

Compilation of California Coastal Power Plant Entrainment and Impingement Estimates for California State Water Resources Control Board Staff Draft Issue Paper on Once-through Cooling

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Entrainment Estimates

The entrainment data presented in **Table 1** were mostly compiled from recent studies of cooling water systems at power plants in California. The design cooling water flows and actual average flows for the 2000–2005 period used in some of the calculations were compiled from several sources (**Appendix A**). Entrainment estimates are only presented for larval fishes because this is the only taxonomic group and life stage that was sampled consistently across all of the facilities. The table presents two sets of entrainment estimates. The first set is calculated using the annual average larval concentrations from the recent studies. The entrainment estimates were calculated by multiplying the larval concentrations by the total annual design and by the average 2000–2005 flows. The other set of entrainment estimates is from the published studies, which did not in all cases present estimates for both design and actual flows (shown as ‘nc’ in **Table 1**). The only plants where recent representative data were not available were the Contra Costa and Pittsburg power plants located in the Sacramento-San Joaquin Delta (Delta) system. The table does present annual entrainment estimates for those two plants from studies completed thirty years ago in 1978–1979; no estimates based on the larval concentration from those studies were calculated because there have been so many long-term changes in flows and species composition within the Delta system that the estimates are unlikely to be representative of current conditions.

The entrainment estimates calculated using the average annual larval concentrations are very similar to the published entrainment estimates for the two nuclear plants (SONGS and DCP) and units at other plants that are operating at a high capacity factor. There are more differences between the two sets of estimates for plants and units that are operating at a low capacity factor. This is due to seasonal changes in larval concentrations that can significantly affect estimates of annual entrainment, especially when peak capacity is occurring during periods with high concentrations of larvae. The seasonality in larval abundances varies between central and southern California, and also between open coast and protected bays and harbors (**Figures 1 and 2**).

Impingement Estimates

Similar to entrainment, the impingement data presented in **Table 2** were mostly from recent studies at power plants in California using the same flow data used in **Table 1** and documented in **Appendix A**. Impingement estimates are only presented for fishes because this is the only taxonomic group that was sampled consistently across all of the facilities. The table presents two sets of impingement estimates for both numbers and biomass of fishes. The first set is calculated using the annual average impingement rates during normal operations calculated from the recent studies. The total annual normal operations impingement estimates were calculated by multiplying the impingement rates by the total annual design and average 2000–2005 flows. These impingement estimates for normal operations would be added to the average annual impingement during heat treatments for the plants where heat treatments are used for controlling biofouling inside the cooling system. The other set of impingement estimates is from published studies, which did not in all cases present estimates for both design and actual flows (shown as ‘nc’ in **Table 2**). These estimates include both normal operations and heat treatment impingement. The only plants where recent representative data were not available were the Contra Costa and Pittsburg power plants located in the Delta system. The table does present annual impingement estimates for those two plants from studies completed thirty years ago in 1978–1979.

Intake Structure

Information on the intake structures at the California power plants is presented in **Table 3**. The various fish protection measures are listed and details provided on the openings of the cooling water systems where they draw water. This information could be used in evaluating the potential for entrapment of marine mammals and reptiles into the systems. Note that the only plants with variable speed drives that allow flow to be adjusted to meet load capacity are installed at the Contra Costa and Pittsburg power plants in the Delta. San Onofre is the only plant with a sophisticated fish return system.

References (see Appendix B)

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MBC Applied Environmental Sciences and Tenera Environmental. 2008b. Redondo Beach Generating Station Clean Water Act Section 316(b) impingement mortality and entrainment characterization study. Prepared for AES Redondo Beach L.L.C., Redondo Beach, CA.

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MBC Applied Environmental Sciences, Tenera Environmental, and URS Corp. 2008b. Harbor Generating Station Clean Water Act Section 316(b) impingement mortality and entrainment characterization study. Prepared for City of Los Angeles Dept. of Water and Power, Los Angeles, CA.

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- Tenera Environmental. 2000b. Moss Landing Power Plant modernization project 316(b) resource assessment. Prepared for Duke Energy Moss Landing LLC, Oakland, CA.
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- Tenera Environmental. 2005. Potrero Power Plant. 316(b) Entrainment Characterization Report for Potrero Power Plant Unit 3. Submitted to Mirant Potrero LLC, San Francisco, CA.
- Tenera Environmental. 2007a. Potrero Power Plant. Impingement Mortality Study Data Report. Submitted to Mirant Potrero LLC, San Francisco, CA.
- Tenera Environmental. 2007b. Moss Landing Power Plant Units 1&2 and Units 6&7 Impingement Study Data Report. Prepared for Moss Landing Power Plant, Moss Landing, CA.
- Tenera Environmental. 2008. Cabrillo Power I LLC, Encina Power Station Clean Water Act Section 316(b) impingement mortality and entrainment characterization study. Effects on the biological resources of Agua Hedionda Lagoon and the nearshore ocean environment. Prepared for Cabrillo Power I LLC, Carlsbad, CA.
- Tenera Environmental and MBC Applied Environmental Sciences. 2008. El Segundo Generating Station Clean Water Act Section 316(b) impingement mortality and entrainment characterization study. Prepared for El Segundo Power LLC, El Segundo, CA.

Table 1. Entrainment estimates for larval fishes from California coastal power plants. Estimates include calculated values from design and average annual 2000–2005 flows using larval concentrations from recent studies and also estimates from recently published entrainment studies. Studies where entrainment estimates were not calculated for design or actual flow conditions during the study are indicated as “nc”. References used in compiling the information in the table are provided in Appendix B.

Plant	Design Flow (mgd)	Average Flow (mgd) based on 2000-2005 data	Average Larval Fish Concentration (# per m ³)	Annual Larval Entrainment Estimate			
				Based on Average Concentration and Design Flow	Based on Average Concentration and Average Flow	Based on Study Results (Design flow)	Based on Study Results (Actual flow)
Alamitos Generating Station Units 1&2	207	121	2.6096	748,143,755	437,759,583	nc	121,970,937
Alamitos Generating Station Units 3&4	392	281	2.6096	1,414,663,347	1,013,512,946	1,109,972,442	728,944,910
Alamitos Generating Station Units 5&6	674	413	2.6338	2,454,486,046	1,503,067,179	nc	835,841,962
Contra Costa Power Plant Units 6&7	440	257	no recent representative data available			nc	95,110,000
Diablo Canyon Power Plant	2,528	2,287	0.5051	1,765,532,613	1,596,971,533	nc	1,481,948,383
El Segundo Generating Station Units 1&2	207	69	0.5160	147,937,420	49,426,499	nc	35,743,328
El Segundo Generating Station Units 3&4	399	265	0.5160	284,368,596	189,249,580	276,934,913	186,532,003
Encina Power Plant	857	621	3.6844	4,365,717,854	3,161,960,103	4,494,849,115	3,627,641,744
Harbor Generating Station	108	59	1.0464	156,251,732	85,429,045	153,331,013	65,298,000
Haynes Generating Station	968	258	3.2500	4,348,289,797	1,159,409,807	4,527,644,084	3,649,208,392
Huntington Beach Generating Station	514	179	0.4216	299,581,897	104,316,376	344,570,635	nc
Mandalay Generating Station	253	234	0.4000	140,164,653	129,172,964	141,736,337	33,422,317
Morro Bay Power Plant	668	257	0.8991	830,359,489	318,873,127	859,337,744	nc
Moss Landing Power Plant Units 1&2	361	193	1.1700	583,974,343	311,469,330	522,319,740	nc
Moss Landing Power Plant Units 6&7	865	387	0.7813	934,455,149	418,259,815	888,204,836	nc
Ormond Beach Generating Station	685	521	0.0446	42,267,607	32,126,547	40,810,043	6,351,783
Pittsburg Power Plant Units 5&6	462	274	no recent representative data available			nc	175,230,000
Potrero Power Plant	231	193	0.9490	303,453,048	252,788,154	289,731,811	nc
Redondo Generating Station Units 5&6	217	51	1.1847	354,625,241	83,019,162	356,000,276	101,659,379
Redondo Generating Station Units 7&8	675	254	0.8276	772,030,657	290,738,095	744,808,585	189,537,344
San Onofre Nuclear Generating Station Unit 2	1,219	1,139	1.9649	3,310,586,813	3,094,578,330	nc	3,555,787,272
San Onofre Nuclear Generating Station Unit 3	1,219	1,154	1.9649	3,310,586,813	3,136,241,271	nc	3,261,783,562
Scattergood Generating Station	495	309	0.7387	505,973,132	315,565,914	524,202,652	365,258,133
South Bay Power Plant	601	417	2.8925	2,403,523,588	1,667,044,144	2,420,527,779	nc

nc = not calculated in report

Table 2. Impingement estimates for fish numbers and biomass (lb) from California coastal power plants. Estimates include calculated values for normal operations for design and average annual 2000–2005 flows using impingement rates from recent studies. For plants using heat treatments these calculated estimates would need to include an estimate of the total impingement during heat treatment events calculate using the average annual impingement and the average numbers of heat treatments. The impingement estimates from recently published impingement mortality studies include heat treatment. Studies where impingement estimates were not calculated for design or actual flow conditions during the study are indicated as “nc”. References used in compiling the information in the table are provided in Appendix B.

Plant	Design Flow (mgd)	Average Flow (mgd) based on 2000-2005 data	Average # fish per million gal	Average Biomass (lbs) fish per million gal	Annual Normal Operations Impingement Estimate				Heat Treatments (HT)			Reported Values				
					Based on Count and Design Flow	Based on Biomass (lbs) and Design Flow	Based on Count and Average Flow	Based on Biomass (lbs) and Average Flow	Average # per HT	Average Biomass (lb) per HT	Average Number of HT per year (2000-2005)	Design Flow Total # Estimate	Design Total Biomass (lb) Estimate	Actual Flow Total # Estimate	Actual Total Biomass (lb) Estimate	
Alamitos Generating Station Units 1&2	207	121							n/a	n/a	n/a					
Alamitos Generating Station Units 3&4	392	281	0.1750	0.0076	81,419	3,514	52,106	2,249	n/a	n/a	n/a	nc	nc	29,013	1,252	
Alamitos Generating Station Units 5&6	674	413							n/a	n/a	n/a					
Contra Costa Power Plant Units 6&7	440	257	no recent representative data available						n/a	n/a	n/a	—	—	107,621	2,741	
Diablo Canyon Power Plant	2,528	2,287	0.0058	0.0009	5,330	785	4,821	710	n/a	n/a	n/a	nc	nc	nc	nc	
El Segundo Generating Station Units 1&2	207	69	0.0103	0.0035	779	265	260	89	227.25	72.18	1.3	nc	nc	186	63	
El Segundo Generating Station Units 3&4	399	265	0.0220	0.0068	3,209	995	2,136	662	229.00	94.60	3.7	2,521	542	1,527	473	
Encina Power Plant	857	621	0.6128	0.0256	191,824	8,016	138,932	5,806	15,831.83	747.70	6	289,562	12,878	215,583	9,609	
Harbor Generating Station	108	59	0.4945	0.1622	19,508	6,399	10,666	3,498	n/a	n/a	n/a	19,861	6,478	8,851	2,903	
Haynes Generating Station	968	258	0.1893	0.0041	66,901	1,462	17,838	390	n/a	n/a	n/a	56,613	1,227	53,442	1,168	
Huntington Beach Generating Station	514	179	0.4079	0.0227	76,582	4,270	26,666	1,487	5,887.00	338.70	4.8	nc	nc	51,082	2,848	
Mandalay Generating Station	253	234	0.7940	0.0299	73,497	2,771	67,733	2,553	101.90	4.20	1.4	30,347	1,308	8,979	199	
Morro Bay Power Plant	668	257	0.3497	0.0140	85,315	3,419	32,763	1,313	n/a	n/a	n/a	nc	nc	78,139	2,957	
Moss Landing Power Plant Units 1&2	361	193	0.5804	0.0058	76,526	762	40,816	406	n/a	n/a	n/a	75,133	804	57,554	600	
Moss Landing Power Plant Units 6&7	865	387	1.7895	0.0287	565,390	9,071	253,067	4,060	n/a	n/a	n/a	135,699	2,297	118,778	2,033	
Ormond Beach Generating Station	685	521	0.0711	0.0164	17,806	4,094	13,534	3,112	677.80	87.20	4.5	7,821	844	517	76	
Pittsburg Power Plant Units 5&6	462	274	no recent representative data available							n/a	n/a		nc	nc	220,364	2,580
Potrero Power Plant	231	193	1.5090	0.0337	127,464	2,847	106,182	2,371	n/a	n/a	n/a	146,098	3,035	108,727	2,446	
Redondo Generating Station Units 5&6	217	51	0.0075	0.0034	593	268	139	63	10.08	7.32	2	263	71	133	60	
Redondo Generating Station Units 7&8	675	254	0.0240	0.0085	5,913	2,084	2,227	785	157.50	37.90	4.8	2,910	1,315	1,101	388	
San Onofre Nuclear Generating Station Unit 2	1,219	1,139	1.5787	0.0335	1,405,342	29,854	1,322,490	28,094	2,494.00	627.80	7.5	nc	nc	1,353,158	28,746	
San Onofre Nuclear Generating Station Unit 3	1,219	1,154									7.8					
Scattergood Generating Station	495	309	0.8226	0.0814	148,840	14,727	92,829	9,185	10,155.00	788.40	5.2	108,843	11,619	95,241	9,422	
South Bay Power Plant	601	417	1.5921	0.0049	349,490	1,082	242,401	751	n/a	n/a	n/a	385,588	1,226	nc	nc	

nc = not calculated in report
n/a = not applicable

Table 3. Information on cooling water intake system design at California power plants. Acronyms used for the various intake components and fish protection systems and provided below the table.

Region	Plant	Intake Location	Type of Intake	Screening or Fish Protection Devices*	Size of openings at Entrance to Intake	Vertical	
						Distance from Riser to VC	Mammal Exclusion Bars Offshore?
NoCal	Contra Costa Power Plant	tidal river	shoreline	BR-TS-VFD	Bar racks 3.5" spacing	n/a	n/a
NoCal	Pittsburg Power Plant	tidal river	shoreline	BR-TS-VFD	Bar racks 3.5" spacing	n/a	n/a
NoCal	Potrero Power Plant	bay/harbor	shoreline	BR-TS	Bar racks 3.5" spacing	n/a	n/a
NoCal	Moss Landing Power Plant Units 1&2	bay/harbor	shoreline	BR-TS	Bar racks 3.5" spacing	n/a	n/a
NoCal	Moss Landing Power Plant Units 6&7	bay/harbor	shoreline	BR-TS	Bar racks 3" spacing	n/a	n/a
NoCal	Morro Bay Power Plant	bay/harbor	shoreline	BR-TS	bar racks 4" on center	n/a	n/a
NoCal	Diablo Canyon Power Plant	ocean	shoreline	BR-TS	bar racks 3" on center	n/a	n/a
SoCal	Mandalay Generating Station	bay/harbor	canal	BR-SS	bar racks 2.5" spacing	n/a	n/a
SoCal	Ormond Beach Generating Station	ocean	offshore	VCap-BR-TS	4' at VCap with bars every 18"	4'	18" spacing
SoCal	Scattergood Generating Station	ocean	offshore	VCap-BR-TS	5' at VCap with bars every 9"	5'	9" spacing
SoCal	El Segundo Generating Station Units 1&2	ocean	offshore	VCap-BR-TS	2' at VCap	2'	?
SoCal	El Segundo Generating Station Units 3&4	ocean	offshore	VCap-BR-TS	3' at VCap	3'	?
SoCal	Redondo Generating Station Units 5&6	bay/harbor	offshore	VCap-BR-TS	4' at VCap with bars every 18"	4'	18" spacing
SoCal	Redondo Generating Station Units 7&8	bay/harbor	offshore	VCap-BR-TS	4' at VCap with bars every 18"	4'	18" spacing
SoCal	Harbor Generating Station	bay/harbor	shoreline	BR-TS	bar racks 4.5" on center	n/a	n/a
SoCal	Haynes Generating Station	tidal river	canal	BR-TS/SS	bar racks 6" on center	n/a	n/a
SoCal	Alamitos Generating Station Units 1&2	bay/harbor	shoreline	BR-TS	bar racks 3" spacing	n/a	n/a
SoCal	Alamitos Generating Station Units 3&4	bay/harbor	shoreline	TS	no bar racks	n/a	n/a
SoCal	Alamitos Generating Station Units 5&6	bay/harbor	shoreline	BR-TS	bar racks 3" spacing	n/a	n/a
SoCal	Huntington Beach Generating Station	ocean	offshore	VCap-BR-TS	5' at VCap with bars every 18"	5'	18" spacing
SoCal	San Onofre Nuclear Generating Station Unit 2	ocean	offshore	VCap-Vanes-Fish Elevator-BR-TS	7' at VCap	7'	No
SoCal	San Onofre Nuclear Generating Station Unit 3	ocean	offshore	VCap-Vanes-Fish Elevator-BR-TS	7' at VCap	7'	No
SoCal	Encina Power Plant	bay/harbor	shoreline	BR-TS	bar racks 3.5" on center	n/a	n/a
SoCal	South Bay Power Plant	bay/harbor	shoreline	BR-TS	bar racks 3" spacing	n/a	n/a

* - VCap = velocity cap, BR = bar racks, TS = traveling screens, SS = Slide screens, Vanes = structures inside intake to divert fishes, VFD = variable frequency drive pumps

Larval Fish Concentrations by Month at Southern California Power Plant OTC Intake

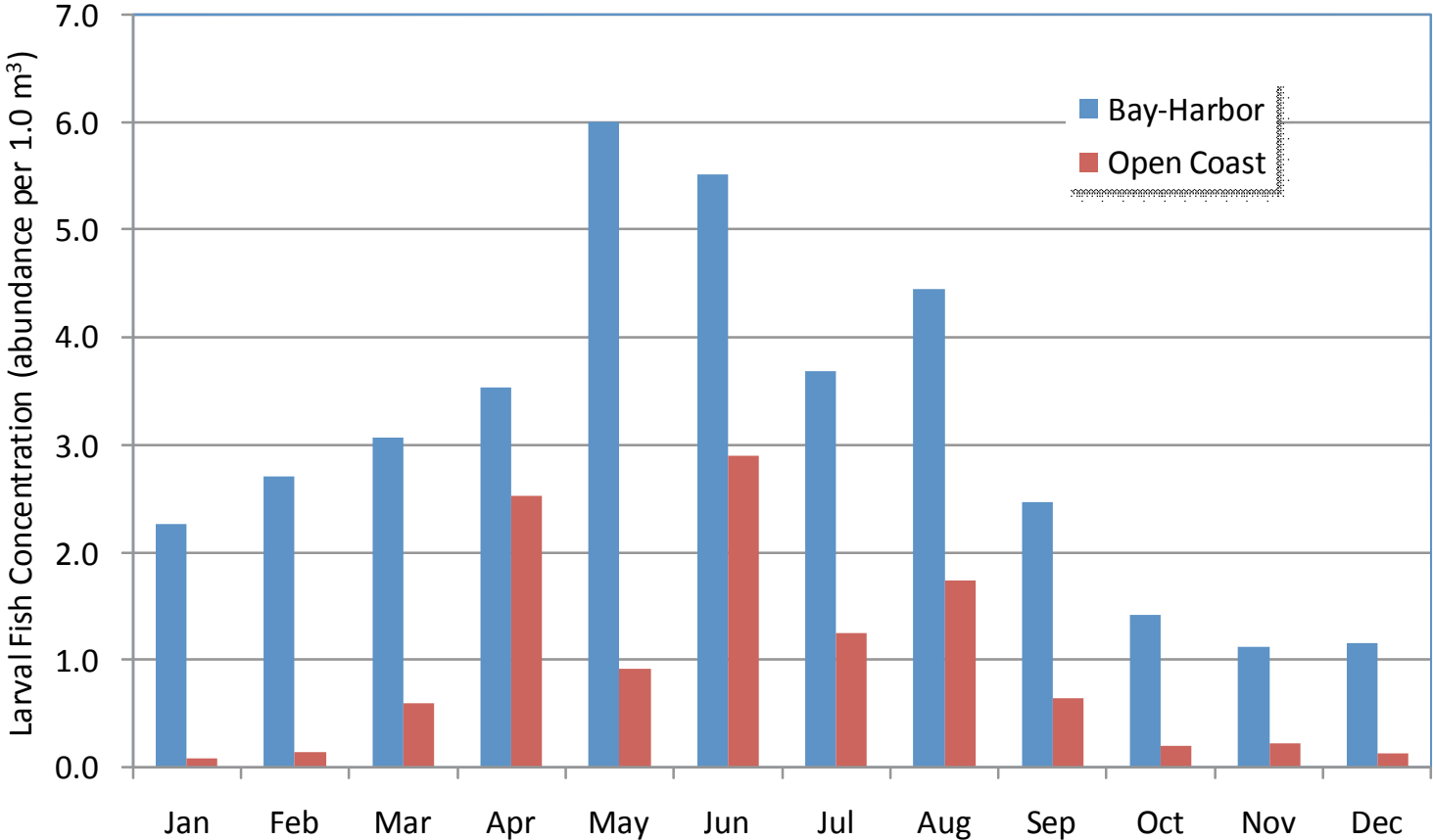


Figure 1. Total concentration of larval fishes by month at OTC intakes in southern California. Data sources based on most recent 316(b) sampling conducted at each power facility. Plants combined for bay-harbor concentrations were South Bay, Encina, Haynes, Alamitos, and Harbor, and the plants combined for the open coast concentrations were San Onofre, Huntington Beach, Redondo Beach, El Segundo, and Scattergood.

Larval Fish Concentrations by Month at Central/Northern California Power Plant OTC Intake

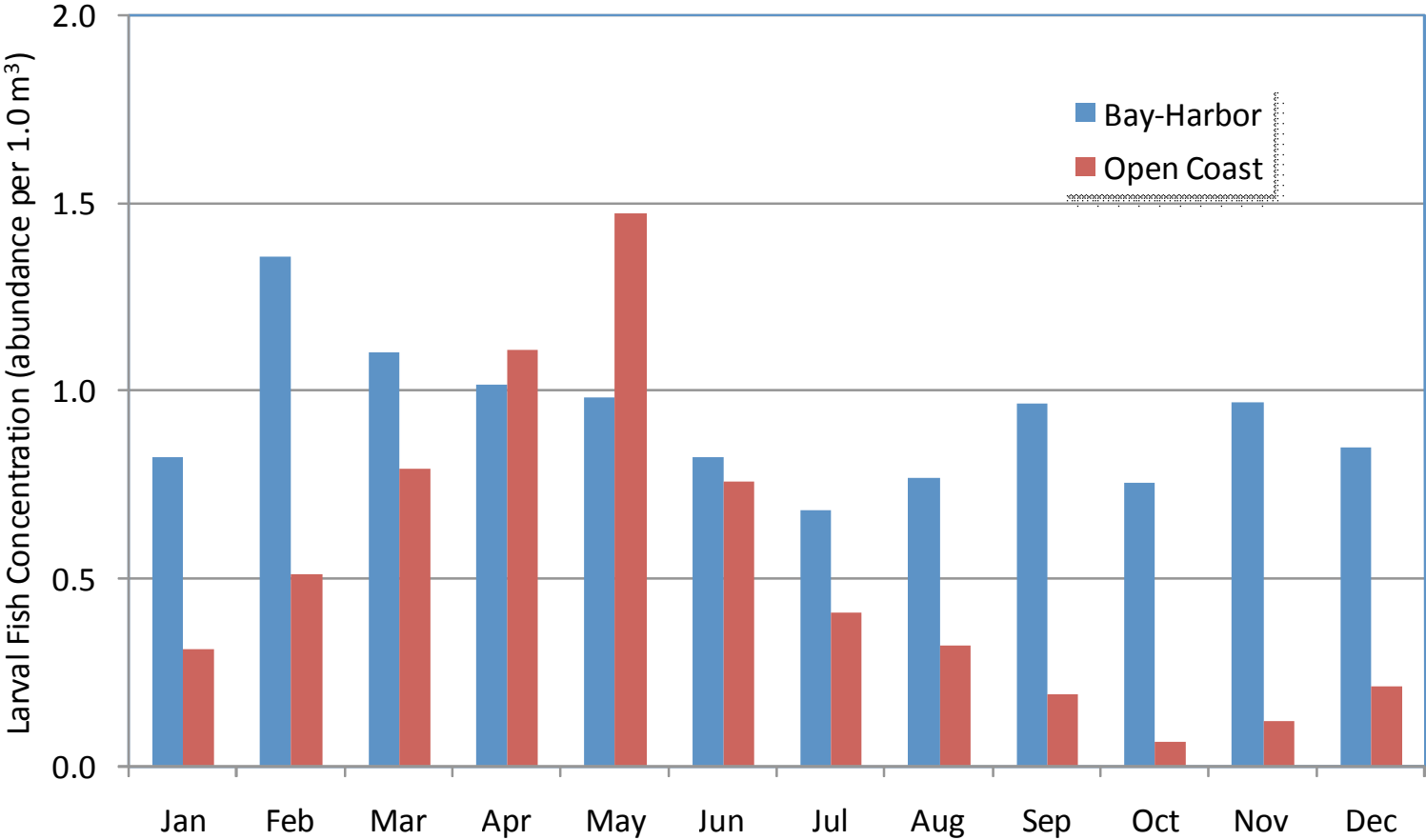


Figure 2. Total concentration of larval fishes by month at OTC intakes in central California. Data sources based on most recent 316(b) sampling conducted at each power facility. Plants combined for bay-harbor concentrations were Morro Bay, Moss Landing, and Potrero, and the plants used for the open coast concentrations was Diablo Canyon.

Appendix A. Sources for cooling water data used in calculations of entrainment and impingement estimates.

Plant	Design Flow (mgd)	Average Flow (mgd) based on 2000-2005	Data Sources
Alamitos Generating Station Units 1&2	207	121	data from SWRCB staff - 2000-05 actual monthly flows
Alamitos Generating Station Units 3&4	392	281	data from SWRCB staff - 2000-05 actual monthly flows
Alamitos Generating Station Units 5&6	674	413	data from SWRCB staff - 2000-05 actual monthly flows
Contra Costa Power Plant Units 6&7	440	257	data from plant staff - daily flows for 2000-2005
Diablo Canyon Power Plant	2,528	2,287	flows from plant source complete for 2000-05
El Segundo Generating Station Units 1&2	207	69	data from SWRCB staff - daily flows for 2000-2005
El Segundo Generating Station Units 3&4	399	265	data from SWRCB staff - daily flows for 2000-2005
Encina Power Plant	857	621	flows from plant source complete for 2000-05
Harbor Generating Station	108	59	data from SWRCB staff - 2000-01 actual monthly flows, 2002-05 daily flows
Haynes Generating Station	968	258	data from SWRCB staff - 2000-01 actual monthly flows, 2002-05 daily flows, 2005 missing for Units 3&4
Huntington Beach Generating Station	514	179	data from SWRCB staff - 2004-05 actual monthly flows, 2000-03 calculated from megawatt output
Mandalay Generating Station	253	234	data from SWRCB staff - 2000-05 actual monthly flows
Morro Bay Power Plant	668	257	flows from plant source complete for 2000-05
Moss Landing Power Plant Units 1&2	361	193	flows from plant source complete for 2000-05
Moss Landing Power Plant Units 6&7	865	387	flows from plant source complete for 2000-05
Ormond Beach Generating Station	685	521	data from SWRCB staff - 2000-05 actual monthly flows
Pittsburg Power Plant Units 5&6	462	274	data from plant staff - 2000-05 daily flows
Potrero Power Plant	231	193	data from SWRCB staff - 2000-05 actual monthly flows - also plant data provided same average
Redondo Generating Station Units 5&6	217	51	data from SWRCB staff - daily flows for 10/1/01-9/30/02 and 1/1/03-12/31/05
Redondo Generating Station Units 7&8	675	254	data from SWRCB staff - daily flows for 10/1/01-9/30/02 and 1/1/03-12/31/05
San Onofre Nuclear Generating Station Unit 2	1,219	1,139	data from SWRCB staff - 2004-05 actual monthly flows, 2000 and 2003 calculated from megawatt output
San Onofre Nuclear Generating Station Unit 3	1,219	1,154	data from SWRCB staff - 2004-05 actual monthly flows, 2000 and 2003 calculated from megawatt output
Scattergood Generating Station	495	309	data from SWRCB staff - 2000 -2005 actual monthly flows
South Bay Power Plant	601	417	flows from plant source complete for 2000-05

Appendix B. References and information on studies used in compiling the data presented in Tables 1 and 2.

Plant	Entrainment collection period & frequency / Reference	Impingement collection period & frequency / Reference
Alamitos Generating Station Units 1&2	Jan-Dec 2006, bi-weekly / MBC and Tenera 2008a	Jan 2006 - Dec 2006; weekly / MBC and Tenera 2008a
Alamitos Generating Station Units 3&4	Jan-Dec 2006, bi-weekly / MBC and Tenera 2008a	Jan 2006 - Dec 2006; weekly / MBC and Tenera 2008a
Alamitos Generating Station Units 5&6	Jan-Dec 2006, bi-weekly / MBC and Tenera 2008a	Jan 2006 - Dec 2006; weekly / MBC and Tenera 2008a
Contra Costa Power Plant	Apr 1978 - Apr 1979, weekly / Ecological Analysts 1981a	Apr 1978 - Apr 1979; weekly sampling / Ecological Analysts 1981a
Diablo Canyon Power Plant	Oct 1996 - Jun 1999, weekly / estimates from Oct 96-Oct 98 Tenera 2000a	Feb 1985 - Mar 1986; weekly sampling / Tenera 1988
El Segundo Generating Station Units 1&2	Jan-Dec 2006, monthly / Tenera and MBC 2008	Jan 2006 - Dec 2006; monthly / Tenera and MBC 2008
El Segundo Generating Station Units 3&4	Jan-Dec 2006, monthly / Tenera and MBC 2008	Jan 2006 - Dec 2006; monthly / Tenera and MBC 2008
Encina Power Plant	Jun 2004 - May 2005, monthly / Tenera 2008	Jun 2004 - Jun 2005; weekly / Tenera 2008
Harbor Generating Station	Jan-Dec 2006, bi-weekly / MBC, Tenera, and URS 2008b	Jan 2006 - Dec 2006; weekly / MBC, Tenera, and URS 2008b
Haynes Generating Station	Jan-Dec 2006, bi-weekly / MBC, Tenera, and URS 2008a	Jan 2006 - Dec 2006; weekly / MBC, Tenera, and URS 2008a
Huntington Beach Generating Station	Sep 2003 - Aug 2004, weekly / MBC and Tenera 2005	Jul 2003 - Jul 2004; weekly / MBC and Tenera 2005
Mandalay Generating Station	Feb 2006 - Feb 2007; biweekly / ENSR Corp. 2008a	Feb 2006 - Feb 2007; biweekly / rates and totals from ENSR Corp. 2008a; average rates and HT data from NPDES data supplied by MBC
Morro Bay Power Plant	Jan 2000 - Dec 2000, weekly / Tenera 2001	Sep 1999 - Sep 2000; weekly / Tenera 2001
Moss Landing Power Plant Units 1&2	Mar 1999 - Feb 2000, weekly / Tenera 2000b	Nov 2005 - Nov 2006; weekly / Tenera 2007b
Moss Landing Power Plant Units 6&7	Mar 1999 - Feb 2000, weekly / Tenera 2000b	Nov 2005 - Nov 2006; weekly / Tenera 2007b
Ormond Beach Generating Station	Feb 2006 - Feb 2007; biweekly / ENSR Corp. 2008b	Feb 2006 - Feb 2007; biweekly / rates and totals from ENSR Corp. 2008b; average rates and HT data from NPDES data supplied by MBC
Pittsburg Power Plant Units 5&6	Mar 1978 - Mar 1979, weekly; Ecological Analysts 1981b	Mar 1978 - Mar 1979; weekly sampling / Ecological Analysts 1981b
Potrero Power Plant	Jan 2001 - Feb 2002, weekly (Dec-Mar) or monthly Apr-Nov / Tenera 2007a	May 2006 - May 2007; weekly / Tenera 2007a
Redondo Generating Station Units 5&6	Jan 2006 - Jan 2007, monthly / MBC and Tenera 2008b	Jan 2006 - Jan 2007; weekly / MBC and Tenera 2008b
Redondo Generating Station Units 7&8	Jan 2006 - Jan 2007, bi-weekly / MBC and Tenera 2008b	Jan 2006 - Jan 2007; weekly / MBC and Tenera 2008b
San Onofre Nuclear Generating Station Units 1&2	Mar 2006 - Apr 2007; biweekly inside plant, monthly at offshore intakes /	Mar 2006 - May 2007; biweekly / MBC 2008
San Onofre Nuclear Generating Station Units 3&4	Mar 2006 - Apr 2007; biweekly inside plant, monthly at offshore intakes / MBC	Mar 2006 - May 2007; biweekly / MBC 2008
Scattergood Generating Station	Jan 2006 - Jan 2007, bi-weekly / MBC, Tenera, and URS 2008c	Jan 2006 - Jan 2007; weekly / MBC, Tenera, and URS 2008c
South Bay Power Plant	Feb 2001 - Jan 2002, monthly / Tenera 2004	Dec 2002 - Nov 2003; weekly / Tenera 2004