs applies to all such water bodies in the state that lack adequate fish tissue data for OEHHA to issue site-specific advice or have yet to be evaluated. OEHHA utilizes data from many sources (including United States Geological Survey (USGS), the Surface Water Ambient Monitoring Program (SWAMP), and Federal Energy Regulatory Commission (FERC) relicensing processes) to develop fish consumption advice. OEHHA releases new site-specific advice as new data becomes available and their staff are able to evaluate the data and assess potential human health impacts. Thus, project partners should always check OEHHA's website and with staff of OEHHA's Fish and Water Quality Evaluation Section to ensure that the most up-to-date advisory information is posted as part of a Post-It Day event. If posting advisories in multiple languages is desirable to reach vulnerable populations OEHHA staff should be consulted regarding translation. In addition, project partners should obtain permission from OEHHA to have organizational logos placed at the bottom of the fish consumption advisories to be posted (see Appendix A for an example advisory with organizational logos). The placement of logos on

advisories acts as a mechanism to convey broad-based support for the protection of public health through the posting of fish consumption advisories.

Key Outcomes: PDF files of fish advisories for each water body planned for posting with logos of relevant project partners; confirmation from OEHHA staff that the advisories planned for posting are accurate and up-to-date and that logo placement is acceptable.

STEP 5: Obtain Landowner Permission to Post Advisories at Waterbodies

Meet with local officials, water agencies and landowners to present project information and obtain permission to post OEHHA-issued fish consumption advisories at water bodies under their jurisdiction. Obtaining landowner permission to post applicable fish consumption advisories is critical for ensuring project success. Efforts to schedule meetings with landowners should begin immediately following Step 2 to provide ample time for multiple meetings to take place, if needed. Landowners may need to put the project on an agenda for review at a board meeting, and sufficient time (up to 6 months) should be allotted for this to occur. Packets of information prepared as part of Step 2 (see Step 2, Key Outcomes) should be used to facilitate explanation of project need and goals. If time or setting allows, the presentation developed as an outcome of Step 3 should be used. Meetings with local officials, water agencies, and landowners allow project partners to educate key community members on the issue of mercury in fish, solicit feedback on project strategy and activities, and secure permission to post fish consumption advisories.

First-time correspondence (via email) should be accompanied by a formal letter signed by the project leader(s) describing the project and asking permission to post (see Appendix B for an example letter to landowners), as well as a PDF of the fish consumption advisory. Applicable landowners may include local irrigation districts, State Parks, United States Forest Service, the County, Army Corps of Engineers, the City, local land trusts, local utilities, homeowner's associations, private campground concessionaires, boat ramp operators, and bait shops.

Following the initial formal letter, follow up should be an in person meeting to further describe and discuss the project. Educational materials should be brought to follow-up meetings, including information on OEHHA-issued fish consumption advisories, information from angler survey efforts, and a laminated example of the ledger-sized fish consumption advisory, demonstrating exactly what would be posted at the water body. Avenues for further information should also be provided including the OEHHA website with access to the scientific data and reports supporting the advisory, and links to The Sierra Fund's full reports online. If permission to post is granted from the landowner, a letter of permission should be obtained from the landowner to retain for project record keeping and to furnish to volunteers for the day of the event.

For efforts to post advisories at sporting goods stores and bait and tackle shops, the process to obtain permission to post is streamlined. A list of potential locations that are in close proximity to the water bodies targeted for posting should be compiled collaboratively with project partners. Each of these locations should be visited in person with a letter written specifically for owners of these businesses, educational materials, and a letter size laminated version of the

OEHHA advisory that can be posted immediately with owner permission. If the party with the authority to give permission to post is not present, these materials may be left at the business and follow-up may be conducted by phone.

Key Outcomes: List of landowners contacted and outcomes of request to post; meeting agendas and follow-up notes to facilitate future correspondence on the issue; educational materials; letter of permission from landowner; list of business owners contacted and outcomes of request to post.

STEP 6: Plan and Publicize Post-It Day Event

Plan for Post-It Day Event. Significant administrative and logistical preparation is required to ensure that a Post-It Day event is a success. Regular meetings should be held with project partners over the course of the project, in addition to those required to finalize and sign any relevant project contracts. The meetings should be attended by relevant outreach and public relations staff from each partner organization. These meetings are essential to creating a unified PR campaign and brainstorming volunteer recruitment strategies, as well as giving general updates and reminders about project tasks and timelines.

Early identification of a clear “slogan” is fundamental for designing attractive event materials to solicit volunteers from membership bases of partner organizations via email and social media. Approximately one month prior to the event, volunteer solicitations should be sent via e-news to subscribers. Additional e-news articles should be sent to the general list(s) and volunteer list(s) of project partners. Information about the Post-It Day event should be posted on the social media of project partners during the week leading up to the event.

Event materials can be incorporated into a media strategy for the project. Local and regional news outlets and applicable deadlines for contacting reporters and submitting op-eds and event information should be identified in advance. If possible, event information can be provided in multiple mediums (print, radio) and in multiple languages in the target community and neighboring communities to raise awareness. (See Figures 4 and 5 for examples of materials used for 2015 and 2016 advisory posting events).

If time and capability allows, donations can be solicited from local grocery stores and small businesses, as this will allow for the provision of complimentary foodstuffs for volunteers on the day of the event. Though providing food for volunteers increases the logistical complexity of the event, this gesture of appreciation makes the day-of more enjoyable and allows the opportunity to conduct project outreach to additional community members as donations are sought.

In addition, time should be devoted to scoping out posting locations and water body access prior to the event so that clear instructions can be drafted for Post-It Day volunteer participants. This information should be incorporated into data cards for the event to facilitate the tracking of locations where advisories are posted (see Appendix C for an example event data card).



Figure 4 (l) Event Materials 2015 and Figure 5 (r) Event Materials 2016: Event materials for 2015 Post-It Day event (slogan: “Volunteer to Post-It”) and 2016 family event coinciding with Post-It Day (slogan: “Fishing for Fun: A Family Affair”).

Bins should be assembled with all materials volunteers might need to complete the posting task. Such materials include: laminated fish advisories (include additional advisories to leave with appropriate staff, if applicable, e.g. State Parks); materials to post advisories (staple guns, hammer and nails, zip ties, duct tape); data cards explaining where specifically, at each water body, to post the signs; GoogleMaps with directions to the site(s) volunteers will be posting; a staff contact card with a cell phone number for at least one of the event organizers (in case questions or emergencies arise while volunteers are in the field); a permissions letter or notice outlining the landowner/managers specific permission to post that site; a list of talking points volunteers can call on if they encounter interested public in the field; and outreach or educational materials that volunteers can give interested public in the field for more information.

Key Outcomes: Attractive event materials for soliciting volunteers designed and distributed; media campaign designed; venue for event secured (if needed); donations for event solicited; data cards for event drafted; material bins packed for each posting site.

STEP 7: Hold Volunteer Posting Event

Hold volunteer posting event that will result in OEHHA-issued fish consumption advisory posters placed at public access points to local fishing locations and other relevant locations such as nearby campgrounds and bait shops. To ensure adequate time to achieve posting goals, a Post-It Day event can commence in the morning. This format allows for educational presentations and logistical details to be accomplished with adequate time for volunteers to travel into the field and post the applicable fish consumption advisories.

Whenever possible, local leaders, and in particular local public health officials, should be made aware of the event in advance and invited to participate the day-of. A key component of education the day-of should be teaching participants how to properly read a fish consumption advisory. Ensuring that volunteers know all three components (population group, species and frequency of consumption) and how to read an advisory will allow for increased outreach capacity by giving volunteers the ability to teach others in the community how to safely consume locally caught fish.

A final orientation for volunteers should take place just prior to heading into the field, whereby volunteers should be divided into pre-determined groups based on posting location assignments. Each group should be provided with a pre-packed materials bin that includes instructions for posting and filling out data cards and pertinent information specific to their site assignments (see list of materials above). After being briefed on the contents of the materials bin, volunteers should be provided printed driving instructions and, in groups of two to three, embark to their posting assignment locations. Upon arrival at a water body, volunteers should consult their data cards for information on where exactly to post the advisory. Volunteers should identify the posting location and use provided tools to post the advisory. A majority of signs can be posted using a staple gun and staples, although some posting locations may necessitate the use of nails and a hammer and/or zip ties. All of these items should be provided to volunteers in their materials bin. Photographs of the posted advisory can be taken as documentation using a camera or cell phone.

As a component of posting each water body, volunteers should fill out a data card about every location a sign is posted, including information on:

1. Whether an advisory was posted
2. Whether photos were taken
3. Geographic coordinates of the poster location
4. Any additional notes, such as materials used or suggestions for next year

After completing their assignments, volunteers typically return on a rolling basis. Care should be taken to secure data cards and photo files from volunteers when they return to facilitate evaluation of project success. Photo files can be emailed or downloaded to a laptop at the event venue. A separate event evaluation can be collected from volunteers to solicit feedback on improvements in event planning, publicity or materials for future years.

An event feedback form should be provided to volunteers upon their return from the field to gain insight about how much volunteers learned, the level at which they enjoyed their experience, and suggestions for improvement. These feedback forms are a great way to gauge the preparedness and execution of the event, as well as gain information about unexpected difficulties or successes of volunteers in the field.

Key Outcomes: Identified water bodies posted with applicable fish consumption advice; data cards and event evaluations providing information that can be used to evaluate project success; volunteer feedback forms; and photographs for post-event media campaign.

STEP 8: Event Follow-Up and Monitoring

Post Fish Consumption Advisory Posting Follow-Up. Event follow-up should include an immediate media campaign to publicize the success of the event and continue to raise awareness on the issue of mercury in fish. The media campaign can consist of a press release issued to local newspapers complete with photographs and should include information on specific water bodies posted, number of advisories posted, and number of volunteers who participated. Further follow-up should be conducted to thank volunteers and local leadership who participated in the event, along with information about how to stay involved with these efforts. Thank you cards should also be addressed to any event donors of food or supplies.

If time and resources permit, posted locations can be monitored to document whether the signs remain, or have been removed or damaged due to human or natural cause. For this effort, data cards can be prepared with a list of posted locations and check boxes for the status of the advisory (i.e. intact, missing, illegible, replaced) If possible, each posted location should be visited in the fall, to understand the percentage of signs that remain at the end of the summer recreation season, and again in the early spring to see how the signs weather the winter (see Appendix D for example post-event monitoring data card). This monitoring can be used to inform future Post-It events, including the choice of material for signs based on durability, and the best posting locations at water bodies based on visibility to water body users.

Key Outcomes: Post-event press release(s) and photograph(s) provided to media; thank you cards sent; post-event monitoring data cards.

Family-Oriented Educational Materials and Activities

In order to address the need to reach population groups sensitive to mercury exposure, in 2016, The Sierra Fund sought to expand the existing suite of educational materials with outreach tools specifically designed to engage and inform children. Drawing from a decade of experience reaching out to the local community on the issue of mercury, key “teachable concepts” were identified and hands-on activities to explore these concepts with youth were developed. These activities were then presented at outreach events geared toward children including single-day events and multi-week summer camps.

The concept of educating children on the dangers of mercury exposure was made a centerpiece of the 2016 Post-It Day event by adding a new family event (“Fishing for Fun: A Family Affair”) to educate the community in addition to the established volunteer led effort to post fish consumption advisories (Post-It Day 2016). Both events were held at the same venue with some overlap of activities to build on the synergy of educating adults and youth alike. On the morning of the event, participants in Post-It Day 2016 followed an event format established in 2015 (see Step 7 of the Project Protocol). After volunteers embarked for the field to post the state-issued advisories, the venue was transformed with educational activity booths and demonstration booths featuring vendors that included local fishing clubs, watershed organizations, and the United States Forest Service.

Three concepts were presented by The Sierra Fund at educational activity booths during the Fishing for Fun event. The activity booths were designed to be visited in sequential order and, upon completion of each activity, children were provided with educational brochures on the concept presented before moving on to the next booth. The activity booths included:

The Origin of Mercury in the Sierra Nevada: This concept was explored with maps of California, historic photos of the Gold Rush, and a hands-on activity to illustrate the process of amalgamation using sand (to represent gold bearing material), gold magnets buried in the sand (to represent fine grained gold entrained in material), and silver magnets (to represent mercury). Children were encouraged to use the silver magnets to “recover” gold from the sand, and left the booth understanding why mercury improved gold recovery during processing. Children also learned that much of the mercury used in gold mining processes was lost to the environment, escaping into surrounding river and stream ecosystems. Upon completion of the activity, children were given a certificate for “finding gold” and a *Reclaiming the Sierra* brochure based on The Sierra Fund’s first full report, *Mining’s Toxic Legacy*, which explores the environmental, cultural and human health impacts of the Gold Rush. See Figure 6.

How Mercury Gets into Fish through Bioaccumulation: This concept was explored through visual aids of the food pyramid and a game using cups in sequentially fewer numbers to represent steps up through the trophic levels. Children were given eight decorative stones to represent methylmercury present in the environment and were asked to place the eight stones in eight cups representing algae (producers). Children were then asked to pretend that the algae were consumed by zooplankton (primary consumers) and move the eight stones into 6 cups representing zooplankton. At each step up in trophic level the number of cups representing the trophic level decreased (4 cups = prey fish; 2 cups = predatory fish; 1 cup = humans) but the number of stones remained the same to illustrate how mercury works its way up, with those consumers who eat at higher trophic levels accumulating more mercury, because organisms at higher trophic levels feed on those below that already have mercury in their tissue. Upon activity completion children were given a sticker with The Sierra Fund’s *Get the Mercury Out* slogan and a coloring sheet of prey and predatory fish. See Figure 7, below.

Eating Fish Safely: This concept was explored through a mock fishing activity incorporating use of OEHHA’s *Statewide Advisory* and magnetic laminated cards featuring the species of fish referred to in the advisory. Children used a magnetic fishing pole to “catch” one of the magnetic laminated fish cards. Children were then asked to match the fish on the card they “caught” to the OEHHA fish advisory, and determine which population group they fell into (Group I: women 18 to 45 years (child-bearing age) and children 1 to 17 years). Based on this information, children were quizzed on how many servings per week of the species of fish that they caught could be safely consumed. Children were offered “fishy” snacks (goldfish and Swedish fish) and The Sierra Fund’s *Fish, Mercury, and You* brochure about how to enjoy locally caught fish in a healthy manner at activity completion. The brochure includes OEHHA’s *Statewide Advisory*, which can be used as a quick reference guide for families. See Figure 8 on the following page.



Figure 6 (l): Activity Booth 1, Figure 7 (top r): Activity Booth 2, and Figure 8 (bottom r): Activity Booth 3: Educational activity booths featured at The Sierra Fund's 2016 Fishing for Fun: A Family Affair event. Children participated in hands-on activities to explain the concepts of mercury origin and amalgamation to gold, bioaccumulation processes, and eating fish safely to raise awareness about the best choices for consuming fish from Sierra Nevada water bodies based on mercury content.

Children who completed activities at all three booths were given a trivia sheet to fill out and a ticket to enter in a raffle for donated items. Post-It Day 2016 participants and Fishing for Fun attendees gathered at the end of the day for the raffle and an ice cream social. These activities have since been used to educate multiple age groups in a summer camp setting and it is anticipated that the concepts will be developed further to be compliant with Common Core curriculum so that the material can be brought to local school children studying California history.

Spanish Language Outreach about Mercury in Fish

Through our Angler Survey research, The Sierra Fund has identified that a Spanish-speaking angler community exists in the Sierra Nevada region. These stakeholders may engage in subsistence fishing to supplement their food budget and may lack access to information that would empower them to make healthy fish consumption choices. Subsistence anglers typically have a higher rate of locally caught fish consumption and therefore, in mining-impacted regions, they may have a higher risk of mercury exposure as a result of consuming contaminated fish. In order to provide information about mercury in fish to this sensitive demographic, The Sierra Fund worked with OEHHA staff in 2017 to get five site-specific fish consumption advisories

within our project area translated into Spanish (see Appendix F). During our third annual Post-It Day event in August 2017, the translated site-specific advisories, as well as the Statewide Advisory for California's Lakes and Reservoirs (in Spanish), were posted for the first time in thirty locations at nine water bodies in five Sierra watersheds. Analysis of Angler Surveys collected 2014-2016 (n=223; updated report to be released in 2018) will inform whether fish consumption advisories should be translated into additional languages to be posted at Sierra Nevada water bodies. The Sierra Fund is dedicated to promoting environmental justice by ensuring that this critical public health information is accessible to all individuals and groups that could be affected by mercury in fish.

In addition to posting fish advisories in Spanish, The Sierra Fund has developed a Spanish language Public Service Announcement (PSA) about mercury in fish. The PSA format was selected for communicating information about mercury in fish to Spanish-speakers due to the potential to reach a wide audience with a consistent message, while offering language-relevant resources for further inquiry. PSAs may be especially useful for organizations wishing to conduct outreach to vulnerable populations without a bilingual staff member to lead direct outreach activities and field questions and responses in the native language. To inform this effort The Sierra Fund discussed the project with staff of the California Department of Public Health's (CDPH) Community Education and Participation section, who have experience developing Spanish PSAs. CDPH offered two useful recommendations for PSA development: 1) keep the message simple, and 2) utilize a conversational format or "novella" to relay the message.

Simple Messaging: In order to communicate a succinct, memorable and highly transferrable message, The Sierra Fund distilled the complex and multi-faceted information about mercury in fish into a short soundbite: "eat more trout, eat less bass." Statewide data indicate that trout is a healthy choice because it is typically a low mercury fish, while long-lived and predatory bass generally contain more mercury. These two species are commonly consumed, found in a vast number of California water bodies, and featured in the Statewide Advisory. Thus, while the message is applicable to the Sierra Nevada region it is not regionally specific; the simple message provides foundational information that will allow an angler to make a healthy choice, wherever they are fishing, by selecting a low mercury fish (rainbow trout) for consumption. While this simplified message grossly generalizes the science and available information about mercury in fish, the PSA offers OEHHA's website as a resource for more information, where listeners may go to find advice about additional species, guidelines for specific water bodies and the full scientific reports that support published fish consumption advisories.

Novella Presentation: Incorporating multiple characters in a short story "novella" is an approach that was recommended by CDPH to increase listener engagement in the PSA. The message about making healthy fish consumption choices is conveyed via a conversation between a father and child fishing and discussing the catch, noting the family can take the catch home for dinner if it is a rainbow trout because trout is low in mercury. However, a bass that is caught should be released so that the family can avoid exposure to mercury by eating contaminated fish. The strategic use of father and child characters renders the message more relatable to a key sensitive population for mercury exposure (children) and leverages the capacity of children to be conduits of information to adults by catching their attention through use of age appropriate material. The development of the Spanish-language PSA builds on The Sierra Fund's

strategy to implement targeted outreach to non-English speaking stakeholders, families and children.

Best Practices and Lessons Learned

The outcomes of The Sierra Fund's three consecutive years of Post-It Day events (2015-2017) have been quantified and evaluated to improve the effectiveness of future efforts to protect public health. The overall goal of this work is to increase the amount and accessibility of information on mercury in locally caught fish and to ensure that this information is being conveyed to those population groups most at risk for mercury exposure.

Best Practice 1: Seek Broad Support for Project

Seek broad, community-based support for fish consumption advisory posting and mercury education projects. Broad community-based support is essential to the success of fish consumption advisory posting and mercury education efforts. To ensure support for the Post-It Day 2015-2017 efforts The Sierra Fund vetted posting locations and sought additional ideas and feedback from partner organizations, members of our Board of Directors and local tribal representatives, all of whom have extensive knowledge of the watersheds and the region. After the list of targeted water bodies was finalized, The Sierra Fund worked with partners to identify specific proposed posting locations at public access points for each targeted water body, and researched the landowner of each water body so that meetings with the appropriate individuals and agencies could be scheduled to secure permission to post. Over the course of two years of work on this project, The Sierra Fund built a list of more than 40 key contacts and secured permission to post state-issued fish consumption advisories from 15 agencies.

During this time period, The Sierra Fund has reached out to community members to provide information on the issue of locally caught fish and to attract volunteers for the annual one-day events. To achieve this, updates on the project have been presented annually to relevant community groups including a local chapter of the UC California Naturalist certification program and the Gold Country Fly Fishers Club. Engagement of youth community members has also been sought by presenting to the Environmental Committee of Nevada Union High School (ECONU), to students of El Dorado High School's Natural Resources Program, and by conducting outreach at the Bear-Yuba Land Trust Eco Kids Day and the Sierra College Day of the Young Child. In addition, The Sierra Fund has worked to bring regional attention to the project by presenting at the Delta Mercury Exposure Reduction Program (MERP) stakeholder meeting in Sacramento and by giving project updates at quarterly meetings of the Delta Tributaries Mercury Council (DTMC).

These presentations have been successful in educating a diverse range of community activists and leaders about legacy mercury pollution, and in attracting over 50 volunteers to take action to protect public health. A survey administered to Post-It Day event participants after the morning training in 2015 showed that volunteers increased their knowledge level an average of 60%. Post-event evaluation forms indicated that every volunteer would participate in the event again. Through annual event evaluation surveys, volunteers have provided suggestions on how

to publicize the event in future years, additional locations signs could be posted, and how to improve the sign-posting process.

The strongest evidence of securing broad, community-based support for The Sierra Fund's Post-It Day project is the fact that, following the 2015 event, the two largest landowners in Nevada County, Nevada Irrigation District (NID) and the USFS Tahoe National Forest (TNF), agreed to utilize internal staff time to post the advisories at applicable water bodies in 2016 and again in 2017. This shift has freed up volunteer time at subsequent Post-It Day events:

- **Post It Day 2016:** over 20 advisories were posted for the first time ever in addition to 52 advisories that were furnished to NID and TNF for their staff to post.
- **Post It Day 2017:** over 30 advisories were posted in Spanish for the first time ever in addition to 50 advisories in Spanish that were furnished to NID and TNF for their staff to post.

Water agencies in neighboring counties have also supported the project and in 2016 Placer County Water Agency (PCWA) and South Sutter Water and Power Agency both agreed to print, laminate, and post applicable advisories for a total of four water bodies under their purview.

Best Practice 2: Communicate with OEHHA

Communicate with OEHHA to ensure that accurate and up-to-date public health information is being disseminated. The success of the Post-It Day effort to date has relied on communication with staff at OEHHA and California Department of Public Health (CDPH) to ensure that the fish consumption advisory signs planned for posting are understandable for the public, and accurately reflect the messages of the state-issued advisories. The design of the poster that has been used at the majority of Sierra locations was completed when this project started in 2015. The Sierra Fund staff worked with OEHHA and CDPH in 2013 to design a sign covering the California Statewide Advisory that was pertinent to the many Sierra locations that did not have site-specific advisories. However, a number of locations that were planned for posting at the 2015 event were covered by site-specific fish advisories, which CDPH had never created a format for that was appropriate for posting at the water bodies (in some cases, the only format available was a print-out of the OEHHA website). Furthermore, many of these advisories included extremely limited information, such as the Rollins Reservoir advisory that warns anglers to limit consumption of catfish, but does not mention any other popular fish that are caught at that location because not enough data had been collected for an advisory to be released for all species.

Due to funding and staffing constraints, OEHHA and CDPH were not able to produce poster designs for the site-specific advisories needed for Post-It Day 2015 locations at Rollins Reservoir, Combie Reservoir, Camp Far West Reservoir and Englebright Lake. Instead, they allowed The Sierra Fund staff to draft poster designs for these locations, which were then reviewed and approved by staff at the state agencies. The Sierra Fund created the poster designs based on the approved Statewide Advisory, and other site-specific advisory signs

created by CDPH. In order to overcome the challenge of the incomplete advisories at Rollins Reservoir and Combie Reservoir, The Sierra Fund created a hybrid design that highlighted the site-specific advisory for that location, but also included information from the Statewide Advisory. This allowed the public to have information on all the fish species they were most likely to encounter at those locations.

In the process of planning for Post-It Day 2016, The Sierra Fund once again reached out to OEHHA staff to ensure that the advisories slated for first-time-ever posting at 11 locations at Donner Lake were accurate and understandable. OEHHA staff reviewed the Donner Lake site-specific advisory and approved it for posting. In 2017 The Sierra Fund reached out to OEHHA to get five site-specific advisories for Sierra Nevada waterbodies translated into Spanish. As part of the translation process The Sierra Fund offered feedback on inconsistencies between text and visuals in terms of how the message was being communicated, and as a result of this OEHHA elected to remove the confusing “mercury meter” icon from the advisory posters. The strong support from OEHHA and CDPH staff for the Post-It Day project has made it possible to get advisories posters designed, reviewed and produced in the time period needed for the annual Post-It Day events to be executed.

Best Practice 3: Landowner Engagement

Engage with landowners and water body operators early and frequently. Early and frequent engagement of landowners and water body operators is critical for moving Post-It Day projects forward. Each year The Sierra Fund has prioritized meeting with local officials, water agencies, and landowners several months prior to the event date. These meetings allow time to educate key community members on the issue of mercury in fish, solicit feedback on project strategy and activities, and secure permission to post fish consumption advisories.

All first-time correspondence (via email) has been accompanied by a formal letter signed by The Sierra Fund’s CEO describing the project and asking permission to post, as well as a PDF of the fish consumption advisory. Applicable landowners to date have included Nevada Irrigation District, Auburn State Recreation Area, California State Parks, United States Forest Service, the Nevada County Fairgrounds, Army Corps of Engineers, the City of Nevada City, the Bear Yuba Land Trust, Pacific Gas and Electric, Cascade Shores Homeowners Association, the Lake Wildwood Lake Committee, and numerous private campground concessionaires, boat ramp operators, and bait shops.

Formal letters have been followed up with in-person meetings whenever feasible and The Sierra Fund staff has met with over 16 individuals at relevant agencies and businesses. At each in-person meeting, The Sierra Fund staff has offered a suite of educational materials, including information on OEHHA-issued fish consumption advisories, the 2011 *Gold Country Angler Survey*, and a laminated example of the fish consumption advisory, demonstrating exactly what would be posted at the water body. The Sierra Fund has also provided avenues for further research, including the OEHHA website with access to the scientific data and reports supporting the advisory, and links to The Sierra Fund’s full reports online.

The Sierra Fund has engaged in phone and email correspondence with additional landowning entities, including the Army Corps of Engineers; California State Parks, Sierra Gold Sector; Placer County Water Agency; South Sutter Water and Power Agency; Pacific Gas and Electric; Yuba County Water Agency; South Sutter Water District; Lake Wildwood Lake Association; Cascade Shores Homeowners Association; Bear Yuba Land Trust; and three summer camps operating at Lake Vera in Nevada City.

Although landowners have been initially contacted months in advance of the annual events, The Sierra Fund has faced challenges with response rate and timing. Often, the same individual has been contacted multiple times before a response has been received. In other cases, the individual contacted has not had the authority to give permission to post, but has declined to share the contact information of the authoritative figure, which slows the process of obtaining permission to post. While these situations are inevitable in some cases, The Sierra Fund has found it helpful to share timelines with contacts, and give hard deadlines for when answers are needed. It has also been beneficial to keep a detailed schedule of communication to track when contact is made and schedule dates for follow-up calls if a response is not received.

Despite difficulty in contacting some landowners, the vast majority have been interested in and highly supportive of the project. Many landowners have been able to identify specific locations at the water body under their jurisdiction that would be valuable to post, and some have even offered suggestions for water bodies to include in (future) expanded advisory posting efforts.

Best Practice 4: Involve At-Risk Populations

Develop strategies to involve populations most at risk for mercury exposure. In an effort to educate populations most at risk for mercury exposure, the planning and design of the Post-It Day event has been adapted slightly on an annual basis from the original format used in 2015.

In 2016, The Sierra Fund staff reached out to members of three local Native tribes to solicit their input on the project and to get ideas on how the project could better serve and involve local Native populations. Members of the Nisenan, Tsi Akim and United Auburn Indian Community were contacted and asked for their feedback on locations that should be included in the annual advisory posting, and members of Sierra Native Alliance were contacted about participating in the second annual event.

To educate women and children about the dangers of consuming mercury-contaminated fish, The Sierra Fund and project partners hosted a family friendly education event, “Fishing for Fun: A Family Affair,” in conjunction with Post-It Day 2016. For this event The Sierra Fund developed educational materials for three activity booths (described above), and drew from a suite of previously created educational materials to provide fun and informative content for participants. Project partner the South Yuba River Citizens League (SYRCL) reached out to twenty-two public and private preschools, elementary schools, and middle schools in advance of the event to encourage attendance. Of these, fourteen schools were provided with printed materials including event flyers and tri-fold educational brochures on mercury and fish. Twelve news articles were published on the event, including two articles in media outlets targeted

specifically toward families with children (First 5 Nevada County and Parents Resource Guide). Two of three Facebook posts related to the event also specifically targeted families with children – one post by Nevada County Schools and one post by Family Resource Councils. In addition, flyers were placed at 282 businesses, intersections, and on public bulletin boards.

Despite the efforts made to reach out to families with children, turnout at the *Fishing for Fun: A Family Affair* was lower than anticipated. In working to publicize the event The Sierra Fund learned that there is a time consuming bureaucratic process involved in getting information into the hands of children via public schools. Future efforts involving schools as an avenue of event information dissemination should take this in to account and follow a timeline more similar to that described above under Best Practice 3.

In 2017, our event strategy focused on communicating information about mercury in fish to Spanish speaking anglers and subsistence fishers. To this end, we reached out to OEHHA several months in advance of the event date with a list of advisories that we wished to have translated into Spanish. We also reached out to CDPH to gain their insight into the design and broadcast of a PSA about mercury in fish. Both agencies were extremely responsive to our desire to engage this at-risk population group and we are looking to expand both the posting of advisories in Spanish and the broadcast of the Spanish language PSA as part of our 2018 event.

Best Practice 5: Project Follow-Up

Conduct project follow-up to ensure continued commitment to reduce involuntary exposure to mercury. Though Post-It Day itself is designed to be executed as a one-day event, project follow-up is a hallmark of what has made this work so successful over the last three years. Year-round commitment ensures that project partners stay engaged on the issue, that fish consumption advisories remain accessible and posted at water bodies, and that the information contained in posted advisories is accurate and up-to-date. To this end, The Sierra Fund works to post advisories at additional locations following Post-It Day events, has kept informed of the status of various fish tissue data collection efforts being undertaken that might lead to the development of new site-specific advice for waterbodies, and has checked the status of posted advisories annually to ensure that they have not been removed and are still legible.

Continued effort to post OEHHA advisories: After the huge success of Post-It Day 2015, with nearly 100 fish consumption advisories posted at local water bodies, The Sierra Fund continued the effort to connect anglers to this important public health information by posting the advisory at the places anglers shop for fishing supplies. Collaboratively with partners, The Sierra Fund compiled a list of 20 bait and tackle shops in close proximity to the water bodies targeted for posting. The Sierra staff visited each of these locations, prepared with a letter written specifically for owners of these businesses and other educational materials, as well as a letter size laminated version of the OEHHA advisory (see Appendix E for an example letter to bait and tackle shop owners).

Of the 20 fishing supply stores visited, 11 locations agreed to post the advisory, six locations took an advisory and responded they must consult with the owner/manager before posting, and three declined to post the advisory. Of these three, two were large, corporate stores that had a policy against posting informational and event signage from outside sources. One of these

stores provided information to contact corporate headquarters, which The Sierra Fund plans to pursue with the hope of getting the sign posted widely throughout the state of California. The third business that declined to post was a small, family-run shop that declared the fish consumption advisory directly discouraged fishing, and was therefore bad for business. The Sierra Fund originally hypothesized this would be a more widespread reaction, and were therefore pleased with the largely positive response of fishing supply stores to getting information to their customers about high mercury in some fish.

Staying informed about fish tissue data collection efforts: The Sierra Fund is in the process of conducting fish tissue sampling at a number of Sierra Nevada water bodies that currently lack the required number of samples for site-specific advice to be issued by OEHHA. In addition, The Sierra Fund is staying up-to-date on other regional research projects involving the collection of fish tissue data, including FERC-relicensing efforts. The goal is to ensure that all applicable data ends up in the hands of OEHHA and that if new site-specific advice is issued for water bodies that were posted as part of 2015-17 events, these water bodies are re-posted with updated and site-specific advisories. A lack of site-specific advice for relevant water bodies is one reason cited by landowners who declined to participate in the 2015 and 2016 Post-It Day events. The Statewide Advisory that applies to California lakes and reservoirs that lack site-specific advice contains consumption advice for many species of fish that may not be present in all Sierra Nevada water bodies. Some landowners felt that posting advice that included consumption guidelines for fish not found in the water body would be confusing for the public. Site-specific advice is the solution to this issue and should be the ultimate goal for all water bodies.

Checking the status of posted advisories: In an effort to monitor the fish consumption advisory signs that were posted at the inaugural event in July 2015, to see how they weathered the summer recreation season, select staff of The Sierra Fund dedicated six days within a two-week period in November to visit posted locations to check on the signs. The Sierra Fund's staff worked from copies of the data cards supplied to volunteers on Post-It Day 2015 to ensure that all posted locations were checked, and to streamline the tracking process.

The Sierra Fund visited a total of 18 sites, including water bodies, campgrounds, day use areas and marinas. Out of the 49 advisories that were posted at the 18 sites during the July 2015 Post-It Day, 35 advisories remained in November 2015. Thus, 71% of the advisories remained. All signs on Forest Service property had been removed, along with the majority of official Forest Service signage, as this landowner's protocol calls for sign removal for the winter season. The number of signs that remained posted, not including Forest Service facilities, totaled 34 out of 39 posters, or 87 percent. After the 2016 event, The Sierra Fund did a second status check on the posted advisories and were pleased to find that advisories that had been posted year-round for two years were still functional and legible.

Next Steps

As a result of three years of planning and executing Post-It Day events in the Sierra Nevada, The Sierra Fund recommends three next steps that should be undertaken regionally and

statewide to ensure that involuntary exposure to mercury is curtailed and public health is protected.

1. **Implement Post-It Day events in neighboring watersheds:** The Sierra Fund believes that a key next step is to implement Post-It Day events in neighboring watersheds to ensure that Sierra Nevada water bodies are posted with consistent state-issued advice regarding fish consumption. A major finding of The Sierra Fund's 2011 *Gold Country Angler Survey* was that anglers from the Sacramento Valley and the Bay-Delta were under the misconception that Sierra Nevada water bodies were home to "clean" fish safe for human consumption. This misconception was in part based on the fact that while the posting of fish consumption advisories is common in urban downstream communities, until 2015, no Sierra Nevada water bodies were posted with advisories. Neighboring water bodies need to be posted so that anglers are aware that mercury contamination is pervasive in the Sierra Nevada and, as a result, species low in mercury should be consumed in amounts considered safe by OEHHA.
2. **Build curriculum on mercury in fish to bring to children in school assembly format:** The activities developed by The Sierra Fund for use at the Fishing for Fun: A Family Affair event were highly successful with the children who attended the event and have been well-received during subsequent use at environmental camps for children. The Sierra Fund staff found the latter outreach format, whereby the materials are brought to a set venue, allowed more staff time to be focused on the educational aspect and less on the logistics of event planning. For future education efforts, The Sierra Fund would like to dedicate resources to the educational content and, to this end, we have begun developing curriculum on mercury in fish with insight provided by project partner SYRCL, who already has a successful school assembly program on watersheds.
3. **Use Angler Survey data to inform advisory posting in additional languages:** In 2018 The Sierra Fund will be releasing an update to our 2011 *Gold Country Angler Survey*. Between 2014-2016 we were able to collect a total of 223 surveys, bringing our dataset total (2009-2016) to 374 surveys. This data will be used to help inform whether fish consumption advisories should be posted in the Sierra Nevada region in languages in addition to English and Spanish in order to ensure that all population groups have access to information allowing them to make healthy fish consumption choices.

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Resources

The Sierra Fund Publications

https://sierrafund.org/mining/Gold_Country_Angler_Survey.pdf

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California Office of Environmental Health Hazard Assessment

<https://oehha.ca.gov/fish/how-follow-advisories>

<https://oehha.ca.gov/fish/women-and-children>

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https://www.dfg.ca.gov/ERP/wq_mercuryissues.asp

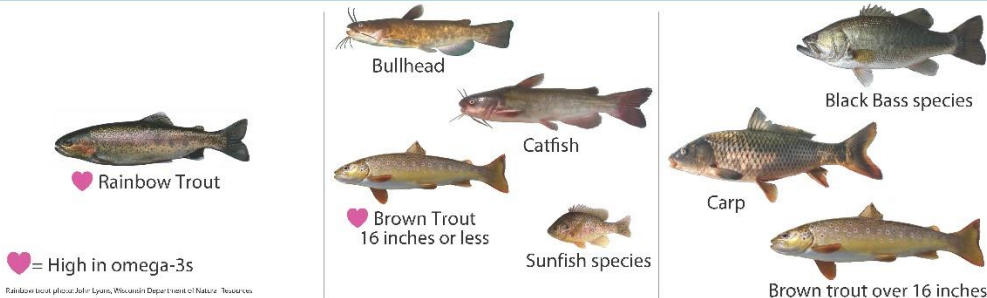
Appendix A: Statewide Advisory with Organizational Logos

NOTICE TO SIERRA ANGLERS

A healthy guide to eating fish from California lakes and reservoirs

This information applies to all lakes and reservoirs in California without site-specific advice.

Women 18 - 45 years and children 1 - 17 years



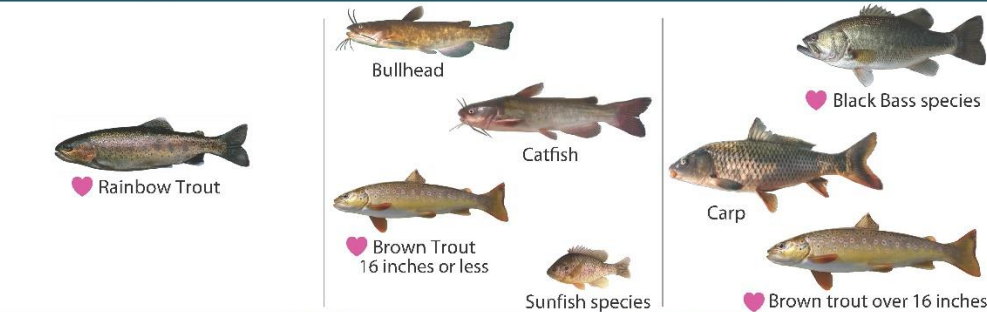
2 total servings a week

OR

1 total serving a week

Do not eat

Women 46 years and older and men 18 years and older can safely eat more fish



6 total servings a week

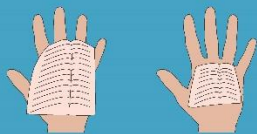
OR

2 total servings a week

OR

1 total serving a week

What is a serving?



For Adults For Children

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

Why eat fish?

Eating fish is good for your health. Fish have omega-3s that can reduce your risk for heart disease and improve how the brain develops in unborn babies and children.

What is the concern?

Some fish have high levels of mercury. Mercury can harm the brain, especially in unborn babies and children. Women 46 years and older and men 18 years and older have lower risk and can eat more fish.

Many California lakes and reservoirs in the Sierra have site-specific guidelines for eating fish. For site-specific information about eating fish from these and other California locations, visit: www.oehha.ca.gov/fish.



This health advisory information is issued by the California Office of Environmental Health Hazard Assessment. Posting this information is a project of The Sierra Fund, in collaboration with the South Yuba River Citizens League, Wolf Creek Community Alliance, and Nevada Irrigation District, among others. Past and present funders of this project include the Clarence E. Heller Charitable Foundation, California Department of Water Resources, California Environmental Protection Agency, and The California Wellness Foundation.

Appendix B: Example Letter to Landowners

Date

Name

Agency

Address

City State Zip

Dear _____,

I'm writing today to ask permission to post fish consumption advisory signs at strategic locations at water bodies owned by your agency. Exposure to mercury through sport fish consumption is likely the single most significant route by which people are exposed to mercury left over from historic mining in the Sierra Nevada foothills. Posting fish advisories will increase public awareness of local risks and prevent health issues associated with mercury exposure. **I'd like schedule a meeting with you, either by phone or in person, to discuss this project in more detail.**

The risk of potential mercury exposure through sport fish consumption is not being effectively communicated to anglers. The Sierra Fund's *Gold Country Angler Survey*, published in 2011, found that **no warning signs** about mercury in fish were posted at most of the fishing locations in the Deer Creek, Yuba, Bear and American River watersheds where the survey took place. It is essential to remedy this lack of information because **90% of anglers** participating in this survey reported eating fish that was caught from mercury-contaminated areas. Many reported feeding the fish they catch to children and women of childbearing age.

The negative health effects of eating mercury-contaminated fish are profound and include brain, nervous system, kidney, and immune system damage. Mercury exposure can cause developmental delays in children, making women of childbearing age, pregnant women and children under 17 particularly high-risk populations. Posting fish advisories will help remedy the lack of information and limited understanding of the risks associated with consuming mercury-contaminated fish.

Mercury is one of the mining contaminants still ubiquitous in Sierra Nevada watersheds. Providing information about mercury in fish is critical, and we are requesting your permission to post at the water body you manage. I'd like to meet with you to go over our project in more detail. Kelsey Westfall, our Outreach Coordinator, will be following up about this. Please feel free to contact her or me at (530) 265-8454, or by email at izzy.martin@sierrafund.org or kelsey.westfall@sierrafund.org.

Sincerely,

Elizabeth Martin
CEO

Appendix C: Example Event Data Cards

Donner Lake: Data Card

Donner Lake: North and West

Managed by Truckee Donner Recreation and Parks District

Bulletin Board at West End Beach-

- ☐ Did you post?
 - ☐ Did you get a photo?
 - ☐ Coordinates
-
-

Notes:

Portable metal kiosk by boat ramp-

- ☐ Did you post?
 - ☐ Did you get a photo?
 - ☐ Coordinates
-
-

Notes:

Building by fish cleaning station-

- ☐ Did you post?
 - ☐ Did you get a photo?
 - ☐ Coordinates
-
-

Notes:

Appendix D: Example Post-Event Monitoring Data Card

Fish Consumption Advisory: Poster Check

Fish consumption advisories were posted on July 11, 2015 at a variety of landowner-approved locations at local water bodies. Please refer to the attached list of poster locations by water body, and verify that posters are still posted, in legible condition. If a poster is missing or illegible, please replace.

Document your work below.

1. Water Body _____
2. Date _____
3. Day of Week _____
4. Time of arrival _____ AM PM
5. Time of departure _____ AM PM
6. Poster-check individual's name(s) _____

List location(s) posted July 11, 2015	Circle status of poster(s)		Additional Information
	Intact	Illegible	
	Missing	Replaced	
	Intact	Illegible	
	Missing	Replaced	
	Intact	Illegible	
	Missing	Replaced	
	Intact	Illegible	
	Missing	Replaced	
	Intact	Illegible	
	Missing	Replaced	

Appendix E: Example Letter to Bait and Tackle Shop Owners

Date

Bait Shop

Address

City State Zip

Dear Business Owner/Manager,

This letter is meant to demonstrate the importance of posting fish consumption advisories at places where anglers shop for supplies. Sport fish consumption is likely the single most significant route by which people are exposed to mercury left over from historic mining in the Sierra Nevada foothills. Posting fish advisories will increase your customers' awareness of local risks and help prevent health issues associated with mercury exposure.

The Sierra Fund partnered with South Yuba River Citizens League and Wolf Creek Community Alliance to lead a volunteer effort to post 98 fish consumption advisories at 28 waterbodies in the Bear and Yuba watersheds on July 11, 2015, with permission from landowning agencies. The event was a huge success and received positive media attention from local news sources, as well as CBS news in Sacramento. Now we're taking the next step to post not only where people fish, but where they purchase supplies.

This ongoing effort to post fish consumption advisories will help remedy the lack of communication to anglers about mercury in fish. After interviewing more than 150 anglers in the Gold Country, The Sierra Fund found that, in general, there is a limited understanding of the associated health hazards from eating mercury-contaminated fish, which include brain, nervous system, kidney, and immune system damage. It is essential to remedy this lack of information because **90% of anglers** participating in this survey reported eating fish that was caught from mercury-contaminated areas. Many reported feeding the fish they catch to children and women of childbearing age, the most sensitive populations to the effects of mercury in the body.

Mercury is one of the contaminants still ubiquitous in Sierra Nevada watersheds from the Gold Rush era. Providing information about mercury in fish is critical, and we hope you will help anglers understand this issue by agreeing to post the fish consumption advisory in your business. If you would like further information on this project, please contact The Sierra Fund's Outreach Coordinator, Kelsey Westfall, at (530) 265-8454 x217 or via email at kelsey.westfall@sierrafund.org.

Sincerely,

Elizabeth Martin
CEO

Appendix F: Site-Specific Advisory in Spanish

Guía Saludable para Consumir Pescado del Lago Combie

Mujeres de 18 - 45 años y niños de 1 - 17 años	Mujeres de 46 años o más y hombres de 18 años y más
 Especies de Róbalo Negro (Black Bass species)  Matalote (Sucker)	 Especies de Róbalo Negro ♥ (Black Bass species)  Matalote (Sucker)
No la consuma	1 porción en total a la semana

¿Cuánto es una porción?



Para Adultos **Para Niños**

Una porción es aproximadamente igual al tamaño de la palma de tu mano para filetes de pescado. Dé porciones más pequeñas a los niños.

¿Por qué comer pescado?

Consumir pescado es bueno para la salud. El pescado contiene omega-3s que puede reducir el riesgo de enfermedades del corazón y mejora el desarrollo del cerebro en fetos y niños.

♥ = Pescados altos en omega-3s

¿Cuál es la preocupación?

Algunos pescados tienen altos niveles de mercurio. El mercurio pueden dañar al cerebro, especialmente en fetos y niños. Las mujeres de 46 años o más y los hombres de 18 años o más tienen menor riesgo y pueden comer más pescado.

*NOTA:

Si no ves una especie de pez en la lista, no significa que puedas comerla tantas veces como quieras. Más bien significa que no hay datos adecuados para desarrollar advertencias para otras especies. Para obtener información adicional acerca de comer especies de pescados de los lagos y embalses de California sin asesoramiento específico del sitio, consulte el aviso general a la derecha, o visite: www.oehha.ca.gov/fish.



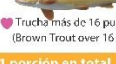
Guía para Consumir Pescado de los Lagos y Embalses de California

Aviso para los lagos y embalses sin advertencia específica para ellos

Mujeres de 18 - 45 años y niños de 1 - 17 años

 Trucha Arcoíris (Rainbow Trout) ♥ = Pescados altos en omega-3s	 Bagre de cabeza toro (Bullhead)  Bagre (Catfish)  Trucha 16 pulgadas o menos (Brown Trout 16 inches or less)  Especies de Pez Luna (Sunfish species)	 Especies de Róbalo Negro (Black Bass species)  Carpa (Carp)  Trucha más de 16 pulgadas (Brown Trout over 16 inches)
2 porciones en total a la semana	1 porción en total a la semana	No la consuma

Mujeres de 46 años o más y hombres de 18 años y más pueden comer más pescado

 Trucha Arcoíris (Rainbow Trout) ♥ = Pescados altos en omega-3s	 Bagre de cabeza toro (Bullhead)  Bagre (Catfish)  Trucha 16 pulgadas o menos (Brown Trout 16 inches or less)  Especies de Pez Luna (Sunfish species)	 Especies de Róbalo Negro ♥ (Black Bass species)  Carpa (Carp)  Trucha más de 16 pulgadas (Brown Trout over 16 inches)
6 porciones en total a la semana	2 porciones en total a la semana	1 porción en total a la semana

Este aviso de salud es emitido por la Oficina de Evaluación de Riesgos de Salud Ambiental de California. Divulgar esta información es un proyecto de "The Sierra Fund," en colaboración con "South Yuba River Citizens League," "Wolf Creek Community Alliance," "Nevada Irrigation District," y otros. Financiadores pasados y presentes de este proyecto incluyen: "Clarence E. Heller Charitable Foundation," "California Department of Water Resources," "California Environmental Protection Agency," y "The California Wellness Foundation."

The Sierra Fund

A Protocol to Post State-Issued Fish Consumption Advisories

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The Sierra Fund

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www.sierrafund.org and www.reclaimingthesierra.org