6.0 COMMERCIAL AND SPORT FISHERIES

Section 6.0 provides a detailed description of existing commercial and sport fisheries around the Tesoro Avon Marine Oil Terminal (Avon Terminal) Lease Consideration Project (Project) study area, including environmental and regulatory settings, and examines the potential for impacts on these resources from the continued operation of the Avon Terminal and Marine Oil Terminal Engineering Maintenance Standards (MOTEMS) compliance-related renovation. The major issues focus on: (1) the effects of continued Project operations—including the associated vessel traffic—and renovation on commercial, sport, and subsidence fishery resources and activities; (2) the effects of potential oil spills on fishery resources and activities; and (3) the effects of MOTEMS renovation and continued operations and potential oil spills on subsidence fisheries.

6.1 ENVIRONMENTAL SETTING

6.1.1 Methodology and Data Collection

As discussed in Section 1.0, Introduction, information from relevant documents—including the Shell Martinez Marine Terminal Lease Consideration Environmental Impact Report (EIR) (California State Lands Commission [CSLC] 2011, State Clearinghouse [SCH] No. 2004072114) and the Shore[1] Marine Oil Terminal Lease Project EIR (CSLC 2012, SCH No. 2001042022)—has been referenced and included, as appropriate for the preparation of this EIR.

The detailed geographic focus of this EIR is from the Carquinez Bridge, encompassing the Carquinez Strait and Suisun Bay, to the western edge of the legally defined Sacramento-San Joaquin River Delta (Delta), just west of Pittsburg (approximately 64 square miles). This area encompasses the Avon Terminal and the areas to the east and west that are most susceptible to oil spills. Vessels using the Avon Terminal transit through the San Francisco Bay Estuary (SFBE); therefore, the area from the Golden Gate to the entrance of the Carquinez Strait is the secondary area of study and will be generally described using existing data. Finally, the potential for impacts from vessels transiting the outer California coast will be briefly presented by incorporating information from other documents by reference.

To characterize the existing environment in the SFBE, the California Department of Fish and Wildlife (CDFW; formerly California Department of Fish and Game [CDFG]) catch and landing statistics and other published materials were used to describe commercial and recreational fisheries. Short descriptions of the CDFW fisheries databases are provided to explain their uses and limitations.

[1] Formerly known as the Wickland Marine Oil Terminal, this marine oil terminal is currently known as the Shore Selby Terminal under current ownership title by NuStar.

To standardize fish landing reporting, the CDFW divides coastal and bay waters into reporting blocks. The CDFW provides both commercial and charter boat fish landings by fishing area or block (where fish are caught), and by port or region (where the fish are landed). Fish dealers, processors, or charter boat operators record landings data. For commercial fisheries, data concerning species, weight, catch block, mode (gear type), and price paid to fishing operators are provided to the CDFW. Charter boat operators report to the CDFW the number of fish caught on their boats (CSLC 2011).

The collected fish landings data have their limitations. For commercial fisheries, the data may not be entirely accurate or complete, as fishing operators may report catches in blocks other than where the fish were actually caught. Catches often occur in more than one block, but may be reported for only one block. Because of these limitations, the CDFW data are supplemented by other information to better describe the fisheries.

For recreational data, the charter boat landings provide the only consistent database that records angler catches, despite the fact that catches from recreational private boats, shore/beaches, and piers make up approximately 86 percent of total recreational catches (CSLC 2011). Information from seafood-consumption studies is used to further describe the fisheries, but these data are based on short-term sampling studies that describe a snapshot in time, rather than a long-term history of fishing activity. These databases were used despite these limitations; qualitative updates are provided from other sources, as needed (CSLC 2011).

6.1.2 Carquinez Strait/Suisun Bay Fisheries, West of the Legally Defined Delta

Fisheries Overview

The SFBE is typically divided into five segments: the Delta, Suisun Bay, San Pablo Bay, Central Bay, and South Bay. The Carquinez Strait links the Delta and Suisun Bay with the San Pablo and Central Bays. This system of bays is influenced by the ocean and its tides, and by large volumes of freshwater runoff from the Sacramento and San Joaquin River watershed. The watershed originates in the Sierra Nevada, Coastal, and Cascade mountain ranges, and drains California's Central Valley (CSLC 2011).

One of the environmental influences on the SFBE and its fish is movement of the null zone, which marks the upstream edge of seawater influence and the upstream limit of what is known as the entrapment zone, an area where suspended materials concentrate as a result of mixing by the outgoing freshwater flow from the Delta above the heavier saltwater flow from the bay. The entrapment zone contains concentrations of suspended materials such as nutrients, plankton, and fine sediments that are often many times higher than in areas upstream or downstream of the entrapment zone (Levine-Fricke 2004). This trophically rich habitat is thought to be important for the rearing of many fish species. The location of this zone moves upstream and downstream several miles daily; its precise location between the lower Delta and Suisun

Bay varies according to the strength and phase of the tides, and the level of freshwater outflow from the Sacramento and San Joaquin Rivers. High freshwater flows from the Delta push the entrapment zone west toward the Carquinez Strait; low flows put it closer to the mouth of the Delta.

Historical Summary and Trends

Historically, major native fisheries in the area included shrimp, sturgeon, and Chinook salmon, among others. Striped bass, an introduced species, is also very popular among anglers in the SFBE.

The SFBE fisheries have always been important to humans, as evidenced by the tens of thousands of people who lived along its shores before Europeans arrived. By the 1800s, fish were a major resource for settlers, with the primary species being Chinook salmon, sturgeon, striped bass, and Pacific herring. The Bay-Delta region was the largest fishing center on the west coast. However, human use of the Sacramento River system and SFBE took a heavy toll. Adverse impacts on SFBE and fisheries began with siltation caused by hydraulic mining in the mid-1800s. As California's population grew, extensive land reclamation, dredging and filling, urban development, water pollution, dams, upstream water diversions, and other water developments altered the SFBE to such an extent that SFBE fisheries declined significantly. Historically, overfishing also took a toll on fisheries; however, in recent years, other activities have caused major declines (CSLC 2011).

Another factor that drastically changed SFBE trophic structure was the introduction of non-native plant and wildlife species, beginning in the 19th century. Non-native species have been introduced to the SFBE via a number of vectors, including the deliberate introduction of species (e.g., American shad, striped bass, carp, and catfish) for recreational or commercial purposes and transoceanic vessel traffic. The combination of hull fouling and ballast water from vessels is the single largest contributor of non-native species to the SFBE. One important invasive species in the Project vicinity is the overbite clam, *Corbula amurensis*. Thought to have been introduced into the SFBE by ballast water exchange from a cargo ship, this phytoplankton-consuming species is now so abundant that the current population is capable of filtering the water column over the SFBE shallows almost 13 times per day and has caused a crash in the abundance of phytoplankton in the SFBE (San Francisco Estuary Partnership [SFEP] 2004).

Shrimp

The shrimp fishery began in the early 1860s; by 1871, Chinese immigrants fished using stationary shrimp nets and were exporting large quantities of dried shrimp meal to China. In 1890, annual landings peaked to over 5 million pounds. By 1915, shrimp were fished by beam trawl and in 1935, landings totaled 3.4 million pounds. Landings steadily declined due to reduced demand for fresh and dried shrimp for food. By the early

1960s, average annual landings declined to 1,500 pounds. In 1965, this fishery rebounded as a viable source of bait for sturgeon and striped bass sport fishing (CDFG 2001).

Shrimp populations appear to vary widely from year to year. Studies show that abundance of bay shrimp increases with increased river inflow to the estuary, probably because juvenile shrimp favor low-salinity habitat. Harvest management is limited to compiling logbook data and monitoring species composition in bay shrimp landings. Catch limits, closed seasons, or restricting harvest in areas are not considered necessary by fisheries regulators because the limited demand maintains fishing effort at levels that would not threaten long-term sustainability of the species. If freshwater inflows increase due to upstream fishery restoration efforts, there may be a beneficial effect on the shrimp fishery (CDFG 2001).

Sturgeon

Sturgeon remains have been found in Native American middens in the Bay-Delta region. White sturgeon has dominated the fishery, although there have been small catches of green sturgeon. The commercial fishery lasted from the early 1860s to 1901, and concentrated in the SFBE. Fishing gear included gillnets, longlines, and multiple unbaited hooks. Landings peaked at 1.65 million pounds in 1887, then declined to 0.3 million pounds in 1895 and to 0.2 million pounds in 1901, when the fishery was closed. Sport fishing for sturgeon was later legalized in 1954. In 1964, the small catch increased significantly when the minimum size limit decreased from 50 inches to 40 inches and it was discovered that bay shrimp were effective bait. By the 1980s, the harvest rate was 40 percent greater than the rate during the two earlier decades. In 1992, a minimum size limit of 46 inches and a maximum 72-inch size limit were established to protect the species from over harvest (CDFG 2010). Effective in 2013, white sturgeon must measure between 40 inches and 60 inches (CDFW 2013a). Permitted fishing gear is limited to barbless hooks and line.

Sturgeon annual harvest estimates show that angling regulation changes started in 1990 are reducing harvest rates by approximately 50 percent of the levels seen in the 1980s (CSLC 2011). Despite the decreased fishing effort, sturgeon populations vary greatly over the years. Angler catch and mark-recapture study information suggests that strong year classes since 1980 have occurred only during 5 of the 10 years when the Sacramento Valley Water Year Index was rated “wet.” An abundance estimate of 142,000 adult fish was reported in 1997 (CDFG 2010). Annual fish populations vary due to changes in high spring freshwater outflows from the Delta, and scientists attribute the high population levels to the very wet 1982–1983 period. Conversely, experts note that the severe 1987–1992 drought adversely affected reproductive success and caused a substantial decline in the adult sturgeon population, as recruitment nearly ceased and reduced growth rates and mortality limited the abundance of fish in the harvestable

population (CSLC 2011). Charter boat catch statistics for CDFW block 308 (in which the Avon Terminal is located) mimic these trends. From 1998 to 2000, only 85 sturgeon were caught, compared to 561 caught from 2002 to 2004. On average, 208 sturgeon per year were reported caught from 2005 to 2012. Of these, approximately 50 per year were kept. In 2013, 306 sturgeon were caught; 38 were kept and the remaining 268 were thrown back (CDFW 2014).

Pacific Salmon

Of the five species of Pacific salmon found on the Pacific coast, Chinook, *Oncorhynchus tshawytscha*, and coho, *O. kisutch*, are the species most frequently encountered in California fisheries. As with sturgeon, salmon fisheries existed long before European settlers arrived in the 1700s. Harvests of Sacramento/San Joaquin watershed salmon by American Indians may have exceeded 8.5 million pounds annually. Traditional fishing methods included use of gill and dip nets, fishing spears, and communal fish dams. The commercial fishery began with the advent of the gold rush. By 1860, the gillnet fishery was well established in Suisun Bay, San Pablo Bay, and the lower reaches of the two rivers. The canning industry stimulated the growth of the fishery, with canneries operating throughout the river system. In 1882, the fishery reached its peak when 12 million pounds were landed. Shortly thereafter, the fishery collapsed due primarily to pollution and degradation of rivers by mining, agriculture, and timber operations, combined with increased landings. By 1919, the last cannery closed, and in 1957, the last inland commercial fishing area open to the general public was permanently closed (CDFW 2013b).

The ocean troll fishery continued and today's trollers use fishing techniques developed during the 1940s. In addition, electronic equipment has significantly increased the efficiency of the modern troller. Prior to 1990, the fishing industry enjoyed relatively high and consistent harvests, averaging approximately 7 million pounds annually of salmon; the largest catch was 14.4 million pounds in 1988. Later commercial harvests have been much more erratic, but have generally been substantially lower. In 1993, to protect stocks, the retention of coho salmon was prohibited in all California commercial fisheries. A sudden collapse of Sacramento River Chinook salmon in 2007 led to a complete closure of the fishery in 2008 and 2009, and while open in 2010 and 2011, it remained considerably constrained (CDFW 2013b).

The ocean sport fishery became popular with the development of the commercial passenger fishing vessel after World War II. The highest sport landings occurred in 1995, when anglers landed a record 397,200 Chinook statewide, which, in addition to the SFBE basin, includes other river basins such as the Klamath River. Prior to the 2008 and 2009 closure, lower recreational landings were typically associated with strong El Niño events, which result in warming sea surface temperatures, poor upwelling, and lower productivity. After the 2007 collapse, the lowest harvest on record

was in 2010, when only 14,800 Chinook salmon were caught statewide (CDFW 2013b). Oceanic and in-river conditions play major roles in salmon catches; however, the variability can also be attributed to changes in fishery regulations. Since 1988, progressively more restrictive regulations have been imposed on the commercial fishery to protect stocks of special concern, including those that are federally and State-endangered or threatened species. As an example, the sport fishery is the only allowable salmon fishery in the SFBE (CSLC 2011).

Striped Bass

A major sport fishery has evolved around the striped bass, with an estimated annual value exceeding $47 million in 1985 (CDFG 2001). Striped bass were introduced in 1879 by railcar from the east coast; 132 were unloaded in Martinez and released in the Carquinez Strait. Three years later, 300 more bass were shipped in and released; the entire west coast striped bass fishery evolved from these introductions (CDFG 2001). In the 1970s, legal-sized bass (over 18 inches) numbered around 2 million. By 1995, because of pollution and freshwater diversions, the population of legal-sized bass hovered around 800,000 (California State Coastal Conservancy 1995). The primary California population of striped bass is found in the SFBE, although there have also been introductions in various reservoirs and the ocean in southern California (CDFG 2001).

Fisheries near the Avon Terminal

The Avon Terminal is located in CDFW fish block 308. This block encompasses the Carquinez Strait and the western extent of Suisun Bay; block 302 includes the remainder of Suisun Bay. Landings for block 308 are reported in the following paragraphs and in Appendix F. For all CDFW blocks, catch block data appear to be sporadic from year to year due to inaccuracies in the reporting of landing locations. The data are supplemented by information from other sources (CSLC 2011).

Commercial Fisheries

The prominent commercial fishery in the vicinity of the Avon Terminal is the shrimp trawl fishery. The modern fishery, which began in 1965, has been harvested entirely by beam trawl. Most shrimp are harvested for bait; a small percentage of catch is still reserved for human consumption. Live tanks are used on all vessels, and shrimp are transported to local bait shops by truck in either the tanks or iced-down wooden trays.

From 1991 to 2004, recorded landings in block 308 totaled over 21,000 pounds (65 percent of the total catch in the block). These landings compare with over 19.4 million pounds for the entire SFBE; by far, most shrimp were caught in the South Bay. Along with shrimp, trawlers also harvest staghorn sculpin, yellowfin goby, and Chinook salmon, totaling 2,558, 2,269, and 3,399 pounds, respectively (25.5 percent of the

catch), over the same time period in block 308 (CSLC 2011). Between 2005 and 2012, shrimp were harvested from block 308 only in 2007 (325 pounds) and 2012 (3,391 pounds). Approximately 4,625 pounds of shrimp were harvested in 2013 (see Appendix F).

Current information indicates that shrimp trawling occurs in San Pablo Bay and Suisun Bay, including waters near the Avon Terminal (see Figure 6-1). Fishing also occurs in waters less than 20 feet deep in the channels of the SFBE's shallow reaches. Fishing occurs year round, but landings usually peak during the months of June through November. Monthly variations in landings may have as much to do with changes in salinity in the water as with fluctuations in demand by sport anglers (CDFG 2001).

Expectations for the shrimp fishery remain as they are now; most of the product is used for angler bait, and little is reserved for human consumption. The market is not expected to change much over the next 20 years.

Charter/Private Boat Sport Fisheries

Marinas near the Avon Terminal include Martinez, Crockett, Benicia, Glen Cove, and Vallejo. In Suisun Bay, Port Suisun, Suisun Marina, Pierce Harbor, Solano Yacht Club, Harris Yacht Harbor, and McAvoy Yacht Harbor service sport boats. In all, 11 facilities provide launches and berths for charter and private boats. Figure 6-2 shows that the Carquinez Strait and Suisun Bay provide habitat for and support numerous fisheries.

The nearest marina to the Project is the Martinez Marina and Yacht Club, located approximately 3 miles west of the Avon Terminal. The marina is open year round and has approximately 250 slips. It is primarily a fishing marina. The marina harbors approximately three charter fishing boats and 10 oil spill response vessels (CSLC 2011).

The city of Martinez adopted a Marina Master Plan in 1993 to upgrade and replace the marina. To date, the old ferry pier has been removed, a plaza and new boat launch have been constructed, and dredging has been conducted at the entrance. Additional dredging, breakwater repair, and entrance reconfiguration are planned over the next several years, contingent on funding (City of Martinez 2013).

Compared to the rest of the SFBE, charter boat activity is relatively light, with sturgeon and striped bass the main fisheries of interest. Recorded charter-boat data for CDFW block 308 show that striped bass and sturgeon are the most popular species caught in the area, with occasional landings of halibut, flounder, and leopard shark (see Appendix F). Charter boats are most active out of the Martinez Marina during sturgeon season, roughly October to April; private boat anglers are expected to follow similar fishing patterns (CSLC 2011).

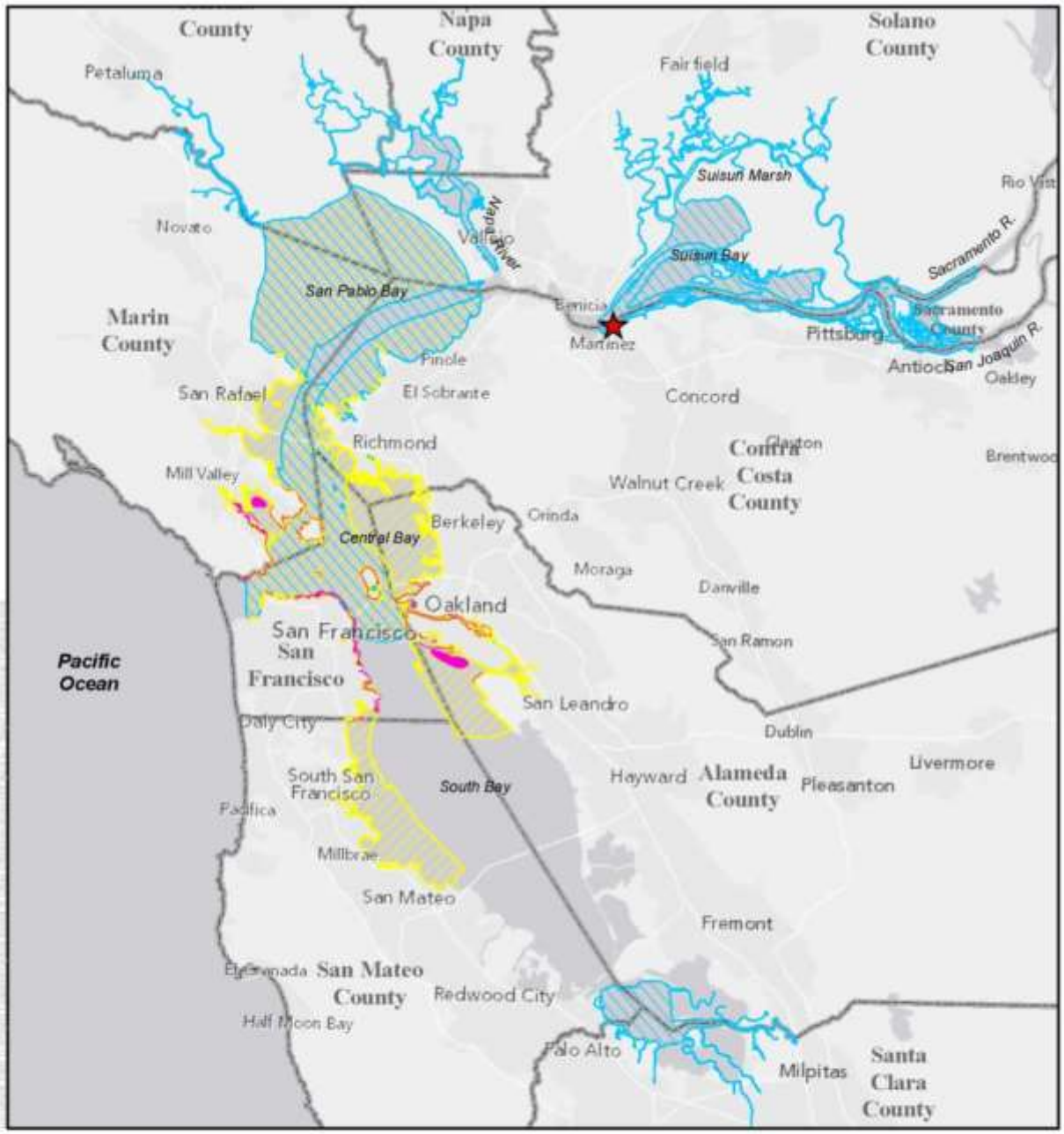


Figure 6-1
Major Commercial Fisheries
California State Lands Commission
Avon Marine Oil Terminal Lease Consideration Project

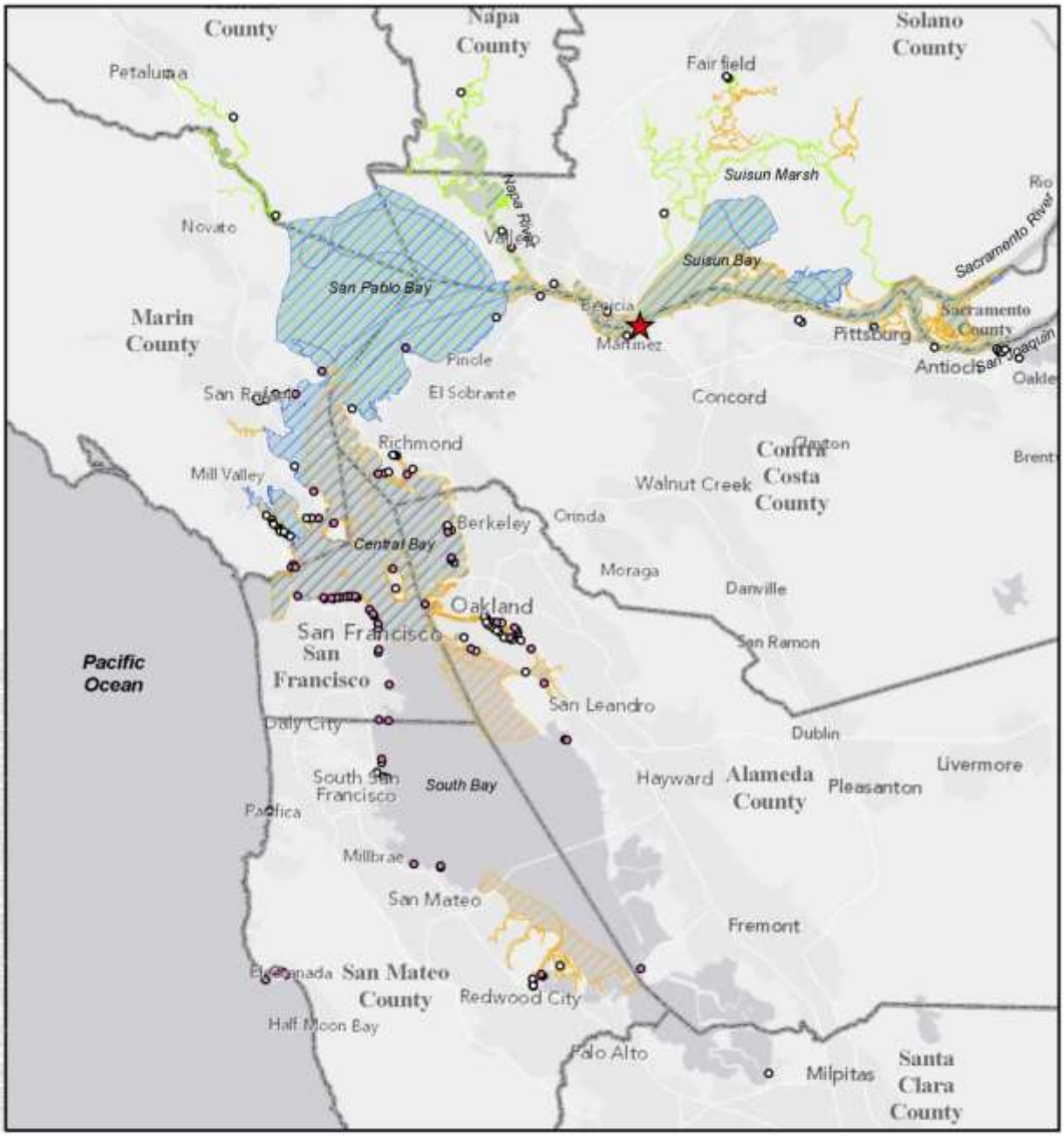
Approximate Terminal Location
Pacific Herring Spawning Areas
Blacktail Bay Shrimp
California Bay Shrimp

N

TRC
Results you can rely on

9/9/2014

0 4 8 Miles


Marin County
Napa County
Solano County
Petaluma
Novato
Fairfield
Suisun Marsh
Napa River
Suisun Bay
Sacramento River
San Pablo Bay
Benicia
Martinez
Pittsburg
Antioch
Pinole
El Sobrante
Concord
San Rafael
Richmond
Mill Valley
Walnut Creek
Contra Costa County
Berkeley
Orinda
Central Bay
Moraga
Danville
Oakland
San Francisco
San Ramon
Pacific Ocean
San Leandro
Daly City
Dublin
South San Francisco
South Bay
Hayward
Alameda County
Pleasanton
Livermore
Pacifica
Millbrae
San Mateo
Fremont
San Mateo County
Redwood City
Half Moon Bay
Palo Alto
Milpitas
Santa Clara County
Figure 6-2
Major Sport Fisheries
California State Lands Commission
Avon Marine Oil Terminal Lease Consideration Project
Approximate Terminal Location
Fishing Pier
Marinas
American Shad
Striped Bass
White Sturgeon
N
TRC
Results you can rely on
8/13/2014
0
4
8
Miles

Demand for recreational fishing, in general, may increase as the San Francisco Bay Area (Bay Area) population increases. However, recreational fisheries are on a general decline. As with commercial fisheries, recreational fishing growth is limited more by the supply of healthy fish than by demand. The Office of Environmental Health Hazard Assessment (OEHHA) has issued recommendations limiting the amount of some fish eaten from the SFBE due to mercury and polychlorinated biphenyl contamination (OEHHA 2011). Therefore, if the condition of the SFBE significantly improves, recreational fishing will likely increase. The reverse situation is also possible.

Pier and Shore Fishing

Public piers, shoreline, and beach areas that provide access for fishing are located throughout the Bay Area; however, access to the open water in the immediate area of the Avon Terminal is limited. Most shoreline access is provided in or near marinas and on or near several piers. Piers and public shoreline areas near the Avon Terminal include Martinez Marina, Martinez Park and public pier, 9th Street Park and pier in Benicia, Benicia Marina and pier, Benicia State Recreation Area, Crockett Marina and Dowrelio Pier, and Vallejo fishing pier and shoreline parks. Anglers have been known to catch flounder, sturgeon, shad, salmon, steelhead, and striped bass from these areas. The Martinez public pier is popular with shoreside anglers going after sturgeon and striped bass (CSLC 2011).

6.1.3 San Francisco and San Pablo Bay Fisheries

Commercial Fisheries

Shrimp

Bay and brine shrimp fishing occurs year round. In 1965, this fishery was developed to supply bay shrimp as live bait for sturgeon and striped bass sport fishing. A small percentage of catch is still consumed fresh. The commercial harvest has been caught entirely by beam trawl; live tanks are used on all vessels, and shrimp are transported to local bait shops by truck in either the tanks or iced-down wooden trays. Staghorn sculpin, yellowfin goby, and long jaw mudsucker are also caught and sold by shrimpers (CSLC 2011).

Key fishing locations include the South Bay, San Pablo Bay, and Suisun Bay (refer to Figure 6-1). Fishing also occurs in waters less than 20 feet deep in the channels of the SFBE's shallow reaches. Currently, the number of vessels harvesting shrimp ranges from to eight to 10. Three trawlers fish in the South Bay, six in the North and San Pablo Bays, and one roams throughout the SFBE (CSLC 2011). From 1991 to 2003, recorded landings for Bay Area ports totaled 14.9 million pounds and averaged 1.1 million pounds per year. From 2000 to 2003, landings were less than the longer-term average, and ranged from more than 972,000 pounds to more than 607,000 pounds (CSLC 2011).

Shrimp landings in 2010 and 2011 were approximately 56,000 pounds and 38,000 pounds, respectively, with no reporting of brine shrimp (CDFG 2011 and 2012a).

Pacific Herring

The SFBE Pacific herring harvest occurs during spawning season, generally from December through March, until quotas are filled. The focus of the fishery is the roe of the herring, which is exported to Japan. Fishing is conducted mainly with gillnets (CDFW regulations phased out the use of round haul nets), and a few fishing interests use the roe-on-kelp method. Kelp is harvested from Monterey Bay and southern California, and is hung from floating rafts or beneath piers in the SFBE. Herring spawn on the kelp, which is then landed and processed (CDFG 2008).

The SFBE produces from 90 to nearly 100 percent of the State's herring catch (CDFG 2008). Over the past decade, most herring fishing has occurred in CDFW block 488 (Central Bay), according to the CDFW. However, herring spawn and a portion of the fishery occurs in the South Bay, especially during years with higher-than-normal rainfall (CSLC 2011).

Herring fisheries are highly managed by the CDFW through the use of area closures, timing and gear restrictions, and quotas. Regulations change annually based on the previous year's estimates of spawning biomass. Currently, the CDFW allows harvest of approximately 10 to 15 percent of the herring that are expected to return to spawn (CDFG 2008). The SFBE Pacific sac-roe herring fishery experiences annual ups and downs (exceeding 20 million pounds landed in 1982, 1989, and 1997, but declining to just 362,000 pounds in the 2004–2005 season), and was closed in the 2009 season (Saving the Bay 2013). The value of the sac-roe herring fishery peaked during the 1995–1996 season, at $19.5 million, and has been steadily declining since. The fishing revenue from the 2006 harvest was just $426,000 (CDFG 2008). Lower harvests have typically occurred during or after El Niño events.

Other Fisheries

The SFBE is a nursery area for Dungeness crab, an important ocean commercial and sport fishery north and south of the SFBE. The Bay Institute reports that the number of young Dungeness crabs in the SFBE is on the rise. The recent increase in abundance may be related to improved ocean conditions, as well as efforts to reduce pollution and restore tidal marsh habitat in the SFBE (CSLC 2011).

Three principle commercial gears used to catch California halibut include otter trawl, set gill net, and hook-and-line. Hook-and-line fishing for halibut makes up less than 20 percent of the total commercial California halibut landings, the majority of which occur within the SFBE fishery (CDFW 2013b).

Sport Fisheries

The SFBE supports a wide variety of fishes for sport fishing opportunities, including charter fishing, private boat fishing, pier fishing, and beach/shore fishing. The most popular game fishes caught in the SFBE are striped bass and sturgeon. Salmon fishing occurs within freshwater and in the SFBE, as well as in the ocean outside of the Golden Gate. Striped bass, sturgeon, and American shad are caught throughout the SFBE. Surfperch, halibut, smelt, rockfishes, sharks, rays, clams, and other species also offer fishing opportunities to Bay Area anglers (CSLC 2011).

Between 1989 and 2003, the number of charter boats operating out of the SFBE ranged from a high of 93 to a low of 44, averaging 59 over the 15 years. In 2003, 44 charter boats operated in the SFBE, the total number of anglers was 52,747, and a total of 150,031 fish were caught (CSLC 2011).

In 2001, the California Department of Health Services and San Francisco Estuary Institute (SFEI) conducted a seafood-consumption study and surveyed anglers throughout the SFBE. The results of the survey indicate that striped bass, halibut, and sturgeon are the most commonly consumed species of party and private boat anglers (SFEI 2001). Pier and shoreside anglers surveyed by the seafood-consumption study consumed a high percentage of striped bass similar to boating anglers, but ate higher percentages of white croaker and jacksmelt (SFEI 2001).

6.1.4 Outer Coast: Oregon Border to Mexico

Commercial and Sport Fisheries

Commercial fisheries are generally described using port landings for all ports in California, including those in Eureka, San Francisco, Monterey, Santa Barbara, Los Angeles, and San Diego. Collectively, these ports reported a total of 4.9 billion pounds of fish taken from 1989 through 2000 (CSLC 2011). Based on the annual average, a similar amount (407 million pounds) was taken in 2011. Of this, approximately 65 percent was market squid (CDFG 2012a). For sport fisheries, in northern California, a total of 72.9 million finfish were reported taken by surveyed anglers from shore, party boats, and private boats from 1989 to 2001 (CSLC 2011), averaging approximately 6 million per year. For the same years in southern California, 163.7 million finfish were reported caught by surveyed anglers (CSLC 2011), averaging approximately 13.6 million per year. In 2010, reported landings in northern and southern California were 484,000 and 1.35 million, respectively (CDFG 2011). In 2011, reported landings in northern and southern California were 666,000 and 1.85 million, respectively (CDFG 2012b).

Marine Aquaculture and Kelp Harvesting

There are 41 registered marine aquaculture facilities located along the California coast, and marine aquaculture leases totaled 11 in 1998. As of 2001, seven kelp bed lessees leased 24 kelp beds, totaling 32.56 square miles, from Año Nuevo (San Mateo County) to San Diego (CSLC 2011).

6.2 REGULATORY SETTING

This section describes the two general types of regulatory tools used to help ensure responsible human activities—controls on human development and resource harvesting management.

The CSLC manages and protects important natural resources and uses on public lands, including tidelands. Commercial and recreational fishing, kelp harvesting, and aquaculture are all considered important uses by the CSLC. Permits are issued for development on tidelands, and mitigation is often required to help protect natural resources and access to those resources.

Coastal zone development is regulated by the San Francisco Bay Conservation and Development Commission (BCDC) and the California Coastal Commission (CCC), depending on the location. The BCDC develops and implements plans for the conservation and development of SFBE waters and regulates shoreline development, including commercial and recreational fishing facilities. The CCC, which has authority along the coast (excluding the SFBE), helps ensure that the biological productivity of coastal resources is maintained, enhanced, and restored for commercial, recreational, scientific, and educational purposes. It ensures that onshore commercial and recreational fishing facilities are protected and, where feasible, upgraded.

National Oceanic and Atmospheric Administration (NOAA) Fisheries is responsible for protecting special-status species under the Endangered Species Act. Additionally, the CDFW, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers (USACE) have regulatory authority to manage development and ensure the protection of aquatic resources. The CDFW is responsible for enforcement of the State-endangered species regulations and the protection and management of all State biological resources. The CDFW's Office of Spill Prevention and Response (OSPR) is also responsible for the State's spill response capability. The OSPR contracts oil spill response organizations to ensure available resources in accordance with the San Francisco Oil Spill Contingency Plan, and monitors these organizations' response capabilities through unannounced drills and other methods. Water quality management and the permitting of discharges into State waters are administered by the California Regional Water Quality Control Board under the Porter-Cologne Act and the federal Clean Water Act.

Fisheries, aquaculture, and kelp harvesting are overseen by several State and federal agencies, including the CDFW, Pacific Fisheries Management Council (PFMC), and NOAA Fisheries. Fisheries are defined, by broad definition of the Federal Fishery Conservation and Management Act (FCMA), as fish, their habitat, and fishing activities. Salmon, groundfish, and pelagic fish species are managed under individual fisheries management plans authorized under the FCMA, Sustainable Fisheries Act, and American Fisheries Act. Within California, most of the legislative authority over fisheries management is enacted within the Marine Life Management Act. This law directs the CDFW and the Fish and Game Commission to issue sport and commercial harvesting licenses, as well as licenses for aquaculture operations. The PFMC—a regional entity with representatives from the fishing industry, the public, and State and federal biological resource management agencies—imposes seasonal, geographic, and gear limitations to maintain healthy fisheries populations and prevent overfishing. If resources are adversely affected to the extent that productive habitat or populations are reduced, harvesting managers will likely respond by limiting harvests.

6.3 SIGNIFICANCE CRITERIA

For the purposes of this analysis, an impact was considered to be significant and to require mitigation if it would result in any of the following:

- Reduce any fishery in the SFBE or along the outer coast by 10 percent or more during a season, or reduce any fishery by 5 percent or more for more than one season
- Affect kelp and aquaculture harvest areas by 5 percent or more
- Cause lost harvesting opportunities due to harbor closures; impacts on living marine resources and habitat; and equipment or vessel loss, damage, or subsequent replacement
- Cause substantial or sustained impact on spawning habitat of commercially important species

To determine the impacts associated with routine operations over the life of the CSLC lease, the following facts and assumptions were used:

- Over the last 10 years, tankers made an average of 124 vessel calls per year, with a low of 38 in 2011 and a high of 181 in 2005 (refer to Table 2-4 in Section 2.0, Project Description). The anticipated level of shipment activity is not expected to change substantially over the 30-year life of the CSLC lease. The anticipated maximum of annual ship and barge traffic can be expected to range from approximately 70 to 120 vessels.
- Vessels will comply with a voluntary agreement made with the CDFW to maintain a minimum distance of 50 nautical miles offshore from the mainland for loaded

crude oil tankers transiting between Alaska and California. Vessels will travel within established 1-mile-wide traffic lanes to San Francisco from the north, south and west until entering the Precautionary Area, where eastbound and westbound traffic merges west of the Golden Gate. Once inside the Precautionary Area, vessels will traverse Regulated Navigational Areas (RNAs), the Carquinez Strait, and Bulls Head Channel on their way to and from the Avon Terminal, as described in Section 2.0, Project Description and shown on Figure 2-6.

- A space-use conflict would arise when the space available to conduct an activity is limited and competing demands are made for the available space.
- Fishing operators normally navigate a safe distance from an obstacle to avoid collision and entanglements.
- To maintain the required depth below mean lower low water, the docking face of the Avon Terminal would be periodically dredged over the 30-year life of the lease. The last dredging operation occurred in 2012, and removed approximately 3,827 cubic yards of material.

6.4 IMPACT ANALYSIS AND MITIGATION

The following subsections describe the Project's potential impacts on commercial and sport fisheries. Where impacts are determined to be significant, feasible mitigation measures (MMs) are described that would reduce or avoid the impact.

6.4.1 Proposed Project

Impact Commercial and Sport Fisheries (CS)-1: Cause space-use conflicts with commercial or recreational sport fisheries as a result of routine Avon Terminal operations. (Less than significant.)

Avon Terminal operations occur in CDFW block 308, and the prominent commercial fishery is the shrimp trawl fishery. Most fishing takes place in San Pablo and Suisun Bays (Smith and Kato 1977). Recreational sport fishing can occur at any location within the Bay-Delta. Boat and shoreside anglers target striped bass, leopard shark, sturgeon, flounder, and halibut. Routine Project operations are considered part of baseline conditions, are not expected to expand, and would not be expected to result in any temporary reduction of commercial or recreational sport fishing, result in lost harvesting time because of harbor closures, damage equipment or vessels, or cause impacts on living marine resources or habitat that would have a significant effect on either commercial or recreational sport fishing. At present, no kelp harvesting or aquaculture is conducted within the Bay-Delta, nor is any projected to occur in the foreseeable future. Therefore, there would be no impact on kelp harvesting or aquaculture.

Mitigation Measure: No mitigation required.

Impact CS-2: Cause space-use and navigation conflicts with commercial fisherman as a result of tanker and barge traffic to and from the Avon Terminal. (Less than significant.)

Vessels in transit between the Avon Terminal and the Pacific Ocean pass through active Pacific herring and bay shrimp fishing areas. All tankers and barges are restricted to existing navigation channels through SFBE and are required to cooperate with the U.S. Coast Guard (USCG) Vessel Traffic Service and pass through RNAs to reduce vessel congestion. They are restricted to the RNAs and established navigation channels while transiting SFBE. Commercial herring fishing occurs primarily in the South Bay and Central Bay. In the Central Bay, shipping corridors used by vessels calling at the Avon Terminal pass through herring fishing areas around Angel Island, off Alcatraz, and along portions of the Tiburon shore. Between 2009 and 2013, Tesoro Refining and Marketing Company, LLC (Tesoro) had approximately 19 vessels lighter at Anchorage 9 related to Avon Terminal operations. In the South Bay, lightering operations at Anchorage 9 could continue to interfere with herring fishing operations. In the Central Bay and San Pablo Bay, vessels transiting to and from the Avon Terminal would continue to pass through shrimp trawl grounds. Commercial fishing boats, primarily trawlers, are able to avoid large vessels located within the shipping channel. The Project would not result in any increases in vessel trips to and from the Avon Terminal; thus, no additional navigational conflicts are anticipated over those that may have occurred in past years and are part of baseline conditions. Therefore, this impact would be less than significant.

Mitigation Measure: No mitigation required.

Impact CS-3: Cause space-use and navigational conflicts with recreational and sport fishing activities as a result of tanker and barge traffic to and from the Avon Terminal. (Less than significant.)

Sport fishing navigational or space-use conflicts between recreational anglers (operating from either commercial party boats or private vessels) and the tankers and barges transiting between the Avon Terminal and Pacific Ocean are expected to be minimal. Recreational fishing for starry flounder, shark, rockfish, sturgeon, halibut, striped bass, and American shad occurs from shore and both anchored and drifting boats, depending on the targeted fish species. Because no additional vessel trips are proposed as part of the Project, no additional conflicts with recreational fishermen are expected over what may have occurred in the past and are part of baseline conditions. Therefore, this impact would be less than significant.

Mitigation Measure: No mitigation required.

Impact CS-4: Cause substantial direct and/or indirect impacts on aquatic biota through the changing of physical and chemical environmental factors as a result of maintenance dredging. (Less than significant.)

Turbidity and suspended-sediment concentration (SSC) can be much greater than ambient conditions in the immediate vicinity of dredging activities. Increased turbidity increases light attenuation, which can reduce phytoplankton productivity, reduce the feeding of some fish species, and change feeding and migration patterns, while increased SSCs can bury the benthic community, reduce the water-filtration rates of filter feeders adjacent to the dredge area, or increase fish gill injury (National Marine Fisheries Service 2004). Estimates of the amount of material that is resuspended during dredging range from 0 to 5 percent (Suedel et al. 2008). Dredging at the Avon Terminal would potentially resuspend 191 cubic yards of sediment over the course of dredging activity. The majority of sediment resuspended during dredging activities resettles within 50 meters of the dredge site within 1 hour (Anchor Environmental 2003), though plume effects can be observed as far downstream as 400 meters (Clarke et al. 2007b). Densities of suspended sediment over ambient levels decrease with distance from the dredge site and are more pronounced at the bottom of the water column than near the surface (Clarke et al. 2007a). However, sediment plumes are unlikely to have lasting effects given the high background turbidity; in one study in San Pablo Bay, dredging plumes were found to have only a localized effect (Schoellhamer 2002). Resuspended sediments near the surface of the water column are expected to dissipate downstream, where they would not increase sediment significantly above ambient levels. Therefore, impacts from increased turbidity and increased SSC concentrations on pelagic species would be less than significant.

Dredging would remove the existing infauna community and alter the substrate composition and topography at the Avon Terminal. Following the completion of dredging, the benthic community is expected to undergo typical ecological succession patterns. As described in Section 4.2, Biological Resources, the benthic community at any estuarine location is dependent on salinity levels. Following salinity-change events, it takes several months for the initial group of benthic organisms to settle and grow. Because freshwater flows into SFBE may change over the course of dredging, it is likely that the benthic community that forms in the dredged area would be composed of species with a different salinity tolerance than those that were removed. However, a change in community composition would occur naturally in the absence of the dredging project due to the seasonal variation in salinity levels at the site. Therefore, this impact would be less than significant.

Indirect effects from dredging are anticipated to include the potential spread of nonindigenous aquatic species (NAS) as a result of disturbing the benthic habitat, although dredging does not pose a significant risk of introduction of new NAS. Dredging would create newly disturbed benthic habitat, making the area attractive for settlement

by opportunistic NAS. However, maintenance dredging disturbs areas that are continually disturbed due to maintenance dredging and vessel traffic. Maintenance dredging at the Avon Terminal is intermittent and minor. As such, it is expected that further spread of NAS within the SFBE resulting from maintenance dredging at the Avon Terminal may impact but is not likely to significantly impact aquatic biota.

Scheduled maintenance dredging is known sufficiently in advance and Tesoro continues to comply with applicable permits to ensure that appropriate assessments are conducted prior to conducting maintenance-related dredging. Dredged spoils are tested and managed according to permits issued by jurisdictional agencies, including the CSLC, USACE, BCDC, and San Francisco Bay Regional Water Quality Control Board. Because disturbance from dredging operations is intermittent and impacts are temporary, impacts from routine maintenance dredging are anticipated to be less than significant.

Mitigation Measure: No mitigation required.

Impact CS-5: Cause impacts on commercial and recreational sport fisheries as a result of minor fuel, lubricant, and/or boat-related spills. (Less than significant.)

With continuing operation, the Avon Terminal would remain a potential point location for minor fuel, lubricant, and other boat-related spills. Any uncaptured material would be dispersed into the waters around the Avon Terminal, degrading the quality of the water column and benthic habitat in the vicinity of the Avon Terminal. Though minor spills are not an occurrence of normal Project operations and best management practices are in place to prevent them, they are reasonably foreseeable as a result of the Project.

No significant adverse impacts on fisheries are expected from minor spills associated with the ongoing operation of the Avon Terminal. Any minor amounts of contaminants that are released into the water would be quickly dispersed by the swift currents in the Carquinez Strait such that concentrations of pollutants would not achieve the levels at which harm to aquatic species is observed.

Although impacts from minor spills are adverse, they are not expected to have a significant effect on fisheries near the Avon Terminal.

Mitigation Measure: No mitigation required.

Impact CS-6: Cause impacts on commercial and recreational sport fisheries as a result of major fuel, lubricant, and/or boat-related spills. (Significant and unavoidable.)

Shrimp, herring, and sport fisheries in the Central Bay, North Bay, San Pablo Bay, Carquinez Strait, Napa River, and Honker Bay are at highest risk of spill contamination.

The Carquinez Strait/Suisun Bay is a migratory corridor and feeding/rearing area for many different sport fish species, including striped bass, sturgeon, and salmon. In addition, SFBE marinas, launch ramps, and fishing access points may be threatened, contaminated, or closed. Impacts from spills would depend on the quantity spilled. Light oils, such as fuel oil, are acutely toxic and cause the greatest impacts on species that live in the upper water column, while most crude oils do not mix well with water and can cause severe, long-term contamination to intertidal areas and cause oiling of fishery infrastructures. Heavy oils, such as heavy crude and some fuel oils, weather slowly and may cause severe long-term contamination of intertidal areas and sediments. Depending on the weight of the oil, spills may harden and wash up along the shoreline.

Crude oils contain a large proportion of highly persistent tar-like compounds. Volatile components of crude oil stock disappear over a few days, but the heavier fractions form an emulsion with sea water (called “mousse”), which allows greater dispersal of oil. Some fraction of crude oil would aggregate into tarballs or mats. The more exposed to the elements oil is, the more rapidly it weathers. The heaviest oils may sink in the water, contaminating the water column and being forced by tidal waves into the substrate.

Fish can be killed or injured from contact with oil spills. The susceptibility of fish to a spill depends on its growth stage, feeding behavior, and the type of oil. Juvenile fish and bay shrimp that use shallow or near-surface waters are susceptible to acute toxicity from lighter oils, while fish that swim lower in the water column, such as salmon and sturgeon, are less likely to come in direct contact with oil. Fish may come into direct contact with oil, thus contaminating their gills; they may absorb toxic components of oil through their skin; and they may suffer adverse effects from eating contaminated food. Substrate that herring use for spawning could become oiled by a large spill. Oil from the Cosco Busan container ship spill in 2007 was listed as one of several factors that may have contributed to the steep decline in herring that led to the closure of the fishery in 2009 (Saving the Bay 2013).

Oil Spill Analysis

As presented in Section 4.1, Operational Safety/Risk of Accidents, the trajectory and extent of an oil spill from the Avon Terminal would depend on the amount of the spill and the season. Based on modeling conducted for the nearby Tesoro Amorco Marine Oil Terminal (Amorco Terminal), while spills at or near the Avon Terminal have the potential to travel through Carquinez Strait into San Pablo Bay and into Suisun Bay and its associated marshes, the highest probability of contact with oil would occur within the direct vicinity of the Avon Terminal. The trajectory of the spill and the extent of its distribution would vary seasonally. A spill in winter during the flooding season would be carried by heavy Delta outflows into San Pablo Bay, oiling shorelines and facilities along the Carquinez Strait. During the dry summer months, spills would be carried upstream along tidal currents and dispersed by wind into Suisun Bay.

Table 4.2-2 in Section 4.2, Biological Resources, shows the biomass of fish and invertebrates that would be impacted from a modeled spill at a Martinez terminal (Applied Science Associates 2009).

Significant adverse impacts on commercial and sports fisheries would result from oil spill accidents originating at the Avon Terminal or from tankers transiting to or from the Avon Terminal. Most recreational sport fishes, as well as commercial bay shrimp, would be susceptible to impact from a spill throughout the year.

Implementation of MMs CS-6a and CS-6b, along with implementation of MM OS-4b (refer to Section 4.1, Operational Safety/Risk of Accidents) and MMs BIO-8a, BIO-8b, and BIO-8c (refer to Section 4.2, Biological Resources), would reduce impacts on commercial and sport fisheries resources.

Mitigation Measures:

MM CS-6a: Post Spill Notices to Warn Fishing Interests. In the event of an Avon Terminal or associated vessel spill, Tesoro Refining and Marketing Company, LLC shall post notices at spill sites, marinas, launch ramps, and fishing access points to warn fishing interests of the locations of contaminated sites. Notices shall be written in English and Spanish, and be posted in areas most likely to be seen by fishing interests.

MM CS-6b: Compensation for Spill Damage. If damages to fishing operations or related businesses are determined by State, federal, or local authorities to be caused by Tesoro Refining and Marketing Company, LLC (Tesoro), financial compensation—as determined by the authorities—shall be provided by Tesoro. Any losses shall be documented as soon as possible after a spill, using methods for determining damages established beforehand. Response for damage losses should include provisions for compensating operators and businesses as soon as possible.

MMs OS-4b, Spill Response to Vessel Spills; BIO-8a, Bird Rescue Personnel and Rehabilitators; BIO-8b, Cleanup of Oil from Biological Area; and BIO-8c, Natural Resource Damage Assessment Team also apply to this impact.

Rationale for Mitigation: Notices to warn fishing interests of sites contaminated by a spill would help prevent capture of contaminated fish and the oiling of fishing equipment and gear by a spill. In addition, in the event of a spill, close coordination and cooperation to determine damages to fishing interests would help ensure that restoration and compensation for damages are completed without delay.

Residual Impacts: There are limitations to thorough containment and cleanup of a major oil spill. Even with specific procedures to protect biological resources in the Project vicinity, impacts of a major oil spill could be significant and unavoidable.

Impact CS-7: Cause impacts on commercial and sport fisheries as a result of the introduction of additional nonindigenous aquatic species from international vessels visiting the Avon Terminal. (Significant and unavoidable.)

The SFBE is among the most invaded aquatic ecosystems in North America. Since 1970, the rate of invasion has been one new species every 24 weeks (Cohen and Carlton 1995). Introduced species have the potential to dominate the SFBE's food webs and may result in profound structural changes to habitat. The results from introductions of species into new habitats are highly unpredictable, and can range from being presumed beneficial to being highly damaging. The striped bass is itself an introduced species, and it continues to be an important recreational species. One of the most destructive NAS is the overbite clam. Thought to have been introduced in the SFBE by ballast water discharge from a cargo ship, this phytoplankton-consuming species is now so abundant that the current population is capable of filtering the water column over the SFBE shallows almost 13 times per day and has caused a crash in the abundance of phytoplankton in the SFBE (SFEP 2004). *Corbula* has overgrazed the SFBE's phytoplankton, which young fish rely on for food, and caused a cascade of ecosystem events that has contributed to the decline of all fish species in the SFBE.

The California Aquatic Invasive Species Management Plan identifies commercial shipping as the most important vector for the introduction of NAS (OSPR 2008). Commercial ships introduce NAS through ballast water discharge or vessel biofouling. These vector routes are addressed in Section 4.2, Biological Resources, and summarized below.

Ballast Water Discharge

In commercial ships, ballast water is taken on in large enough quantities that it is able to support a host of marine species, from plankton to fish, during their relatively long transit times in ballast. Ballast water is, therefore, capable of transporting live aquatic species halfway around the world.

Under the National Invasive Species Act of 1996, the USCG established regulations and guidelines to prevent the introduction of NAS from ballast water discharge. At the State level, the CSLC is the lead implementing agency for the State's ballast water management program. As directed by the Marine Invasive Species Act of 2003, the CSLC formulated recommendations to regulate ballast water discharge for vessels operating in State waters. All vessels coming into California from outside the exclusive economic zone are required to submit ballast-water reports to the CSLC that include information about port of origin, how the ballast water was managed, and how much ballast water was discharged.

Vessels moored at the Avon Terminal are required to follow ballast water management requirements under the terms of the Vessel General Permit and USCG regulatory guidelines, as well as State performance standards for control of NAS. Under these regulations, ballast water management requirements vary depending on the vessel's point of origin, as described in Section 2.0, Project Description. Tesoro's Avon Marine Oil Terminal Operations Manual includes requirements for the handling of ballast wastes from tank ships and barges.

The volume of noncompliant ballast water discharged as a percentage of total discharges has decreased from 24 percent in 2006 to 10 percent in 2012. Between 2010 and 2012, approximately 2.5 million tons of noncompliant ballast water was discharged to California waters. The majority of noncompliant discharges (88 percent) between 2010 and 2012 consisted of water that was exchanged offshore, but in a location not acceptable under California law. Approximately 9 percent of discharged water was not exchanged at all. Unexchanged ballast water discharge is considered a high risk for introducing new NAS. In the period between 2010 and 2012, tankers accounted for about half of all noncompliant discharges and one-fifth of high-risk ballast water discharge (CSLC 2013c).

Vessel Biofouling

Many marine organisms that have a sessile life stage—in which they are attached to hard substrata—can readily colonize ships' hulls or niche areas. The most common fouling organisms are barnacles, but mussels, seaweed, anemones, and sea squirts can also attach themselves to ships' hulls (OSPR 2008). Shrimps, worms, and sea snails can hide in the crevices created by colonies of barnacles and mussels. Fouling organisms are then transported into new environments where they may be transferred from the ship into the new environment by spawning, detachment, or mechanical removal.

Fouling by commercial ships is one of the primary routes through which NAS are introduced to the SFBE. The CSLC states that all vessels pose some level of risk from biofouling (CSLC 2013c). Beginning in 2008, the CSLC required vessels operating in State waters to submit an annual Hull Husbandry Reporting Form.

Tesoro has no control over, ownership of, or authority to direct vessels that would dock at its marine terminal; therefore, specific details of how vessels manage biofouling cannot be provided as part of the Project. The vessels would be governed by the applicable CSLC standards for biofouling management, which would reduce the likelihood of introduction of aquatic species invasion from biofouling.

Under MMs BIO-9a and BIO-9b, Tesoro would ensure that vessels seeking to call at the Avon Terminal are advised of California's Marine Invasive Species Act and are submitting forms as required by the CSLC, and would be required to provide a share of

the funding for actions related to NAS. However, the impact of introducing new NAS via ballast water and biofouling in the SFBE could potentially be so devastating that even a reduced risk has the potential to cause significant and unavoidable adverse impacts on commercial and recreational sport fisheries.

Mitigation Measures: MMs BIO-9a, Marine Invasive Species Act Reporting Forms and BIO-9b, Invasive Species Action Funding apply to this impact.

Rationale for Mitigation: Vessels entering the SFBE are the primary vector for transmitting NAS; therefore, working with vessel operators to ensure that they are compliant with the implementing regulations of the California Marine Invasive Species Act would be an important component for reducing the risk posed by new NAS. As the risk from NAS cannot be fully mitigated, funding of activities designed to counteract the effects of NAS would help to offset impacts.

Residual Impacts: The impact of introducing new NAS via ballast water and vessel biofouling in the SFBE and Sacramento-San Joaquin River Delta could potentially be so devastating that even a reduced risk has the potential to cause a significant and unavoidable adverse impact on commercial and recreational sport fisheries.

Impact CS-8: Cause degradation of Bay-Delta waters from vessel hull antifouling paint. (Less than significant.)

Antifouling paint from tankers and barges using the Avon Terminal may contribute to the contaminant loading of Bay-Delta waters and sediments. The amount of contaminant material originating from vessels using the Avon Terminal is assumed to be relatively small and lower than other known sources of similar contaminants to the SFBE, such as the ports of Oakland and San Francisco and the nearby mothballed merchant marine fleet. As a result, any contaminants that might originate from the continued use of the Avon Terminal are not expected to affect fish species targeted by commercial or recreational fishermen. Therefore, this impact would be less than significant.

Mitigation Measure: No mitigation required.

Impact CS-9: Reduce shrimp fishery or affect shrimp or fish harvesting opportunities during renovation. (Less than significant.)

Shrimp trawling is the predominant commercial fishery in the vicinity of the Avon Terminal. MOTEMS renovation activities would be localized around the area of the Avon Terminal where vessel traffic currently occurs, and would not impede commercial or recreational fishing traffic. Shrimp trawling occurs throughout Suisun Bay, but is much more prevalent in other parts of the SFBE. Renovation impacts on the shrimp fishery would be less than significant, as less than 0.1 percent of the area available for fishing east of Martinez would be affected by renovation activities.

Several elements of MOTEMS renovation, including those that degrade water quality and create noise, have the potential to cause disturbance to commercially important fish. Direct impact and injury from pile driving could result to fish within approximately 7,065 feet, and behavioral changes could occur in fish within 32,800 feet (LSA Associates 2014). Impacts on recreational fishing from renovation would be less than significant given that there are no nearby fishing piers, and shore access for recreational fishing is limited near the Avon Terminal. Implementation of MMs BIO-11a, BIO-17a, BIO-17b, BIO-17c, BIO-18a, BIO-18b, and WQ-8 would further reduce the less-than-significant impacts from degraded water quality and noise.

Mitigation Measure: No mitigation required.

6.4.2 Alternative 1: No Project

Impact CS-10: Cause impacts on the San Francisco Bay Estuary and associated biota by decommissioning, abandoning in place, and/or removing the Avon Terminal, and shifting crude oil imports and refined product exports to alternative transport. (Significant and unavoidable.)

As described in Section 3.0, Alternatives and Cumulative Projects, if the Avon Terminal lease were not renewed, the Avon Terminal would be decommissioned and either abandoned in place or partially or completely removed, and crude oil would be transported overland through a combination of rail, tanker, and/or pipeline to the Golden Eagle Refinery. Similar overland transportation of exported refined products would take place, and Tesoro could also pursue transitioning the Amorco Terminal (currently an import-only terminal) to absorb export operations from the Avon Terminal, thereby increasing the throughput at the Amorco Terminal.

Decommissioning and/or deconstruction of the Avon Terminal would cause temporary disturbance to fisheries habitat and nearby sport fishing, resulting in short-term adverse, but less-than-significant impacts. Renovation activities associated with partial or complete removal of the Avon Terminal would cause temporary disturbances to habitat and wildlife that inhabit the Carquinez Strait. Removal of Avon Terminal structures could result in physical harm or injury to individuals and increased levels of noise that could cause harm to fish and wildlife. Depending on renovation timing, noise levels could also impede fish migration. Work that disturbs the channel bottom could release contaminated sediments from the channel floor with potential adverse effects on wildlife. Beneficially, removal of the Avon Terminal structures would result in a small but probably insignificant lessening of night lights along the Carquinez Strait. In the long term, fisheries habitat would likely be reclaimed, and more area would likely open up for sport fishing.

Any Avon Terminal-removal projects would be subject to regulation under existing State and federal regulations, at which point, environmental review would be conducted and mitigation measures developed to ensure that the project was in compliance with relevant regulations.

To the extent that exports are transitioned to the nearby Amorco Terminal, there would be little reduction in vessels transiting the SFBE. Thus, there would be no overall reduction in shipping noise, and the risk of hazards from an oil spill and from the introduction of NAS via ballast water and hull fouling would be shifted downstream rather than reduced; the potential impact on the SFBE and associated biota would continue to be significant and unavoidable.

Mitigation Measures: Should this alternative be selected, MMs would be determined during a separate environmental review under the California Environmental Quality Act (CEQA).

6.4.3 Alternative 2: Restricted Lease Taking Avon Terminal Out of Service for Oil Transport

Impact CS-11: Cause impacts on the San Francisco Bay Estuary and associated biota by using the marine terminal for other purposes and shifting imports and refined crude oil exports to the Amorco Terminal or overland transport. (Significant and unavoidable.)

This alternative would renew the lease, but would take the Avon Terminal out of service; the facility would be left in place and not decommissioned or demolished. Impacts associated with the decommissioning and demolition, as described in Impact CS-10, would not occur. The marine terminal could potentially be repurposed for other activities, if authorized by a separate lease action by the CSLC. Depending on the other uses, impacts on commercial and sport fisheries would need to be assessed.

As with the No Project alternative, Tesoro could transition the Amorco Terminal to absorb import and export operations from Avon Terminal, or utilize other overland transport options, as described in Impact CS-10. Thus, there would be no overall reduction in shipping noise, and the risk of hazards from an oil spill and from the introduction of NAS via ballast water and hull fouling would be shifted downstream rather than reduced, and the potential impact on the SFBE and associated biota would be continue to be significant and unavoidable.

Mitigation Measures: Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA.

6.5 CUMULATIVE IMPACT ANALYSIS

The geographic context for analysis of cumulative impacts on commercial and sport fishery resources includes the San Francisco-San Pablo Bay region, Carquinez Strait, and the outer coast of California. Impacts on commercial and sport fishery resources from the Project that are less than significant may become significant when combined with impacts from related projects in the region. This analysis identifies cumulative impacts and evaluates whether the incremental contribution of the Project to a cumulative impact would be considerable.

Impact CUM-CS-1: Cause cumulative adverse impacts on commercial and sport fishery resources through space-use conflicts as result of routine Avon Terminal operations. (Less than significant.)

Operations at the Avon Terminal would continue in conjunction with those of nearby marine oil terminals and marinas. Marine vessels transiting through the Carquinez Strait would continue to use established shipping channels. Terminal uses and the use of shipping channels precludes access to fishing areas, but also concentrates land uses and vessel traffic so that other areas are available for fishing. The Project contributes to the cumulative impact caused by space-use conflicts. The number of vessels visiting the Avon Terminal is a small fraction of vessel traffic in the San Francisco region and the Avon Terminal is located within an industrial zone; therefore, the incremental contribution of the Project is not cumulatively considerable.

Mitigation Measure: No mitigation required.

Impact CUM-CS-2: Cause cumulative impacts on San Francisco Bay Estuary and associated biota from oil spills from all marine oil terminals combined, or from all tankering combined. (Significant and unavoidable.)

A major oil spill at the Avon Terminal or from vessels visiting the Avon Terminal would potentially affect a wide range of marine and terrestrial biological resources. As discussed in Section 4.1, Operation Safety/Risk of Accidents, operations associated with the Avon Terminal contribute incrementally to the cumulative risk of an oil spill. Vessel traffic associated with the Avon Terminal is approximately 5.3 percent of the total probability of a spill from tanker and tank barge traffic in the SFBE. The facilities with potential to contribute to the accidental release of petroleum products in the SFBE include the Chevron Richmond Refinery Long Wharf Terminal, Tesoro Amorco Terminal, and the Plains All American Martinez Marine Oil Terminal. As discussed in Impact CS-5, major spills of fuel, crude oil, or other materials can be expected to have serious adverse effects on commercial and recreational fishing interests. Fish species could be directly impacted and fisheries infrastructures would be threatened by a major spill. Two major spills into the SFBE from different sources within the same season

would cause even greater adverse impacts on the fisheries and habitats. MMs BIO-8a through BIO-8c collectively aid in the prevention and cleanup of accidental releases of oil spills. MMs CS-6a and CS-6b provide for notification to fishing interest and compensation for damage from a spill; however, a major spill could have a residual impact following spill response and cleanup. Therefore, the impact would be cumulatively considerable and significant cumulative impacts would occur from implementation of the Project.

Mitigation Measures: MMs CS-6a, Post Spill Notices to Warn Fishing Interests; CS-6b, Compensation for Spill Damage; BIO-8a, Bird Rescue Personnel and Rehabilitators; BIO-8b, Cleanup of Oil from Biological Area; and BIO 8c, Natural Resource Damage Assessment Team apply to this impact.

Rationale for Mitigation: Implementation of Project-specific MMs would help to reduce the impacts of a Project-related oil spill.

Residual Impacts: Even with specific procedures to reduce the risk of a Project-related oil spill, the cumulative impacts of an oil spill would remain significant and unavoidable.

Impact CUM-CS-3: Cause cumulative impacts by increasing the risk of introduction of nonindigenous aquatic species from vessel traffic to the San Francisco Bay Estuary. (Significant and unavoidable).

The California Ballast Water Management for Control of Nonindigenous Species Act of 1999, as revised and reauthorized by the Marine Invasive Species Act of 2003, and Public Resources Code sections 71200 to 71271 specify required ballast water and vessel biofouling management practices. These laws and associated regulations were developed to prevent future introduction of NAS to SFBE waters. However, prior to the introduction of these management practices, a considerable number of NAS were introduced into the SFBE, resulting in a realignment of the biotic communities in the SFBE. All commercial vessel traffic in the SFBE has the potential to introduce NAS. Although vessels that call at the Avon Terminal are required to comply with federal and State provisions, compliance with the current regulations is not enough to ensure full mitigation of this impact. Thus, significant cumulative impacts would occur.

Mitigation Measures: No mitigation measures available.

6.6 SUMMARY OF FINDINGS

Table 6-1 includes a summary of anticipated impacts on commercial and sport fisheries and associated mitigation measures.

Table 6-1: Summary of Commercial and Sport Fisheries Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
Proposed Project	
CS-1: Cause space-use conflicts with commercial or recreational sport fisheries as a result of routine Avon Terminal operations.	No mitigation required
CS-2: Cause space-use and navigation conflicts with commercial fisherman as a result of tanker and barge traffic to and from the Avon Terminal.	No mitigation required
CS-3: Cause space-use and navigational conflicts with recreational and sport fishing activities as a result of tanker and barge traffic to and from the Avon Terminal.	No mitigation required
CS-4: Cause substantial direct and/or indirect impacts on aquatic biota through the changing of physical and chemical environmental factors as a result of maintenance dredging.	No mitigation required
CS-5: Cause impacts on commercial and recreational sport fisheries as a result of minor fuel, lubricant, and/or boat-related spills.	No mitigation required
CS-6: Cause impacts on commercial and recreational sport fisheries as a result of major fuel, lubricant, and/or boat-related spills.	MM CS-6a: Post Spill Notices to Warn Fishing Interests MM CS-6b: Compensation for Spill Damage (Also refer to MMs OS-4b, BIO-8a, BIO-8b, and BIO-8c)
CS-7: Cause impacts on commercial and sport fisheries as a result of the introduction of additional nonindigenous aquatic species from international vessels visiting the Avon Terminal.	Refer to MMs BIO-9a and BIO-9b
CS-8: Cause degradation of Bay-Delta waters from vessel hull antifouling paint.	No mitigation required
CS-9: Reduce shrimp fishery or affect shrimp or fish harvesting opportunities during renovation.	No mitigation required
Alternative 1: No Project	
CS-10: Cause impacts on the San Francisco Bay Estuary and associated biota by decommissioning, abandoning in place, and/or removing the Avon Terminal, and shifting crude oil imports and refined product exports to alternative transport.	Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA
Alternative 2: Restricted Lease Taking Avon Terminal Out of Service for Oil Transport	
CS-11: Cause impacts on the San Francisco Bay Estuary and associated biota by using the marine terminal for other purposes and decommissioning and shifting imports and refined crude oil exports to the Amorco Terminal or overland transport.	Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA

Impact	Mitigation Measure(s)
Cumulative Impacts	
CUM-CS-1: Cause cumulative adverse impacts on commercial and sport fishery resources through space-use conflicts as result of routine Avon Terminal operations.	No mitigation required
CUM-CS-2: Cause cumulative impacts on San Francisco Bay Estuary and associated biota from oil spills from all marine oil terminals combined, or from all tankering combined.	Refer to MMs CS-6a, CS-6b, BIO-8a, BIO-8b, and BIO 8c
CUM-CS-3: Cause cumulative impacts by increasing the risk of introduction of nonindigenous aquatic species from vessel traffic to the San Francisco Bay Estuary.	No MMs available

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