



Fish Tissue

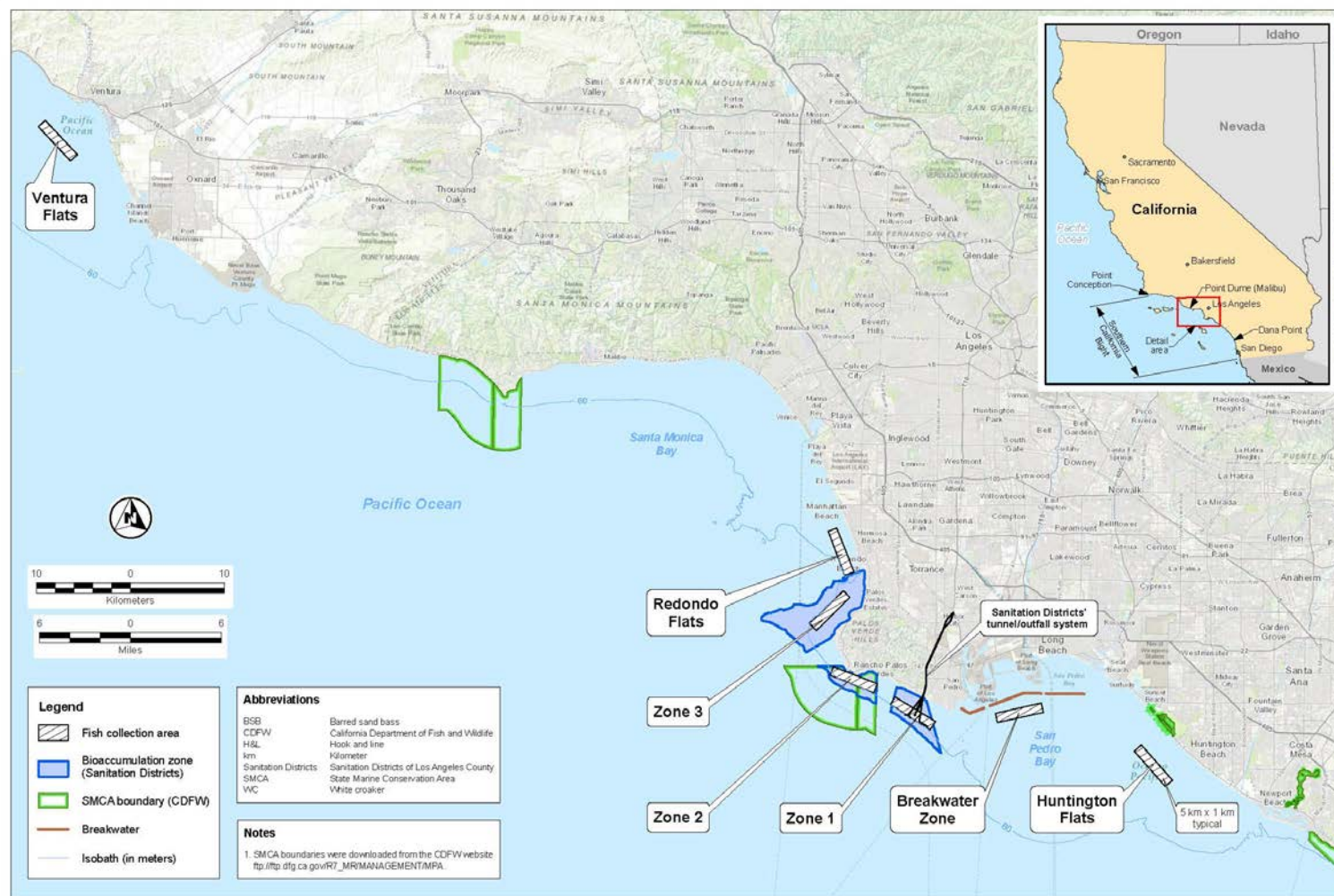


Fish Collection Locations and Targets

- **LACSD Zone 1:** 30 White Croakers and 30 Barred Sand Bass
- **LACSD Zone 2:** 10 White Croakers and 10 Barred Sand Bass
- **LACSD Zone 3:** 30 White Croakers and 30 Barred Sand Bass
- **Breakwater Zone:** 30 White Croakers and 30 Barred Sand Bass
- **Huntington Flats:** 30 Barred Sand Bass
- **Redondo Flats:** 30 Barred Sand Bass
- **Ventura Flats:** 30 White Croakers



Collection Locations





White Croaker Night Trawl





Fish Collection Dates

- **Zone 1,2,3 and Breakwater:**

- June 10, 2014 through August 2016 by Sanitation Districts using the *Ocean Sentinel*

- **Huntington Flats, Redondo Flats, Ventura Flats:**

- July 15, 2015 through July 24, 2016 by Seaventures



Fish Tissue Analysis

- **Analytical Media**

- Skin-off fish fillet

- **Analytical Laboratory:**

- Vista Labs, El Dorado Hills, CA

- **Sample Analysis Dates:**

- February 2, 2016 through November 29, 2016

- **Analytes:**

- DDT Compounds
 - PCB Expanded List



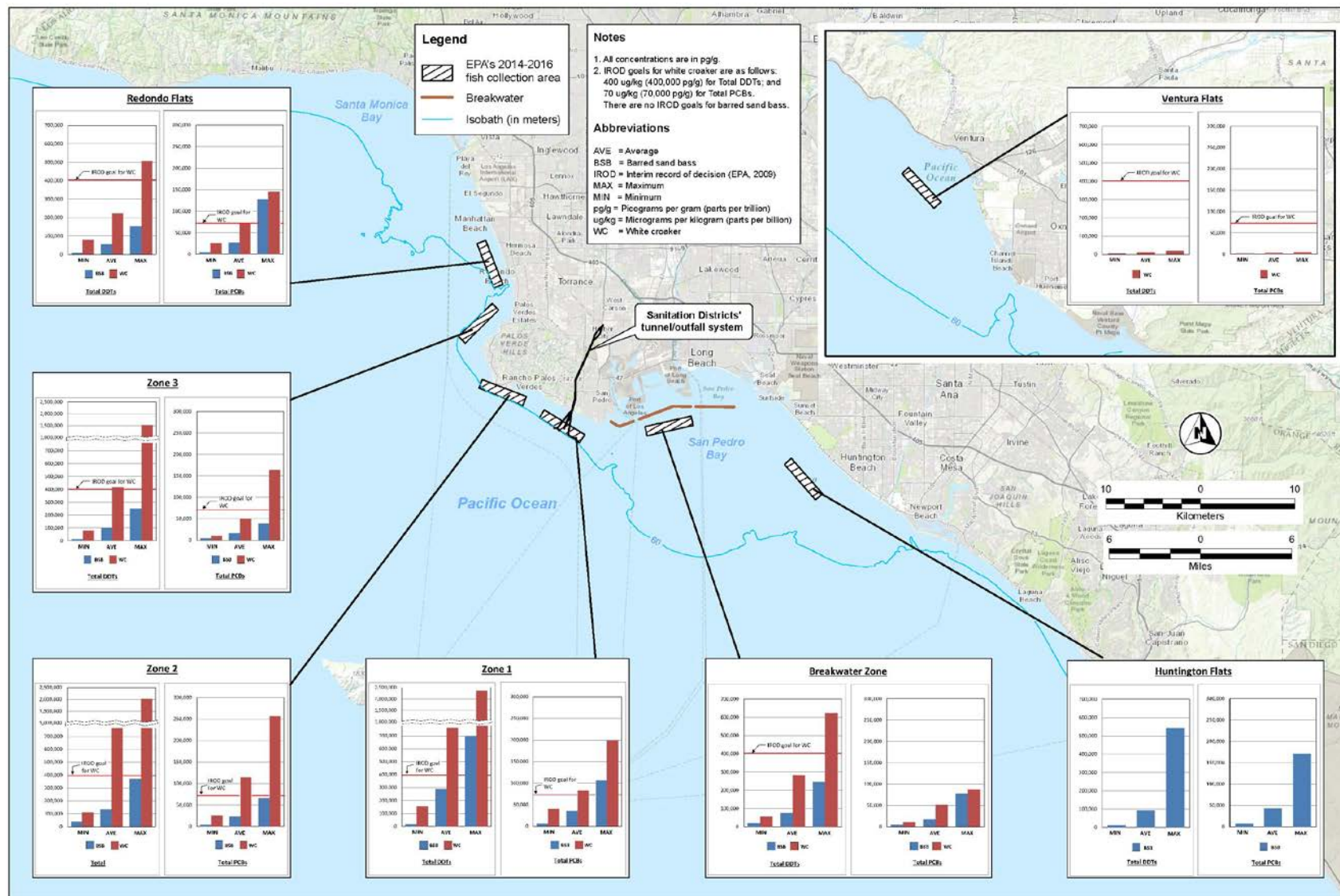
Fish Collection Results

- **White Croaker:**
 - Three LACSD Zones: 30 out of 30 fish
 - Breakwater Zone: 30 out of 30 fish
 - Redondo Flats: 8 out of 30 fish
 - Ventura Flats: 30 out of 30 fish
- **Barred Sand Bass:**
 - LACSD Zone 1: 30 out of 30 fish
 - LACSD Zone 2: 12 out of 30 fish
 - LACSD Zone 3: 14 out of 30 fish
 - Breakwater Zone: 31 out of 30 fish
 - Huntington Flats: 30 out of 30
 - Redondo Flats: 26 out of 30 fish



Fish Tissue Analytical Results

Total DDTs and Total PCB Expanded List



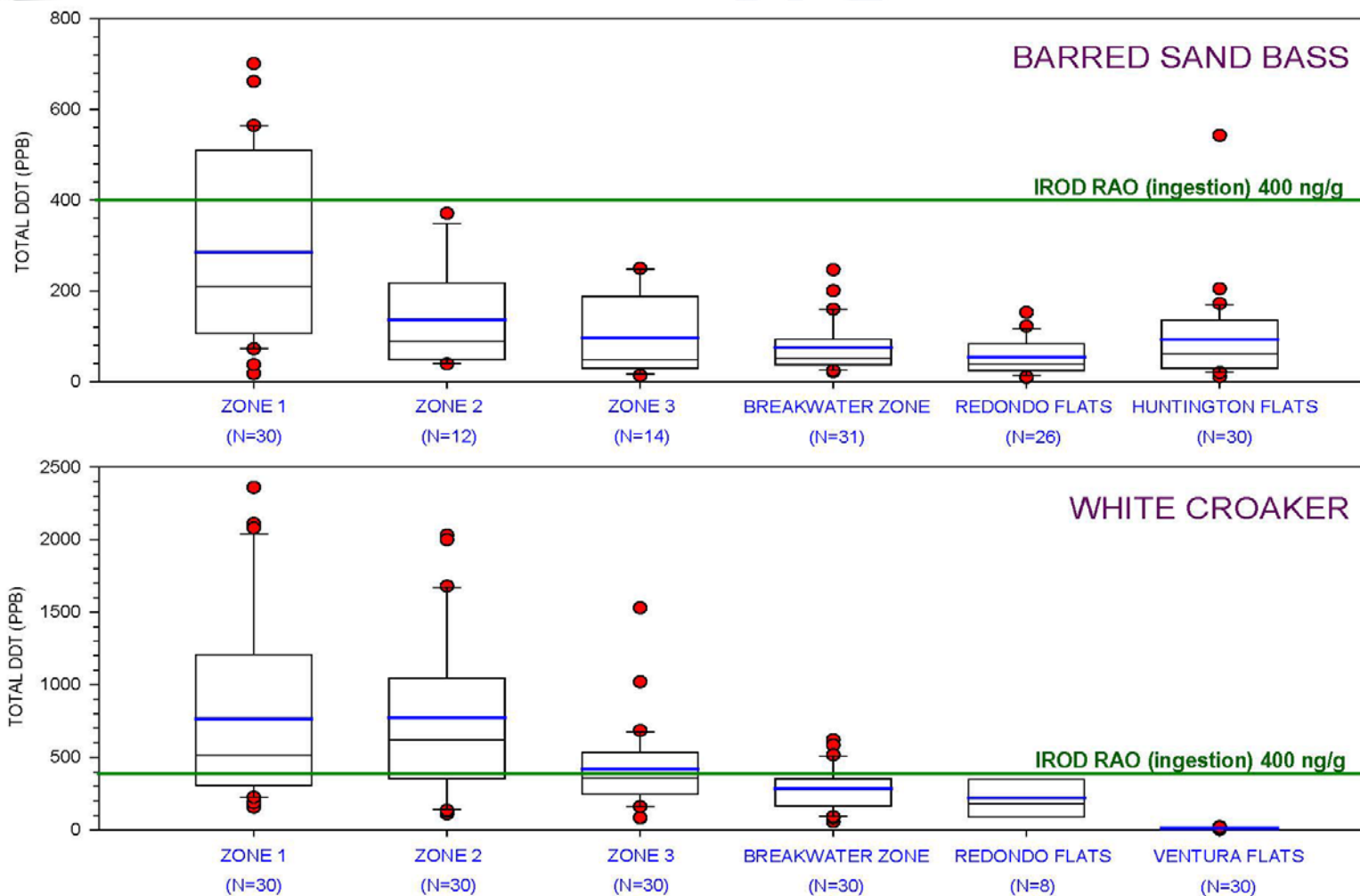


Fish Tissue Total DDTs Concentrations

Sample ID	DDT (IROD GOAL=400)											
	Barred Sand Bass						White Croaker					
	Breakwater Zone	Huntington Flats	Redondo Flats	Zone 1	Zone 2	Zone 3	Breakwater Zone	Redondo Flats	Ventura Flats	Zone 1	Zone 2	Zone 3
1	22.2	172	31.1	155	39.2	19.5	287	382	11	603	598	580
2	155	21.3	35.8	146	93.3	35	105	508	10.8	1280	1040	528
3	57.4	124	112	105	64.4	245	293	163	5.71	1180	856	245
4	99.2	205	101	137	225	219	57	118	17.1	348	410	685
5	70.5	134	78.3	331	371	250	81.8	195	7.72	451	611	268
6	48.1	59	105	100	198	32.7	166	247	9.06	580	341	496
7	78.3	141	114	501	44.9	58.7	280	79.8	8.11	401	711	433
8	26.2	58.4	122	206	60.8	61	294	82.9	6.51	236	865	469
9	201	47.7	8.77	72.6	296	18.6	308		12.5	416	129	248
10	31.5	27.7	22.4	133	83.8	13.4	421		16.1	1290	347	183
11	91.7	20.4	153	191	114	177	622		8.13	265	136	424
12	247	30.6	15.5	565	40.4	156	264		6.46	2080	182	515
13	121	137	34.2	518		32.8	434		4.83	693	110	1530
14	56.5	84.9	50.4	551		37.5	585		6.94	295	758	551
15	41.3	130	73.1	529			233		7.32	680	2000	365
16	49.5	62.7	25.1	302			333		17.7	187	991	207
17	31	64.7	22.7	536			341		7.5	389	2030	84.4
18	93	20.2	9.99	116			331		7.77	229	1680	1020
19	45.5	543	66.9	214			374		4.49	2360	1060	81.7
20	24.6	95.2	36.1	74.5			316		5.66	347	632	281
21	38.7	29.3	39.6	17.6			253		20.4	836	1600	553
22	160	119	25.6	91.1			517		21.3	1700	355	259
23	85.1	32.6	46.1	662			91.7		16.2	311	552	166
24	27.6	147	26.1	37.6			383		18.8	1400	472	335
25	136	143	47.1	297			187		16.1	678	852	381
26	23.9	29.1	15.1	107			120		17.4	390	508	353
27	47.8	52.6		508			199		16.2	834	551	561
28	51.5	10.7		701			341		17.6	2110	1180	281
29	37.4	31.5		325			164		17.4	157	1410	160
30	90.9	28.9		339			129		9.97	225	215	256
31	46.4											
Min	22.2	10.7	8.77	17.6	39.2	13.4	57	79.8	4.49	157	110	81.7
Median	51.5	60.85	37.85	210	88.55	48.1	290	179	10.385	515.5	621.5	359
Mean	75.3	93.4	54.5	285.6	135.9	96.9	283.7	222.0	11.8	765.0	772.7	416.6
Max	247	543	153	701	371	250	622	508	21.3	2360	2030	1530
STDEV	55.3	100.6	40.3	206.2	110.9	91.0	142.9	152.4	5.3	626.6	535.7	289.1
N	31	30	26	30	12	14	30	8	30	30	30	30
N>=IROD GOAL	0	1	0	9	0	0	5	1	0	18	22	13
FISH CLEAN LEVEL	100%	97%	100%	70%	100%	100%	83%	88%	100%	40%	27%	57%



Total DDTs





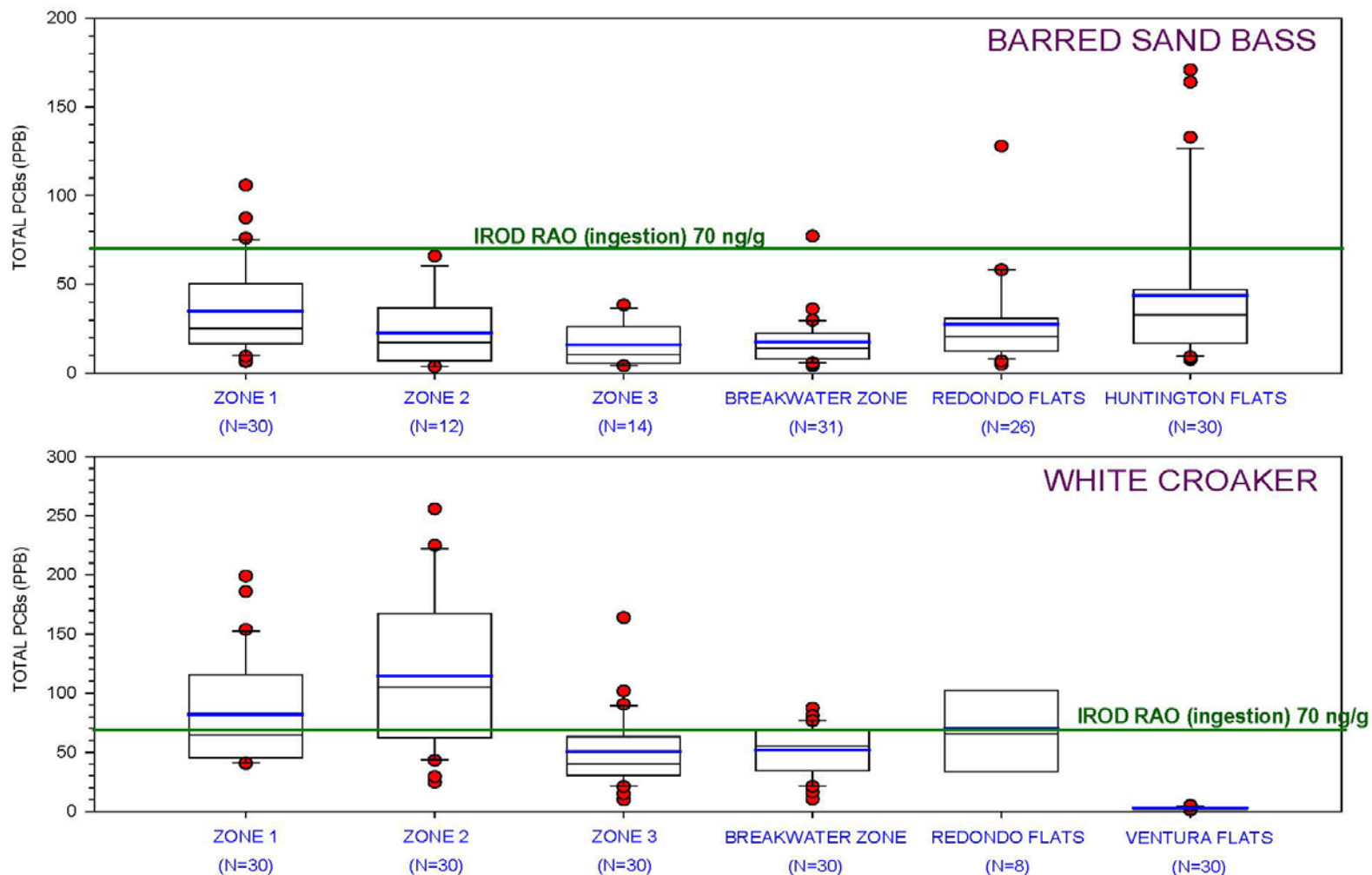
Fish Tissue

Total PCBs Expanded List Concentrations

	PCBs (IROD GOAL=70)											
	Barred Sand Bass						White Croaker					
Sample ID	Breakwater Zone	Huntington Flats	Redondo Flats	Zone 1	Zone 2	Zone 3	Breakwater Zone	Redondo Flats	Ventura Flats	Zone 1	Zone 2	Zone 3
1	21.3	20.3	16	19.5	9.13	4.22	52.1	62.5	3.37	79.9	89.5	55.6
2	22.6	20	12.9	37.3	21.1	4.19	21.3	146	2.4	89.3	115	61
3	8.01	133	128	16.7	38.3	34.6	33.8	42	1.34	103	109	30
4	22.2	65.8	41.6	17.2	32.5	22.9	10.6	30.9	3.85	42.9	63.6	102
5	24	71.1	32.8	27.3	66	38.5	16.7	68.6	1.96	45.8	102	35.8
6	16.3	32.7	58.3	22.8	47.4	7.74	46.2	112	2.43	62.2	71.9	90.7
7	36.2	40.4	28.3	53.3	4.39	7.62	58.5	26.5	2.32	65.9	118	57.1
8	11.4	27.7	30.1	22.8	7.17	28.4	55.3	73.8	1.95	45.4	111	41
9	29.8	63.5	11.3	19.2	21.7	5.56	64.7		3.37	62.1	76	29.7
10	11.6	28.6	16.2	16.7	13.8	9.72	59.4		3.09	115	71.7	62.2
11	19.4	17.5	58.2	22.9	6.87	21.2	81		1.96	40.5	43.2	39.4
12	77.3	15.2	6.83	37.8	3.77	25.4	55.1		1.82	186	29.5	66.6
13	13.9	171	10.1	39		4.89	76.8		1.75	118	24.7	164
14	7.4	46.4	20.2	50.5		11.1	75.9		1.78	45.5	145	70.6
15	8.95	44.5	26.4	60.2			68		1.82	154	225	30.7
16	5.84	29.7	11.2	32.3			47.3		2.06	46.5	176	76.8
17	6.1	32.9	15.5	31.9			70.9		2.53	41.8	196	14.9
18	21	8.85	4.96	16.1			72.5		2.12	63.5	256	62.8
19	11.9	164	42.4	65.8			64.8		1.9	138	225	9.98
20	14.1	39.9	24.2	9.5			65.3		2.22	40.9	173	21.2
21	5.81	12.9	25.2	7.05			46.3		4.95	72.3	161	54.9
22	23.8	42.7	20.9	14.8			87.4		4.79	134	83.4	38.7
23	9.65	20.3	18.1	87.5			35.2		3.94	42	69.1	35.9
24	7.76	33.3	18	6.46			69.2		5.14	122	50.9	31.4
25	17.1	36.6	30.1	50.3			33.5		2.91	78.8	168	64.7
26	4.24	9.25	8.43	17.9			26.6		3.92	49.5	59.4	26
27	13.3	49.9		76.1			34.9		3.83	80.5	54.3	37.2
28	18.8	12.3		106			59		2.91	199	167	43.9
29	27.5	14.1		16.6			33.5		2.84	59.8	152	27.7
30	28.8	7.68		43.1			38.3		3.33	40.9	50.3	38.1
31	4.83											
Min	4.24	7.68	4.96	6.46	3.77	4.19	10.6	26.5	1.34	40.5	24.7	9.98
Median	14.1	32.8	20.55	25.1	17.45	10.41	55.2	65.55	2.48	64.7	105.5	40.2
Mean	17.8	43.7	27.5	34.8	22.7	16.1	52.0	70.3	2.8	82.2	114.6	50.7
Max	77.3	171	128	106	66	38.5	87.4	146	5.14	199	256	164
STDEV	13.9	42.0	24.9	24.6	19.7	12.0	20.1	41.1	1.0	44.8	63.0	30.4
N	31	30	26	30	12	14	30	8	30	30	30	30
N>=IROD GOAL	1	4	1	3	0	0	6	3	0	14	21	5
FISH CLEAN LEVEL	97%	87%	96%	90%	100%	100%	80%	63%	100%	53%	30%	83%



Total PCBs Expanded List





White Croaker Total DDTs Results

- **Reference location: Ventura Flats**
 - All fish tissue concentration below IROD goal
- **Zone 1 through 3:**
 - Fish tissue concentration decrease further away from White Point.
 - Average and maximum fish tissue concentrations exceed IROD goal.
- **Redondo Flats:**
 - Fish tissue concentration lower than zone 1 through 3
 - Average fish tissue concentration below IROD goal
 - Maximum fish tissue concentration above IROD goal
- **Breakwater Zone:**
 - Average fish tissue concentration below IROD goal.
 - Maximum fish tissue concentration above IROD goal.



Barred Sand Bass Total DDTs Results

- **Reference Location:** Redondo Flats
- **Zone 1:**
 - Average and maximum fish tissue concentrations exceed reference location
- **Zones 2 & 3:**
 - Average fish tissue concentrations exceed reference location
 - Maximum fish tissue concentration below reference location
- **Huntington Flats (Spawning Ground):**
 - Average and maximum fish tissue concentrations exceed reference location
- **Breakwater Zone:**
 - Average and maximum fish tissue concentrations below reference location



Exposure Point Concentration vs. IROD Goal

Total DDTs

Total DDTs (pg/g)									
Sample Areas	White Croaker					Barred Sand Bass			
	IROD Goal	Maximum	Average	Minimum	EPC (95% UCL)	Maximum	Average	Minimum	EPC (95% UCL)
Zone 1 (June 2014- August 2016)	400,000	2,360,000	765,033	157,000	995,306	701,000	285,613	17,600	376,433
Zone 2 (June 2014- August 2016)		2,030,000	772,733	110,000	938,908	371,000	135,900	39,200	227,123
Zone 3 (June 2014- August 2016)		1,530,000	416,637	81,700	515,494	250,000	96,871	13,400	171,991
Breakwater (June 2014- August 2016)		622,000	283,683	57,000	328,024	247,000	75,348	22,200	94,186
Huntington Flats (July 2015 - July 2016)		NA	NA	NA	NA	543,000	93,417	10,700	126,132
Redondo Flats (July 2015 - July 2016)		508,000	221,963	79,800	324,057	153,000	54,498	8,770	72,111
Ventura Flats (July 2015 - July 2016)		21,304	11,757	4,495	13,403	NA	NA	NA	NA
TM #2 Rainbow Harbor (2011-2012)	400,000	111,000	85,600	45,500	102,000				
TM #2 Pier J (2011-2012)		294,000	118,000	35,900	169,000				
TM #2 Cabrillo Pier (2011-2012)		267,000	116,000	15,000	163,000				
TM #2 Santa Monica Pier (2011-2012)		48,000	25,200	10,300	NA				
TM#1 Near Shore/In water (March-May 2009)		256,600	138,400	40,440	165,300				



Exposure Point Concentration vs. IROD Goal

Total PCBs Expanded List

Total PCBs (pg/g)									
Sample Areas	White Croaker					Barred Sand Bass			
	IROD Goal	Maximum	Average	Minimum	EPC (95% UCL)	Maximum	Average	Minimum	EPC (95% UCL)
Zone 1 (June 2014- August 2016)	70,000	199,000	82,167	40,500	97,588	106,000	347,820	6,460	43,992
Zone 2 (June 2014- August 2016)		256,000	114,550	24,700	134,101	66,000	22,678	3,770	32,900
Zone 3 (June 2014- August 2016)		164,000	50,686	9,980	60,125	38,500	16,146	4,190	25,350
Breakwater (June 2014- August 2016)		87,400	52,003	10,600	58,232	77,300	17,771	4,240	22,202
Huntington Flats (July 2015 - July 2016)		NA	NA	NA	NA	171,000	43,736	7,680	57,815
Redondo Flats (July 2015 - July 2016)		146,000	70,288	26,500	97,809	128,000	27,547	4,960	36,236
Ventura Flats (July 2015 - July 2016)		5,140	2,820	1,340	3,140	NA	NA	NA	NA
TM #2 Rainbow Harbor (2011-2012)	70,000	178,000	78,200	120,000	146,000				
TM #2 Pier J (2011-2012)		575,000	194,000	63,100	290,000				
TM #2 Cabrillo Pier (2011-2012)		164,000	86,200	23,600	118,000				
TM #2 Santa Monica Pier (2011-2012)		23,500	15,900	7,560	15,900				
TM#1 Near Shore/In water (March-May 2009)		224,000	114,000	25,000	152,000				



Total DDTs

Fish Tissue Concentration Comparison

Species	Barred sand bass									White croaker														
	NOAA 2002-2004 (ND=0) ⁴			SCCWRP Bight 2013 ⁵			EPA 2014-2016 (ND=EDL) ⁶			NOAA 2002-2004 (ND=0) ⁴			EPA ICs 2009-2012 (ND=MDL) ⁷			SCCWRP Bight 2013 ⁵			Sanitation Districts 2015 (ND=RL) ⁸			EPA 2014-2016 (ND=EDL)		
Sampling Event																								
Location	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
Breakwater Area	60,700	202,000 (6)	402,000				22,200	75,350 (31)	247,000	17,300	251,000 (49)	2,900,000	14,800	127,000 (15)	267,000				NA	NA	NA	57,000	284,000 (30)	622,000
Huntington Flats	124,000	124,000 (1)	124,000				10,700	93,400 (30)	543,000	35,600	104,000 (10)	188,000	NA	NA	NA				NA	NA	NA	NA	NA	NA
Redondo Flats	45,300	99,100 (10)	269,000				8,770	54,500 (26)	153,000	60,100	234,000 (25)	874,000	NA	NA	NA				NA	NA	NA	79,800	222,000 (8)	508,000
Ventura Flats	NA	NA	NA				NA	NA	NA	44,200	84,000 (9)	115,000	10,300	25,200 (4)	48,300				NA	NA	NA	4,490	11,800 (30)	21,300
Zone 1	46,200	881,000 (16)	4,320,000				17,600	286,000 (30)	701,000	186,000	1,350,000 (16)	6,770,000	NA	NA	NA				Composite	479,000 (10)	Composite	157,000	765,000 (30)	2,360,000
Zone 2	NA	NA	NA				39,200	136,000 (12)	371,000	127,000	992,000 (29)	3,590,000	NA	NA	NA				Composite	264,000 (10)	Composite	110,000	773,000 (30)	2,030,000
Zone 3	65,400	303,000 (5)	586,000				13,400	96,900 (14)	250,000	NA	NA	NA	NA	NA	NA				Composite	151,000 (10)	Composite	81,700	417,000 (30)	1,530,000



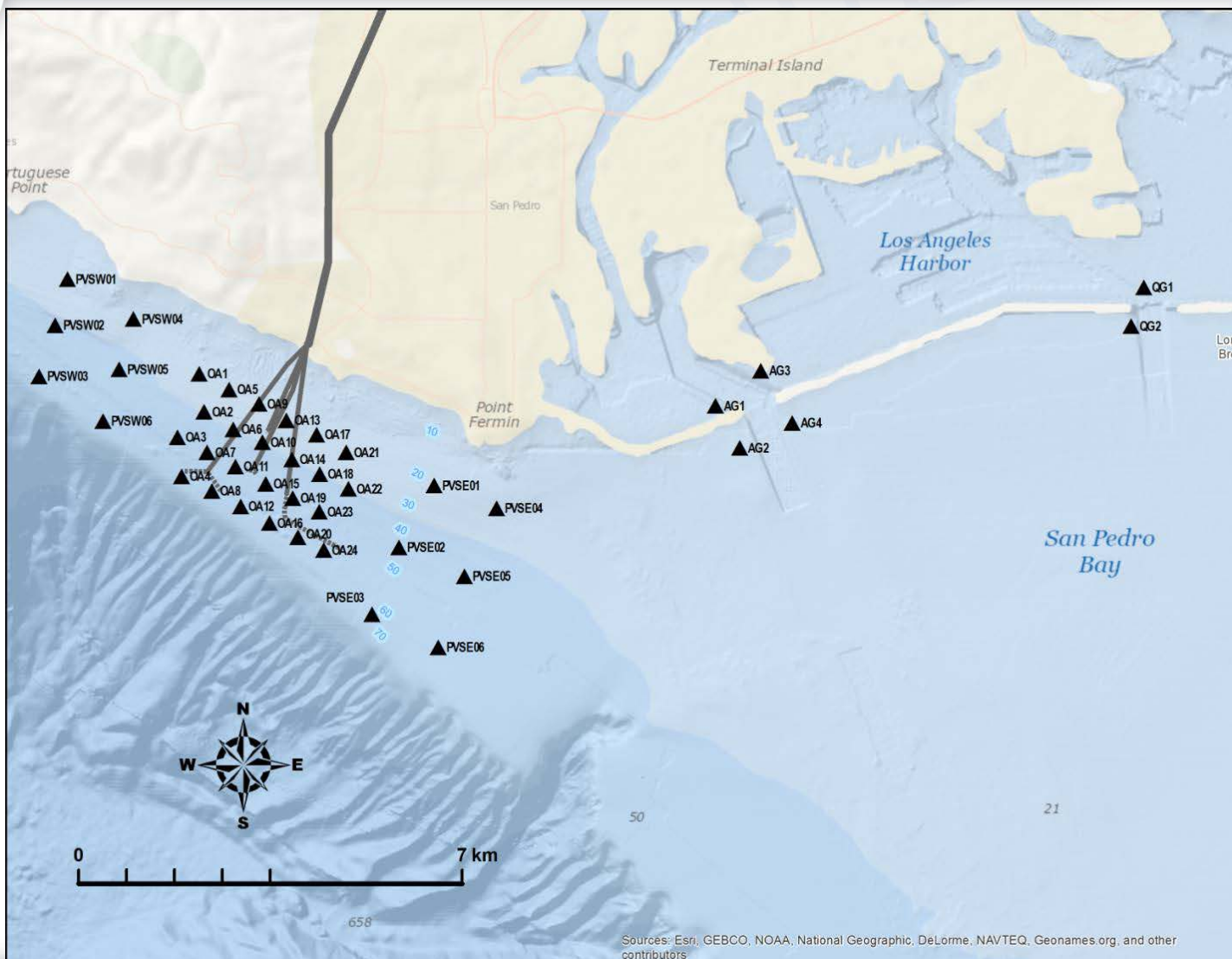
Total PCBs

Fish Tissue Concentration Comparison

Species	Barred sand bass									White croaker														
	NOAA 2002-2004 (ND=0) ^d			SCCWRP Bight 2013 ^e			EPA 2014-2016 (ND=EDL) ^f			NOAA 2002-2004 (ND=0) ^d			EPA ICs 2009-2012 (ND=MDL) ^g			SCCWRP Bight 2013 ^e			Sanitation Districts 2015 (ND=RL) ^h			EPA 2014-2016 (ND=EDL) ^f		
Sampling Event																								
Location	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
Breakwater Area	24,300	57,400 (6)	111,000				4,240	17,800 (31)	77,300	5,260	44,200 (49)	279,000	23,600	82,500 (15)	164,000				NA	NA	NA	10,600	52,000 (30)	87,400
Huntington Flats	80,300	80,300 (1)	80,300				7,680	43,800 (30)	171,000	5,410	41,100 (10)	72,400	NA	NA	NA				NA	NA	NA	NA	NA	NA
Redondo Flats	8,170	26,500 (10)	58,700				4,960	27,600 (26)	128,000	18,600	62,100 (25)	209,000	NA	NA	NA				NA	NA	NA	26,500	70,300 (8)	146,000
Ventura Flats	NA	NA	NA				NA	NA	NA	8,860	21,700 (9)	31,000	7,570	15,800 (4)	23,500				NA	NA	NA	1,340	2,820 (30)	5,140
Zone 1	46,200	97,750 (16)	4,320,000				6,460	34,800 (30)	106,000	24,800	152,000 (16)	619,000	NA	NA	NA				Composit e	38,200 (10)	Composit e	40,500	82,200 (30)	199,000
Zone 2	NA	NA	NA				3,770	22,700 (12)	66,000	15,300	120,000 (29)	356,000	NA	NA	NA				Composit e	29,450 (10)	Composit e	24,700	115,000 (30)	256,000
Zone 3	12,100	40,400 (5)	80,400				4,190	16,100 (14)	38,500	NA	NA	NA	NA	NA	NA				Composit e	24,600 (10)	Composit e	9,980	50,700 (30)	164,000



Fish Tracking Receiver Array Locations





Fish Tracking Results

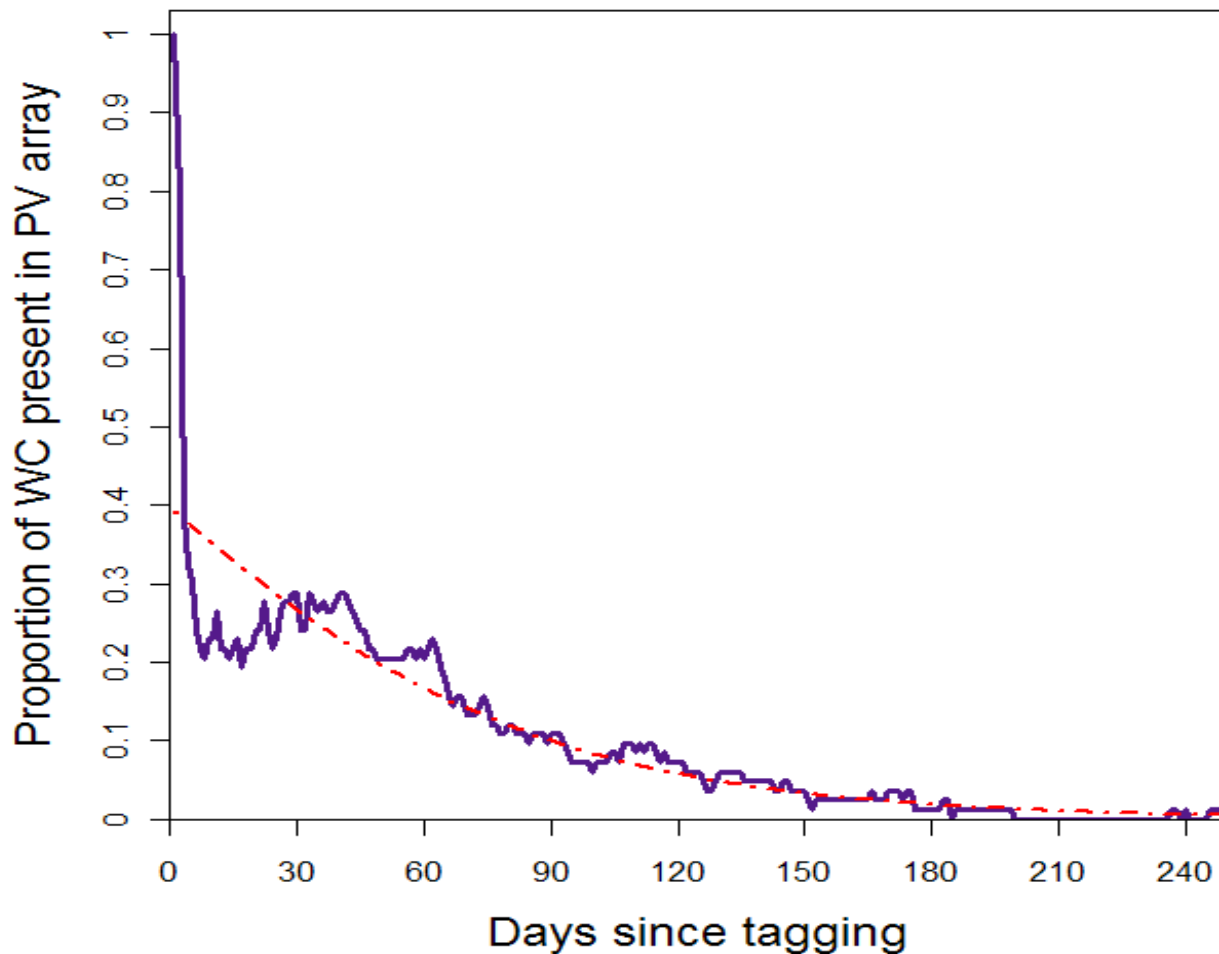


Figure 16 - WC Presence/Absence Over Study Duration. This figure shows the proportion of individual WC present in the PV Shelf array (detected by one or more receiver stations) over subsequent lengths of days post-transmitter implantation.