City of Newport Beach
Water Quality/Coastal Tidelands Committee Minutes

Date: April 11, 2013
Time: 3:00 p.m.
Location: Newport Coast Conference Room

1. **Welcome/Self Introductions**
   Committee Members present:
   Chairwoman/Council Member Nancy Gardner
   Dennis Baker
   Carl Cassidy
   Fred Galluccio
   George Robertson

   Guests present:
   Jack and Nancy Skinner, SPON
   Philip Bettencourt
   Jim Mosher, resident
   Pat Fuscoe, MiOcean Foundation
   Larry Honeybourne, Orange County Health Care Agency
   Amy Senk, Corona del Mar Today

   Staff present:
   John Kappeler, Water Quality Manager
   Mike Pisani, Deputy Municipal Operations Director
   Dave Kiff, City Manager

   The agenda for the Water Quality/Coastal Tidelands Committee was posted at 6:47 pm on April 4, 2013, on the City Hall Bulletin Board located in the entrance of the Council Chambers at 100 Civic Center Drive.

2. **Approval of Previous Meeting's Minutes**
   The minutes from the March 14, 2013 meeting were approved.

3. **Old Business**
   1. **Bay and Ocean Bacteriological Test Results**
      John Kappeler reviewed recent water quality test results within Newport Bay and along the ocean shoreline. Staff noted hits at the Newport Boulevard Bridge every other week recently and will investigate further the storm drain in the area below the transfer station as well as other potential causes.

   ACTION: Investigation of cause of hits at Arches/Newport Boulevard bridge made a priority of the Committee

   Chairwoman Gardner polled the Committee to see if future the Bay and Ocean Bacteriological Test Results would not be printed and attached to the agenda. She suggested they be projected on the screen at the meeting and made available electronically if someone wished to print out a hard copy. Committee members were in agreement.

ACTION: Go paperless with future Bay and Ocean Bacteriological Test Results

4. **New Business**

Mike Pisani gave a presentation and overview of the **City's Street Sweeping Program**. The presentation described the locations and frequency of street sweeping within the City as well as the cleaning of storm drains and catch basins. (See attached presentation)

- Unlike many other cities, Newport sweeps every alley and every municipal parking lot in the City
- Marine Avenue, Newport and Balboa Pier Area and oceanfront sidewalks and parking lots as well as Main Street are swept daily
- Street sweeping is currently contracted with Athens Services and has been since 2010
- Alleys are swept by Sunset Property Management

ACTION: Nancy Gardner to contact City Attorney and ask if the City can legally enforce street sweeping and catch basin maintenance within private HOAs to ensure compliance with new EIRs.

ACTION: Jack Skinner and John Kappeler to prepare an outline of what tests they think would be necessary to study the efficiency of the frequency of sweeping on biofilm in some known problem areas and how much money they think they would need to ask for to fund this study. (Estimate of $15K for materials – labor would be free).

Larry Honeybourne gave a presentation on the new **US EPA 2012 Recreational Water Quality Criteria**. (See attached Presentation)

- Criteria released in December is Guidance material, it is not mandated and was intended to be used by the states to develop Recreational Water Quality Criteria of their own
- They allowed qPCR methodology as a mechanism to test water.
- For marine water you can only use enterococcus but for fresh water you can use enterococcus or ecoli.
- EPA does not recognize the three bacterial indicators in AB 411 (Enterococci, Total Coliform or Fecal Coliform) as valid indicators, however local health departments will continue to implement AB 411.
- It would require a legislative change to remove total and fecal coliform indicators.

Pat Fuscoe Updated the Committee on various past, present and future MiOcean programs. (See attached Presentation)

- Based on studies they found that 5th Grade is the most impressionable age of your life, MiOcean funds an Ocean Institute Watershed Education Program for 5th Graders.
- MiOcean's model is a public/private partnership. They raise the money privately so things can be built and maintained publicly.
- Newest completed project is a 17-Acre bioinfiltration wetlands in Costa Mesa (Fairview-Talbert Park) that cleans 1900 acres of existing non-conforming urban or suburban areas that have no BMPs at all.
- Newest MiOcean project involves purchasing litter booms ($50K each) to be installed and maintained by the County in two channels as a beta test – the Talbert Channel and the Huntington Beach Channel. If they work as well as anticipated, MiOcean plans to do them all over Orange County.
- LA County Flood Control & Watershed Management are addressing their Trash TMDLs with upstream BMPs (despite the experience they have with litter booms.)

- LA County is seriously considering adopting a Water Quality Fee and if that happens it is likely that Orange County would consider doing the same to help fund projects like this.
- **Dennis Baker** commented that the Delhi Channel is a perfect location for a litter boom because it has an access ramp to facilitate cleaning.
- Orange County Public Works Department is having a meeting announcing their "Adopt a Channel Program.

ACTION: Nancy Gardener will ask OC Public Works Department to do a presentation for the Newport Bay Watershed Executive Committee on their "Adopt a Channel Program."

5. Public Comments on Non-Agenda Items

- Jim Mosher suggested a change in the timing of street sweeping on trash collection days for streets within the City. He felt it would be better if the street was swept after trash collection took place rather than before.

6. Topics for Future Agendas

(a) Bacteriological Dry-Weather Runoff Gutter Study (Phase III)
(b) Prop 84 ASBS Grant Program
(c) Big Canyon Project
(d) Rhine Channel Project Wrap Up
(e) Senate Bill – SB 1447

Set Next Meeting Date

The next meeting date was set for May 9th, at 3 PM in the Newport Coast Meeting Room

7. Adjournment

The meeting was adjourned at 4:45 pm.

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Chairwoman / Nancy Gardner

Health Care Agency / Environmental Health Newport Bay Bacteriological Monitoring Program
Total Coliform (TC), Fecal Coliform, Enterococcus (ENT) Colony Forming Units / 100 ml Sample

STATION	Location Description		12/19/12	12/27/12	1/2/13	1/7/13	1/14/13	1/22/13	1/28/13	2/4/13	2/13/13	2/20/13	2/25/13	3/6/13	3/11/13	3/18/13	3/25/13	4/3/13	4/8/13
NEWPORT BAY (Lower Bay)			RAIN	RAIN	RAIN				RAIN						RAIN				
BNB09	43rd Street Beach	TC	70	>830	50	<10	<10	10	>70	50	30	50	40	<10	70	20	70	>3800	30
		FC	10	40	<10	<10	<10	<10	10	<10	<10	10	<10	<10	10	10	<10	300	10
		ENT	4	72	20	4	<2	2	<2	<10	2	10	4	<2	<2	<2	218	20	8
BNB10	38th Street Beach	TC	290	490	50	230	20	30	80	<10	10	50	80	60	30	<10	10	30	30
		FC	50	100	<10	10	<10	10	10	<10	<10	<10	30	<10	<10	<10	<10	<10	<10
		ENT	22	285	4	52	4	10	6	10	8	2	44	38	6	2	2	6	<2
BNB11	33rd Street Channel	TC	420	240	20	4200	360	100	100	20	20	28000	50	30	20	80	100	30	10
		FC	20	30	<10	40	<10	10	<10	<10	10	840	<10	<10	<10	30	<10	<10	<10
		ENT	42	76	10	72	10	20	<2	4	8	350	6	4	<2	20	8	<2	4
BNB32	Lido Yacht Club Beach	TC	340	210	10	10	<10	<10	>490	80	<10	20	40	10	50	10	<10	<10	>50
		FC	170	30	10	<10	10	<10	<10	10	<10	<10	10	<10	<10	20	<10	<10	<10
		ENT	4	8	4	10	<2	90	4	2	6	2	100	<2	<2	2	<2	4	<2
BNB07	Via Genoa Beach	TC	80	120	10	<10	10	<10	>710	30	10	250	<10	<10	20	70	<10	10	>70
		FC	20	30	10	<10	<10	10	100	20	10	60	<10	<10	10	20	<10	<10	20
		ENT	10	24	4	2	4	6	10	2	<2	60	6	<2	2	20	4	2	20
BNB35	Newport Blvd. Bridge	TC	920	670	170	9600	330	>19000	>1390	>40000	340	>40000	<10	40000	120	>40000	170	>40000	330
		FC	95	30	70	4200	<10	5000	100	1100	70	>40000	<10	23600	<10	95	60	900	<10
		ENT	140	62	56	1000	78	3800	>180	1000	10	23800	<2	6200	2	150	20	800	8
BNB12	Rhine Channel	TC	50	100	80	40	20	210	>250	20	20	120	<10	<10	30	70	<10	60	30
		FC	10	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	10	<10	<10	20
		ENT	8	2	4	<2	<2	<2	2	<2	2	<2	<2	<10	2	<2	<2	8	<2
BNB14	19th Street Beach	TC	30	>620	50	60	20	<10	>640	30	70	<10	<10	<10	>110	<10	10	40	>20
		FC	<10	250	10	10	10	<10	30	<10	<10	<10	<10	<10	10	<10	<10	30	<10
		ENT	6	30	2	20	24	4	4	4	8	2	<2	<2	<2	2	<2	>2	8
BNB15	15th Street Beach	TC	30	>310	<10	20	30	20	>320	<10	<10	100	10	10	20	<10	<10	580	10
		FC	60	<10	<10	<10	<10	<10	30	<10	<10	<10	<10	<10	<10	<10	<10	140	<10
		ENT	8	2	2	4	2	6	2	<2	<2	10	<2	2	2	140	<2	<2	4
BNB17	10th Street Beach	TC	160	>660	20	20	<10	120	>430	95	<10	40	<10	<10	50	10	<10	50	>10
		FC	30	<10	20	<10	10	50	250	40	<10	20	<10	<10	<10	<10	<10	20	<10
		ENT	2	28	<2	<2	10	6	236	6	10	10	<2	<2	4	<2	<2	<2	4
BNB18	Alvarado/ Bay Isle Beach	TC	100	>410	20	100	20	100	>920	10	30	20	20	70	110	10	10	<10	>320
		FC	20	30	<10	20	<10	10	95	10	<10	<10	10	10	<10	<10	10	<10	360
		ENT	4	10	<2	88	6	1000	6	4	10	78	8	329	2	<2	<2	4	26
BNB22	N Street Beach	TC	10	>200	10	10	10	<10	250	30	<10	10	<10	10	<10	<10	<10	20	10
		FC	10	10	<10	<10	<10	<10	30	10	10	<10	<10	<10	<10	10	<10	30	<10
		ENT	<2	6	<2	4	<2	<2	<2	4	<2	4	<2	6	<2	<2	<2	2	2
BNB31	Garnet Avenue Beach	TC	70	>340	80	50	10	40	>880	80	<10	50	30	40	180	10	10	460	>10
		FC	20	10	<10	60	<10	10	30	<10	10	50	<10	<9	<10	<10	10	410	<10
		ENT	26	<2	4	24	2	2	8	6	8	100	<2	3	2	20	<2	20	2
BNB03	Ruby Avenue Beach	TC	<10	>520	230	10	<10	<10	>580	50	10	10	<10	9	100	<10	10	30	>70
		FC	<10	240	110	10	<10	<10	70	<10	10	<10	<10	9	<10	10	<10	<10	10
		ENT	4	>74	6	4	<2	<2	190	<2	10	10	2	2	6	<2	2	<2	52
BNB20	Sapphire Avenue Beach	TC	20	>180	70	20	10	20	>460	30	20	20	<10	9	10	40	10	30	>10
		FC	<10	110	<10	<10	<10	<10	20	10	20	<10	<10	9	<10	40	10	10	<10
		ENT	8	6	2	<2	2	<2	4	4	2	<2	<2	<2	4	<2	4	<2	4
BNB34	Grand Canal	TC	710	>320	280	190	20	95	>560	130	60	860	<10	990	20	380	<10	20	20
		FC	540	<10	150	180	<10	110	30	120	50	<10	<10	440	10	260	<10	20	20
		ENT	10	8	22	22	2	<2	<2	68	20	42	<2	226	<2	20	2	42	4
BNB21	Abalone Avenue Beach	TC	50	120	100	30	<10	150	>300	10	30	80	<10	90	160	30	80	100	100
		FC	10	30	70	<10	<10	130	20	20	<10	<10	<10	20	70	30	50	130	40
		ENT	2	10	8	<2	2	10	6	2	10	10	<2	10	4	<2	10	72	24
BNB01	Park Avenue Beach	TC	<10	>350	130	10	20	<10	>690	40	<10	70	130	9	50	20	40	20	10
		FC	<10	<10	10	10	<10	<10	30	<10	10	<10	<10	<9	<10	<10	10	<10	<10
		ENT	<2	6	<2	2	<2	2	<2	2	2	8	<2	3	<2	<2	<2	<2	<2
BNB02	Onyx Avenue Beach	TC	50	>270	50	130	10	80	>850	<10	40	10	40	<10	190	10	<10	10	160
		FC	40	20	20	10	10	<10	160	<10	20	10	<10	<10	10	<10	<10	<10	95
		ENT	10	26	22	10	4	20	22	2	4	20	6	2	6	<2	4	10	120
BNB29	Promontory Point Channel	TC	10	>210	10	<10	20	<10	>670	>40000	<10	20	<10	<10	20	10	<10	<10	<10
		FC	<10	10	<10	<10	<10	<10	20	20	<10	<10	<10	<10	<10	<10	<10	<10	<10
		ENT	4	2	2	<2	<2	<2	20	<2	2	2	<2	<2	<2	<2	<2	<2	<2
BNB33	Bayside Drive Beach	TC	120	30	10	<10	60	30	100	>100	10	130	60	30	20	150	30	>270	>260
		FC	10	<10	<10	<10	<10	<10	<10	30	<10	40	40	<10	20	60	<10	60	160
		ENT	6	4	<2	<2	6	2	<2	4	6	6	2	2	<2	20	<2	42	40
BNB23	Rocky Point Beach	TC	30	20	70	<10	10	<10	30	<10	110	60	<10	<10	<10	<10	<10	20	<10
		FC	<10	<10	10	<10	<10	<10	20	10	40	<10	<10	<10	<10	<10	<10	10	<10
		ENT	4	4	<2	<2	<2	4	2	<2	6	10	<2	<2	<2	<2	<2	10	<2

NS - NOT SAMPLED
LA - LAB ACCIDENT
Cw/(o)C- CONFLUENT GROWTH WITH(OUT) COLIFORMS
TNTC - TOO NUMEROUS TO COUNT

SINGLE SAMPLE STANDARDS:
Total Coliforms - 10,000 organisms per 100 milliliters sample.
Fecal Coliforms - 400 organisms per 100 milliliters sample.
Enterococci - 104 organisms per 100 milliliters sample.
Fecal:Total Ratio - >1000 total coliforms if ratio exceeds 0.1.

New Data
Single Sample Standard Violation.
Long-term Posting Location.
Creek/Drain Sample Location.
Rain Influenced Data.

30-DAY LOG MEAN STANDARDS (of five weekly samples)
Total Coliforms - 1,000 organisms per 100 milliliters sample.
Fecal Coliforms - 200 organisms per 100 milliliters sample.
Enterococci - 35 organisms per 100 milliliters sample.

Health Care Agency / Environmental Health Newport Bay Bacteriological Monitoring Program
Total Coliform (TC), Fecal Coliform (FC), Enterococcus (ENT) Colony Forming Units / 100 ml Sample

STATION	Location Description		12/19/12	12/27/12	1/2/13	1/7/13	1/14/13	1/22/13	1/28/13	2/4/13	2/13/13	2/20/13	2/25/13	3/6/13	3/11/13	3/18/13	3/25/13	4/3/13	4/8/13
NEWPORT BAY (Upper Bay)			RAIN	RAIN	RAIN				RAIN						RAIN				
BNB24	Newport Dunes - Middle	TC	3200	>19000	190	130	10000	40	>5400	95	50	1610	20	200	>1220	70	80	>70	>10
		FC	240	770	95	10	6800	20	240	80	30	1080	20	230	70	10	40	30	30
		ENT	160	259	30	22	96	2	68	10	24	600	10	34	24	6	4	6	2
BNB24	Newport Dunes - West	TC	2800	18000	220	450	8000	70	>5400	210	220	3200	95	530	>1480	>180	80	400	40
		FC	270	960	110	40	6200	20	200	70	80	1160	70	310	60	95	40	260	<10
		ENT	170	160	36	24	327	2	70	24	32	2400	20	224	20	62	4	24	2
BNB24	Newport Dunes - East	TC	>1370	>14000	100	10	12000	300	>4800	130	180	630	50	40	>840	40	290	10	<10
		FC	220	360	50	10	7800	230	310	80	10	470	20	20	80	10	200	<10	10
		ENT	130	232	10	4	42	20	62	10	10	7600	10	8	20	30	38	2	6
BNB24	Newport Dunes - North	TC	>1170	>8000	80	100	5400	>10	>7000	>320	130	280	10	130	>700	>60	20	40	>325
		FC	190	240	20	50	3000	<10	240	250	20	140	<10	10	100	80	10	10	180
		ENT	150	110	4	50	34	8	98	20	10	56	<2	32	4	6	10	6	60
BNB25	Vaughn's Launch	TC	NS	5600	>790	NS	110	NS	>7200	NS	NS	NS	10	NS	>380	NS	20	NS	>40
		FC	NS	100	70	NS	20	NS	300	NS	NS	NS	<10	NS	30	NS	10	NS	10
		ENT	NS	150	20	NS	8	NS	80	NS	NS	NS	6	NS	6	NS	10	NS	220
BNB26	Ski Zone	TC	NS	>40000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
		FC	NS	1550	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
		ENT	NS	1000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
BNB28	North Star Beach	TC	>20400	>980	>480	180	30	30	>1240	>450	>340	1660	<10	160	>500	60	10	<10	10
		FC	1240	40	80	10	20	30	70	30	20	80	<10	10	20	<10	<10	<10	10
		ENT	600	22	28	2	400	38	26	54	150	96	10	38	8	28	8	4	4
BNB30	De Anza	TC	7800	>460	130	160	50	10	>840	320	50	13000	10	50	260	60	10	<10	10
		FC	200	40	10	30	<10	<10	70	10	10	170	<10	<10	<10	<10	<10	10	<10
		ENT	120	20	26	<2	4	6	20	44	36	600	6	36	<2	30	<2	10	2
BNB05	Bayshore Beach	TC	4000	>240	110	110	60	10	>790	180	10	620	20	60	70	80	20	<10	10
		FC	230	<10	20	<10	<10	10	20	60	<10	30	10	20	10	20	<10	10	10
		ENT	70	6	2	4	2	2	10	32	20	50	<2	42	4	38	2	<2	<2
NEWPORT BAY TRIBUTARIES																			
CNBCD	San Diego Creek - Campus Dr.	TC	46000	41000	31000	29600	>630	>660	>58000	>3400	>3700	103000	2600	>700	>17000	>2400	>680	>1900	NS
		FC	2400	5000	280	410	95	70	2200	140	210	12000	100	10	400	60	60	330	NS
		ENT	7400	6000	190	1000	64	58	600	120	150	20000	20	20	10	48	26	400	NS
CNBSA	Santa Ana Delhi Channel	TC	>127000	>187000	3400	18000	100	>3300	>35000	>6200	>2800	200000	5100	>3900	>11000	>1170	>4100	>3600	NS
		FC	6200	6200	140	370	<10	60	480	360	450	15000	100	260	380	80	360	320	NS
		ENT	3600	2000	206	216	100	100	150	150	412	30000	40	150	378	100	150	210	NS
CNBBC	Big Canyon Creek	TC	>440	>860	>190	>280	>340	>230	>510	>430	420	4000	210	>350	>440	>520	>490	>500	>480
		FC	360	240	80	140	80	80	270	380	100	1640	60	40	80	70	80	10	160
		ENT	1000	313	130	800	230	190	120	120	130	2200	140	140	58	150	60	38	48
CNBND	Backbay Drive Pipe	TC	440	>460	>380	>160	>640	5000	>9000	>6000	16000	>250	370	>440	>1380	>750	>910	>190	>660
		FC	240	130	120	70	220	960	330	4000	4200	50	95	20	60	10	70	<10	80
		ENT	2000	48	30	82	48	>396	86	42	406	160	28	36	120	40	120	44	400
NEWPORT SLOUGH																			
BNS01	Lancaster Street & 61st Street	TC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	>120	NS
		FC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	10	NS
		ENT	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4	NS
BNSO2	Lancaster Street & Canal Street	TC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	40	NS
		FC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	30	NS
		ENT	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	10	NS

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OCSD Bacteriological [illegible]n Monitoring Program
Total Coliform (TC), [illegible]ecal Coliform (FC),
Enterococcus (ENT) Colony Forming Units/100 ml Sample

DATE		12/11	12/12	12/18	12/19	12/26	12/27	1/2	1/3	1/8	1/9	1/15	1/16	1/22	1/23	1/29	1/30	2/5	2/6	2/13	2/14	2/19	2/20	2/26	2/27	3/5	3/6	3/12	3/13	3/19	3/20	3/26	3/27	4/2	4/3
Location/Tide				RAIN	RAIN	RAIN	RAIN	RAIN	RAIN													RAIN	RAIN												
Bolsa Chica	TC	<17	NS	<17	NS	17	NS	<17	NS	33	NS	<17	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	33	NS	17	NS	<17	NS	17	NS	<17	NS
Beach	FC	<17	NS	<17	NS	<17	NS	<17	NS	33	NS	17	NS	<17	NS	17	NS	<17	NS	<17	NS	17	NS	17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS
39N	ENT	8	NS	2	NS	10	NS	4	NS	32	NS	2	NS	<2	NS	2	NS	2	NS	<2	NS	2	NS	6	NS	2	NS	8	NS	<2	NS	10	NS	2	NS
Bolsa Chica	TC	540	NS	<17	NS	50	NS	<17	NS	67	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	17	NS	17	NS	<17	NS	<17	NS
Reserve	FC	230	NS	33	NS	50	NS	<17	NS	17	NS	<17	NS	<17	NS	17	NS	<17	NS	33	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS
33N	ENT	66	NS	4	NS	156	NS	4	NS	34	NS	2	NS	4	NS	4	NS	2	NS	48	NS	2	NS	6	NS	<2	NS	6	NS	4	NS	40	NS	2	NS
Bluffs	TC	7600	NS	33	NS	17	NS	17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	17	NS
27N	FC	6200	NS	33	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	17	NS
	ENT	>400	NS	8	NS	12	NS	12	NS	2	NS	12	NS	<2	NS	2	NS	<2	NS	10	NS	2	NS	12	NS	6	NS	2	NS	<2	NS	2	NS	18	NS
17th Street	TC	120	NS	<17	NS	33	NS	<17	NS	83	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS
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Jacks Snack	TC	50	NS	17	NS	33	NS	33	NS	50	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	17	NS	<17	NS	17	NS	67	NS	<17	NS
Bar	FC	17	NS	<17	NS	17	NS	<17	NS	50	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	33	NS	<17	NS
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Beach Blvd.	TC	67	NS	17	NS	17	NS	<17	NS	67	NS	<17	NS	<17	NS	<17	NS	17	NS	17	NS	17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS
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SCE Plant	TC	450	170	17	33	33	250	<17	<17	120	<17	17	<17	17	<17	<17	270	<17	17	<17	<17	17	17	960	<17	<17	<17	<17	17	<17	<17	17	50	<17	<17
9N	FC	220	67	<17	33	<17	33	<17	<17	50	<17	<17	<17	<17	<17	<17	270	17	<17	<17	<17	<17	<17	500	<17	<17	<17	<17	33	<17	<17	<17	67	<17	33
	ENT	110	162	6	12	2	14	2	4	38	82	12	38	<2	2	8	88	10	28	2	10	2	26	122	2	4	<2	<2	24	<2	2	12	52	8	4
Magnolia	TC	720	660	33	17	<17	430	250	<17	<17	33	130	33	600	50	<17	17	<17	17	<17	<17	<17	33	960	<17	<17	100	<17	33	17	33	180	83	<17	<17
Street	FC	350	480	<17	<17	<17	83	150	<17	83	33	100	17	480	120	17	<17	17	<17	17	<17	17	17	500	<17	<17	33	<17	50	<17	<17	100	67	<17	<17
6N	ENT	222	58	420	16	<2	100	64	6	30	30	4	46	280	32	8	18	14	16	2	2	4	30	122	4	6	16	<2	20	2	198	34	54	<2	<2
Brookhurst	TC	83	170	33	67	100	620	17	<17	33	180	33	33	<17	330	<17	2600	<17	<17	17	83	130	17	1400	2300	17	17	<17	17	<17	<17	17	<17	<17	<17
3N	FC	50	100	17	33	17	420	33	<17	50	35	17	50	17	280	17	3300	17	50	17	83	150	17	1000	2800	<17	17	17	<17	<17	33	<17	<17	<17	<17
	ENT	68	76	8	6	10	112	28	6	22	86	6	48	2	56	4	>400	16	14	10	22	6	80	210	304	6	2	2	12	<2	8	4	2	4	<2
Santa Ana	TC	<17	33	1100	440	220	230	17	67	100	<1	50	200	<17	67	17	17	33	67	<17	100	33	83	<17	50	67	33	17	67	33	33	<17	17	<17	<17
River Mouth	FC	<17	33	1100	33	83	67	17	17	83	50	50	100	<17	17	<17	33	33	50	<17	67	<17	120	33	150	100	<17	<17	17	<17	33	<17	<17	<17	<17
0	ENT	2	16	>400	66	28	38	8	16	12	60	<2	96	2	44	10	14	10	38	4	70	8	82	2	10	8	2	4	12	6	4	<2	2	<2	2
Orange	TC	NS	660	NS	4000	NS	460	NS	100	NS	<17	NS	17	NS	17	NS	150	NS	170	NS	50	NS	170	NS	17	NS	17	NS	83	NS	<17	NS	<17	NS	<17
Street	FC	NS	540	NS	380	NS	17	NS	33	NS	50	NS	17	NS	<17	NS	<17	NS	67	NS	17	NS	130	NS	17	NS	<17	NS	100	NS	<17	NS	<17	NS	<17
3S	ENT	NS	106	NS	316	NS	38	NS	32	NS	28	NS	66	NS	12	NS	18	NS	90	NS	12	NS	66	NS	12	NS	4	NS	14	NS	<2	NS	2	NS	<2
52nd/53rd	TC	NS	400	NS	1900	NS	400	NS	<17	NS	100	NS	<17	NS	<17	NS	<17	NS	<17	NS	17	NS	150	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17
Street	FC	NS	230	NS	170	NS	33	NS	17	NS	170	NS	<17	NS	<17	NS	17	NS	<17	NS	50	NS	50	NS	17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17
6S	ENT	NS	366	NS	60	NS	62	NS	6	NS	272	NS	6	NS	2	NS	12	NS	8	NS	6	NS	74	NS	4	NS	<2	NS	2	NS	<2	NS	<2	NS	<2
38th Street	TC	NS	300	NS	620	NS	180	NS	17	NS	17	NS	67	NS	<17	NS	33	NS	17	NS	17	NS	33	NS	33	NS	<17	NS	17	NS	<17	NS	<17	NS	<17
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15th/16th	TC	NS	860	NS	67	NS	320	NS	17	NS	130	NS	50	NS	33	NS	33	NS	67	NS	17	NS	67	NS	<17	NS	<17	NS	<17	NS	<17	NS	33	NS	<17
Street	FC	NS	480	NS	50	NS	130	NS	<17	NS	100	NS	67	NS	<17	NS	<17	NS	150	NS	17	NS	50	NS	<17	NS	<17	NS	<17	NS	<17	NS	17	NS	<17
15S	ENT	NS	>400	NS	48	NS	112	NS	6	NS	90	NS	36	NS	52	NS	10	NS	96	NS	12	NS	46	NS	2	NS	4	NS	52	NS	<2	NS	<2	NS	<2
Balboa Pier	TC	NS	<17	NS	50	NS	680	NS	<17	NS	100	NS	83	NS	17	NS	50	NS	130	NS	<17	NS	83	NS	17	NS	17	NS	50	NS	<17	NS	<17	NS	<17
21S	FC	NS	<17	NS	50	NS	420	NS	<17	NS	67	NS	120	NS	17	NS	33	NS	83	NS	<17	NS	50	NS	17	NS	17	NS	33	NS	<17	NS	<17	NS	<17
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The Wedge	TC	NS	50	NS	67	NS	350	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	33	NS	<17	NS	83	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17
27S	FC	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	33	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	17
	ENT	NS	2	NS	24	NS	66	NS	<2	NS	<2	NS	2	NS	8	NS	<2	NS	2	NS	4	NS	34	NS	<2	NS	<2	NS	2	NS	<2	NS	<2	NS	6
Corona Del	TC	NS	100	NS	33	NS	33	NS	<17	NS	<17	NS	17	NS	50	NS	17	NS	33	NS	<17	NS	17	NS	<17	NS	<17	NS	17	NS	17	NS	<17	NS	<17
Mar Beach	FC	NS	17	NS	<17	NS	33	NS	<17	NS	<17	NS	<17	NS	33	NS	<17	NS	33	NS	17	NS	<17	NS	<17	NS	17	NS	<17	NS	17	NS	17	NS	<17
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Crystal Cove	TC	NS	17	NS	17	NS	100	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	17	NS	83	NS	280	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17
39S	FC	NS	<17	NS	<17	NS	17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	<17	NS	100	NS	150	NS	<17	NS	<17	NS	33	NS	<17	NS	<17	NS	<17
	ENT	NS	2	NS	2	NS	12	NS	<2	NS	6	NS	<2	NS	<2	NS	2	NS	<2	NS	10	NS	42	NS	<2	NS	<2	NS	<2	NS	<2	NS	<2	NS	<2

SPRING TIDES
NEW DATA
SINGLE SAMPLE STANDARD VIOLATION
N/S NO SAMPLE / NO DATA
CWOS CONFULENT GROWTH WITHOUT SHEEN
CWS CONFULENT GROWTH WITH SHEEN
CWB CONFULENT GROWTH WITH BLUE (FECAL INDICATOR)

Summary

- Primary Contact Recreation Use
  - Full body contact – immersion/ingestion (Swimming, diving, surfing, etc.)
- Developed as part of a 2007 Consent Decree
- First Update Since 1986/based on Epi studies
- Criteria are *guidance* to states for developing water quality standards to protect swimmers from exposure to microbes that indicate the presence of fecal contamination.
- qPCR methodology and standards developed

2

Background

- 2012 Criteria based on ***one*** bacterial indicator of fecal contamination for marine waters
  - Enterococci
- AB 411 (State of CA) based on ***three*** bacterial indicators
  - Enterococci
  - Total Coliform
  - Fecal Coliform

3

2012 Criteria

- Based on magnitude (concentration of indicator), duration and frequency
  - Magnitude
    - Geometric Mean (GM)
    - Statistical Threshold Value (STV)
  - Duration and Frequency
    - Not to exceed GM in 30 day interval
    - STV not greater than 10% within the same 30 day interval

4

2012 Criteria (cont'd)
Standards

- Two suggested numeric enterococci concentration standards for marine waters (culture methods):
  - Estimated Illness Rate 36/1000 bathers
    - GM - 35 cfu/100ml (AB 411 - 35 cfu/100ml)
    - STV - 130 cfu/100ml (AB 411 – 104 cfu/100ml)
  - Estimated Illness Rate 32/1000 bathers
    - GM - 30 cfu/100ml
    - STV – 110 cfu/100ml
-

5

2012 Criteria (cont'd)
Illness Rates

- Bather illness criteria expanded
- Previous illness rate - 19/1000
- New - 36/1000 is considered equivalent
- Recommended allowable bather illness rates for marine and freshwater standards are now equivalent

6

Beach Action Values

- Optional precautionary monitoring and notification program. Intended to provide an early alert to beachgoers
- BAVs for marine waters (enterococcus)
  - 36/1000 Illness Rate
    - 70cfu/100ml or 1000cce (qPCR)
  - 32/1000 Illness Rate
    - 60cfu/100ml or 640 cce (qPCR)

7

USEPA Guidance Tools

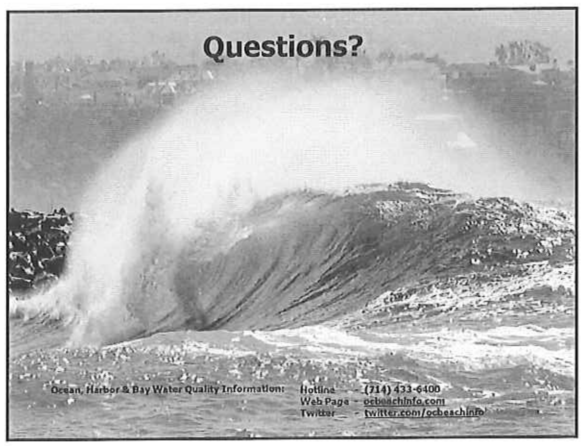
- Evaluating and Managing Rec Waters
  - Sanitary Surveys
  - Predictive models
- Developing Alternative Criteria
  - Site Specific epidemiological studies
  - Quantitative Microbial Risk Assessement
  - Alternative Indicators or Methods

8

Conclusions

- 2012 Criteria similar to previous standards with similar levels of public health protection
- Local Health Departments will continue to implement AB 411
- Unknown impact on SWRCB Ocean Plan and RWQCB Basin Plans
- Alternative criteria development may be challenging

9



Water Quality / Coastal Tidelands Committee

City of Newport Beach
April 11, 2013

Street Sweeping in Newport Beach

Mike Pisani
Deputy Municipal Operations Director

Reasons for sweeping streets and alleys

- The collection of litter, sand, and landscape debris from trees:
  - Prevents trash from entering catch basins, storm drains, and the bay
  - Contributes to neighborhood cleanliness

Areas swept in Newport Beach

- Streets
- Alleys
- Oceanfront sidewalks & Parking Lots

Streets

- Weekly
- Selected business areas daily
  - Marine Avenue
  - Newport & Balboa Pier Areas

Alleys

- Twice per Month

Other

- Oceanfront sidewalk three times per week
- Parking lots weekly

Frequency of Sweeping in Neighboring Cities

- Irvine – *twice per month*
- Fountain Valley – *twice per month*
- Huntington Beach – *twice per month*
- Costa Mesa – *twice per month*
- Santa Ana – *weekly*

Street Sweeping Service Providers

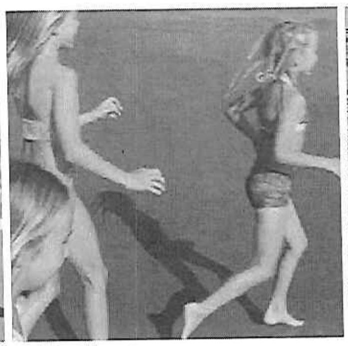
- Streets: Athens Services

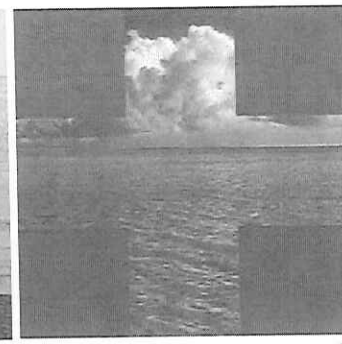
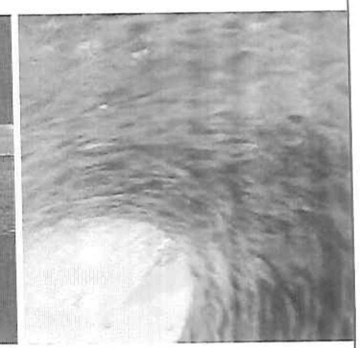
- Alleys: Sunset Property Management

Parking Enforcement for Sweeping

- Used in areas where on-property parking is at a premium and/or has heavy business activity
  - Balboa Peninsula
  - West Newport
  - Balboa Island
  - Corona del Mar
  - Lido Island

Questions & Answers

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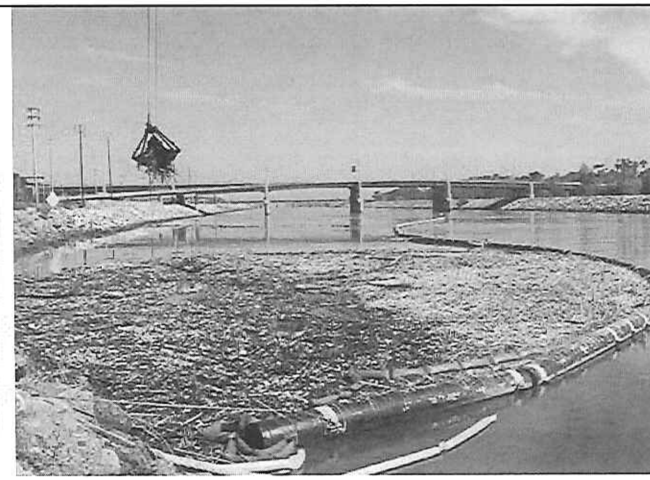
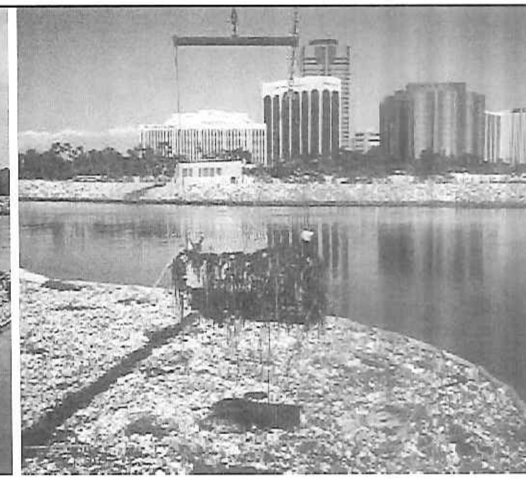
LOS ANGELES RIVER TRASH BOOM

The Los Angeles River Trash Boom, located in the City of Long Beach,used for the interception, collection, and removal of floating and semi-submerged trash and debris at the mouth of the Los Angeles River, near the Port of Long Beach.





Amount of Trash Collected

Flows from the Los Angeles River and runoff from Long Beach area storm drains are the water sources. This water enters into the wetlands and 2 to 3 cubic feet per second (1.3 million gallons per day) is treated by the wetlands' plant life. Plant life in the East Basin reduce nutrients in the water by 60 to 80 percent and also remove traces of heavy metals, organic carbons, oil, and greases from urban runoff. Treated water from the East Basin is then conveyed into the West Basin for storage and groundwater recharge or conveyed into the Los Angeles River.

Project Benefits

- Enhanced Passive Recreation
- Water Quality Improvements
- Habitat Restoration
- Water Conservation and Storage
- Aestheti Improvements
- Educational Displays
- Enhanced Ground Water Recharge
- Flood Protection

Funding

Final construction cost was approximately $7 million. This project was funded with a $2.35 million Proposition 13 CALFED grant, $200,000 from Proposition 40 funds administered through the Rivers and Mountains Conservancy, $400,000 from the California Coastal Conservancy Wetland Recovery Project, and $4 million from the Los Angeles County Flood Control District.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COUNTY OF ORANGE CALIFORNIA
Trash Boom #1
Trash Boom #2
Talbert Channel
Huntington Beach Channel
Brookhurst St.
Santa Ana River
Pacific Ocean

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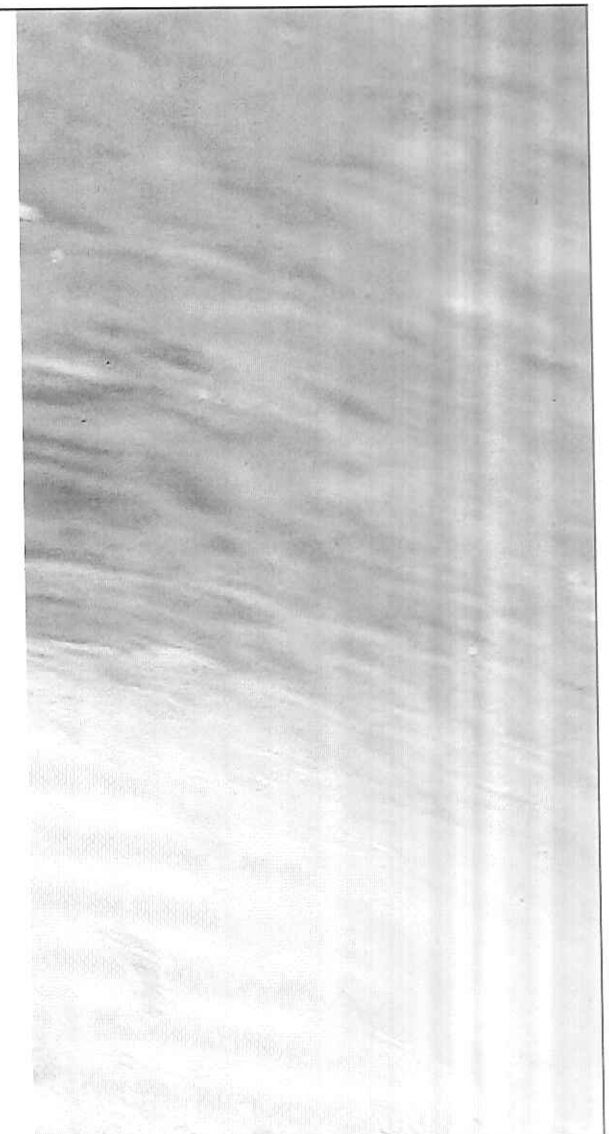
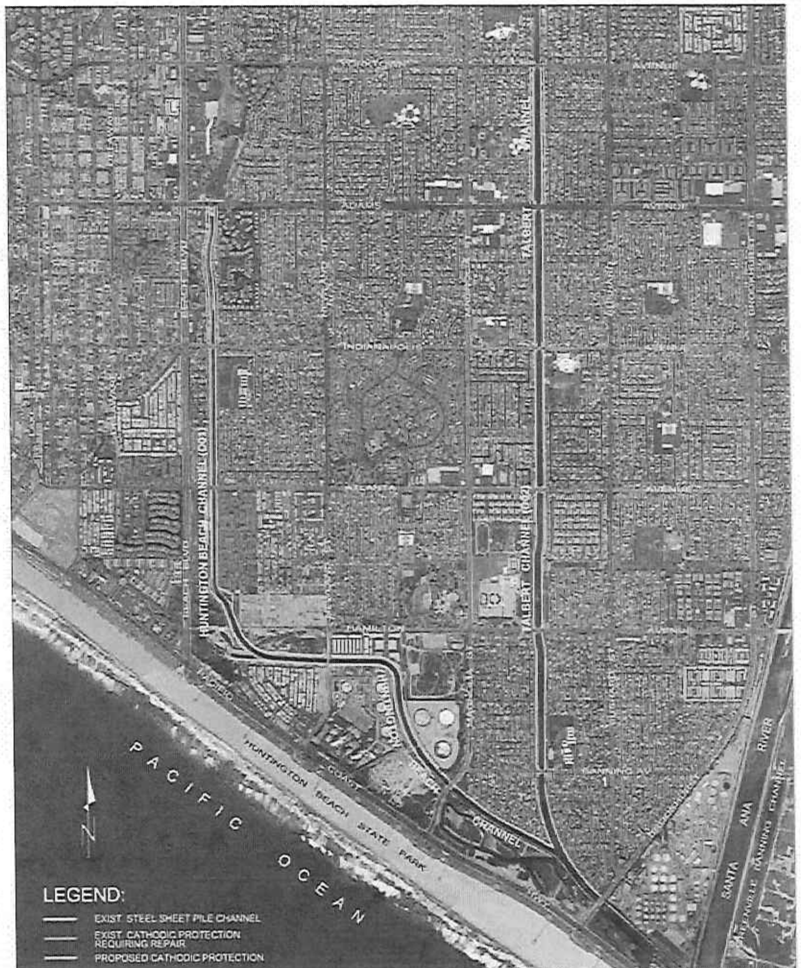
Miocean Litter Boom Project

The Miocean Foundation is pleased to announce a partnership with the County of Orange to design, permit and build two litter booms across the Talbert & Huntington Channels that drain several square miles into the Santa Ana River jetty area. These booms will trap and collect tons of floating trash that otherwise ends up on our beaches and in our coastal waters. After extensive research (including sessions with LA County who operates several booms), Miocean has agreed to source funding for the construction cost ($50,000 each), and the County has agreed to sponsor the design and permitting. The County has also agreed to operate and maintain the Litter Booms for 10 years with twice/year regular clean outs and other clean-outs as needed due to weather conditions.

As a valued donor, we welcome your interest and commitment to funding for this "pilot" project. If the first operational year is deemed successful, we will pursue more countywide locations. Please let us know if you are willing to co-sponsor this project and the amount of your commitment. Your contribution is, of course, a tax deductible expense and will be properly documented. Furthermore, we will routinely update you on our progress, as well as performance results. Feel free to contact us directly with any questions.

+ www.miocean.org

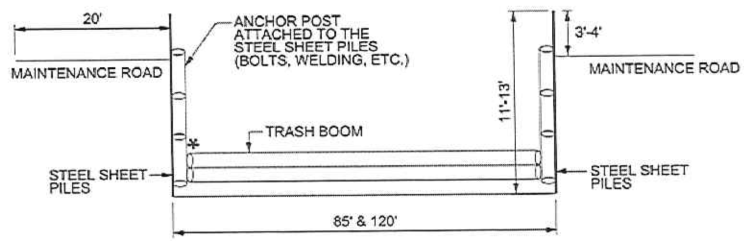




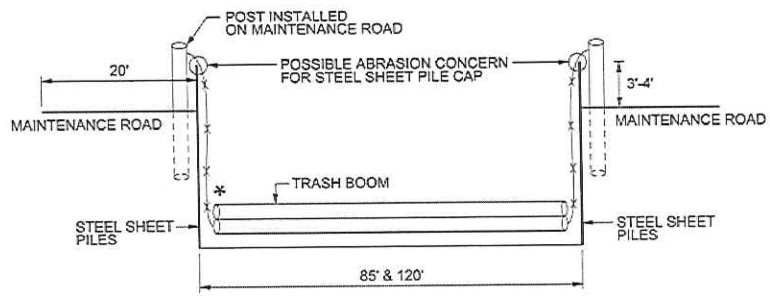
County of Orange OC Public Works Department FLOOD CONTROL DESIGN	CREATED BY: SM SCALE : NONE	LOCATION MAP

HUNTINGTON BEACH CHANNEL (D01) AND TALBERT CHANNEL (D02)

OPTION 1

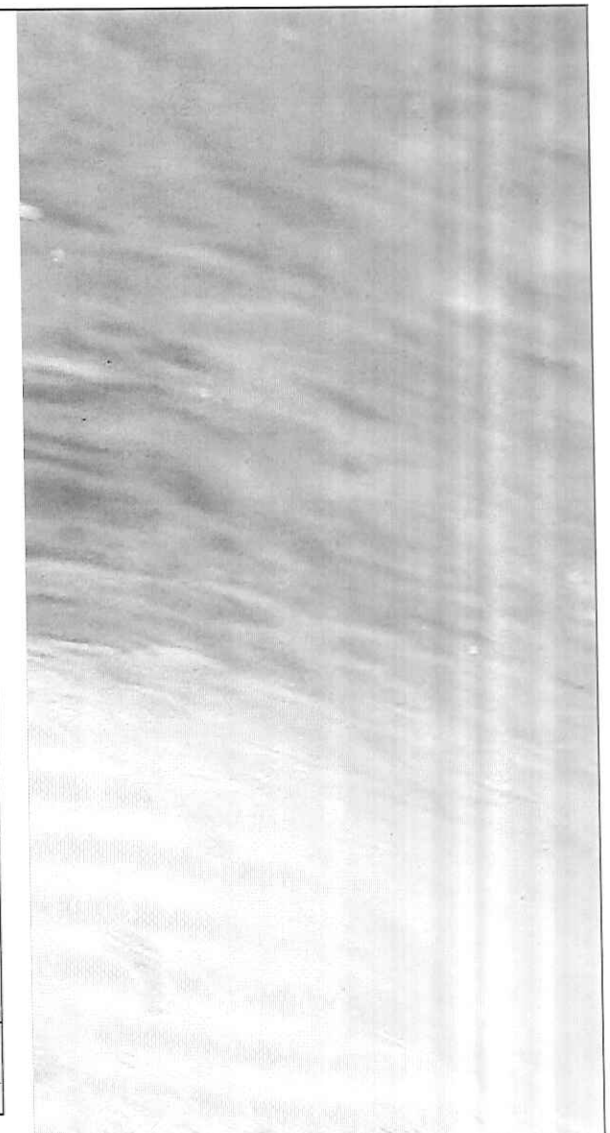


OPTION 2



* HIGH WATER = 9'
LOW WATER = 2'

County of Orange **OC Public Works Department**	FLOOD CONTROL DIVISION DATE: 12/21/2010	TRASH BOOM DETAIL
HUNTINGTON BEACH (D01) & TALBERT (D02) CHANNEL		SCALE: NTS



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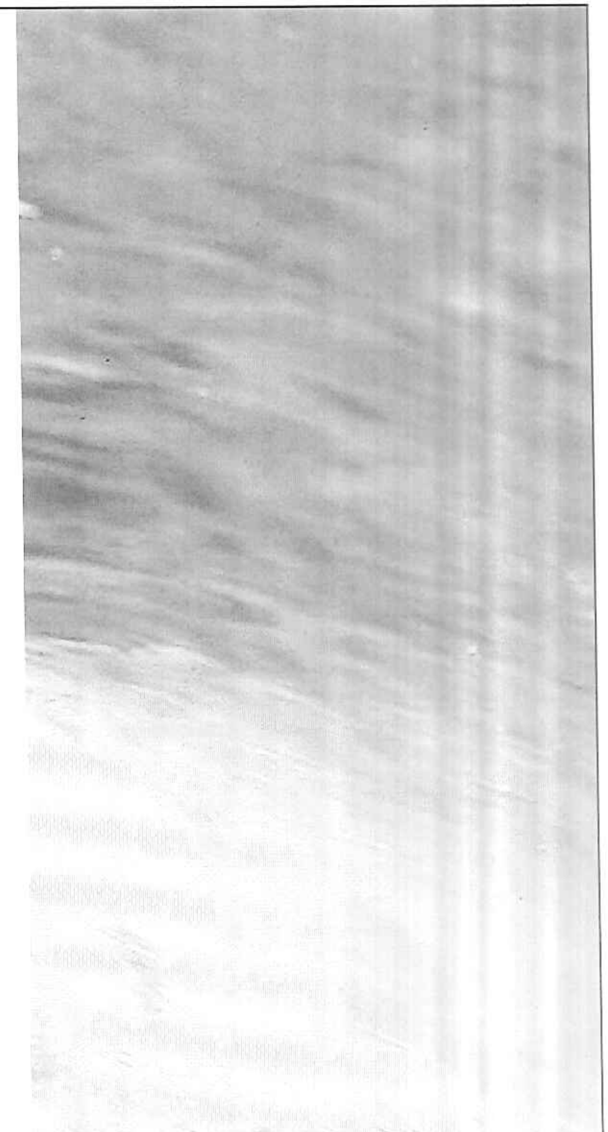
Litter Booms

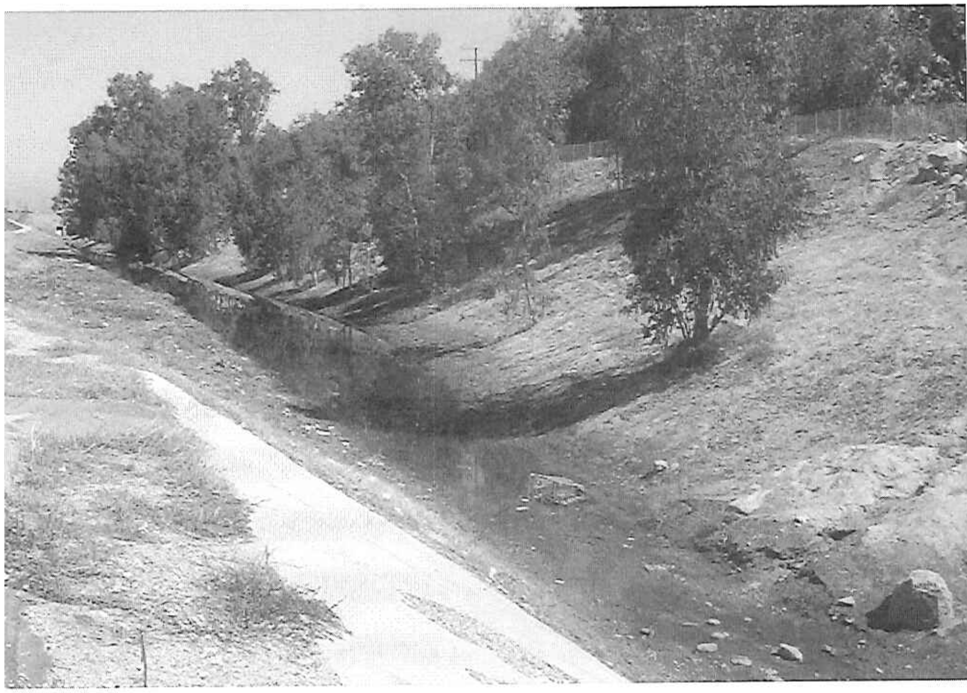
Experience Insights – LA County Public Works

10/23/12

- Installed and operated several Litter Boom/Trash Nets including Ballona Creek; LA River; San Gabriel River; and Coyote Creek.
- Installation/Operational inputs:
    - Beware of tidal zone influences.
    - Have anchors that slide up and down with level of channel flow.
    - Incorporate "fuses" in anchors for break away if high flow impacts exceed capacity.
    - Beware of breakaway when a large "raft" of trash is released downstream (very visible and concentrated impact versus diluted and gradual build-up without nets).
    - Best if deployed in flatter gradients where flow velocities are modest.
    - Very effective in early season small storms that are laden with summer build-up of trash (recommend responsive removals during early season storms).
    - Less effective in later season storms with very high flow and relatively less trash/cleaner water (consider opening them in high storm season?).
    - Some liability concerns over floating victims getting trapped in nets.
- The LA County Public Works & Watershed Management Division are addressing trash TMDL's with upstream BMP's versus downstream collection.
- The engineer/director who has the most experience with the Litter Booms and Trash Nets is Scott Schales at 626-300-4702. He is now in the Traffic Division, but remains an authority on design, installation and operation aspects. He is open to sharing his experience with us.



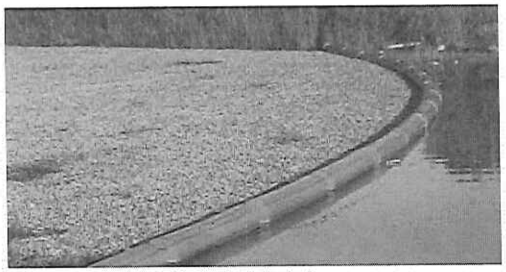
+ dominguez gap wetlands



+before construction

+after construction

Litter Booms



Tuffboom (courtesy of Worthington Products, Inc.).

Summary

Litter booms are floatation structures with suspended curtains that are used to contain floating trash. Booms are best suited to slow-moving waters. Since more pollutants sink than float, they are only useful for trapping highly buoyant materials and can miss most of the gross solids[1] load. Maintenance is done manually, with a boom truck or with a skimmer vessel. Capital costs can range from $100,000 to $150,000 per site.

Description/Design

Litter booms are floatation structures with suspended curtains that can be used to contain floating trash (USEPA 1999, Gordon and Zamist 2006). Booms were initially designed as oil slick retention devices (Allison et al 1998) and are still often designed using absorbent materials to collect oil and grease from the water's surface (Gordon and Zamist 2006). The size of a boom depends on the expected volume of floatables released during a storm event. Newer Australian designs use floating polyethylene boom arms with fitted skirts to deflect floating debris through a flap gate into a storage compartment (Allison et al 1997). Litter booms have a five to seven year lifespan before they are deteriorated by ultraviolet light, or are torn by captured debris (RBF Consulting 2003).

Most litter booms are installed with the boom attached to points on the opposite side of the channel with sufficient slack to allow the boom to form a semicircle. Booms are placed downstream of one or more outfalls, preferably in slow moving

[1] Gross solids are defined as "litter, vegetation, and other particles of relatively large size" (Caltrans 2003 Phase 1 Pilot Study). Litter is subsequently defined as "manufactured items made from paper, plastic, cardboard, glass, metal, etc. that can be retained by a 5 mm (0.2 in nominal) mesh screen". This definition is understood to be consistent with the LA River Trash TMDL definition of litter.

TC-5 Treatment Control

Litter Boom Manufacturers/ Examples

- Applied Fabric Booms
- Elastec, Inc.
- Kepner Plastics Debris Barrier
- Nautilus Marine Protection, Inc.
- Slickbar Products Co.
- Stormwater Systems Inc. (Bandalong Floating Debris Trap)
- Worthington Products, Inc. (Tuffboom)

Implementation Point

In Street	
Start of Pipe	
In Pipe	
End of Pipe	✓
In Creek	✓
Dispersed	

waters (Allison et al 1997). This results in trash and debris accumulating in the middle of the boom, which is generally located in the middle of the channel, the region of highest water flow velocity. High velocities can drag collected litter under the boom. Orange County found that performance is improved by angling the boom across the channel. This allows trash to accumulate on one side of the channel, away from the high velocity region (Gordon and Zamist 2006).

- Applied Fabric Booms
- Elastec, Inc.
- Kepner Plastics Debris Barrier
- Nautilus Marine Protection, Inc.
- Slickbar Products Corp.
- Stormwater Systems, Inc., Banadalong Floating Debris Trap
- Washington Products, Inc. Tuffboom

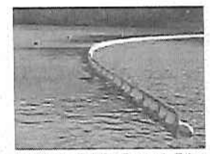


Figure 1. Debris Boom In-Take (courtesy of Slickbar Products Corp.).

Figure 2. Bandalong Floating Debris Trap (courtesy of Stormwater Systems, Inc.).

Applicability/Siting

Litter booms are best suited for very slow moving waters (Allison et al 1998). Despite early claims of performance (Allison et al 1998), it was later recognized that trash and debris performance is greatly reduced during high flows. This reduction is due to material being forced over and under the boom (Allison et al 1998) or the boom breaking away from the banks. Litter boom performance can be enhanced by angling booms across to the current, and by using mesh skirts. Problems still persist during high flows (Allison et al 1998). As a result, one of the most important factors to consider when siting booms is the receiving water velocity. Booms float and can move with water level fluctuations, but they can be dislodged by high river velocities and winds (USEPA 1999). Special consideration should be given to booms located in highly visible public areas. Booms potentially create unsightly conditions near outfalls and may be inappropriate in areas with waterfront development (USEPA 1999).

Maintenance

Litter booms are cleaned manually with a vacuum truck or a skimmer vessel (Allison et al 1998, USEPA 1999). Special attention should be given to booms located in highly visible public areas (USEPA 1999). Maintenance of small booms can be achieved by pulling the boom to the bank and accessing the material from land. This method of maintenance has been conducted for some small booms but not for most installations (Allison et al 1998). The recommended cleaning frequency is every two to four weeks (Allison et al 1998). Containment booms must be cleaned after storm events. To help control floatables within Lake Merritt, the City of Oakland has installed litter booms. The Lake Merritt Institute (LMI) is under contract with the City of Oakland to coordinate litter removal. Every week, volunteers remove litter from the entire shoreline. LMI also removes trash from litter booms on a weekly basis or as needed. For some litter booms, LMI has to remove the barrier and scrape off mussels every year or two, or they will sink (Bailey R[2], *pers. comm.* 2007).

Performance and/or Effectiveness

Results of performance and/or effectiveness studies have been mixed. Booms have been shown to trap large quantities of floatable materials. The County of Los Angeles Department of Public Works pilot tested a litter boom system at the mouth of the Los Angeles River in Long Beach. During the first two years of the pilot testing period, the litter boom system trapped approximately 150 tons urban trash and debris (County of Los Angeles 2003). Approximately 1252 tons of trash has been harvested since the installation of the litter boom system in April 2000 (Teren, E[3]. *pers. comm.* 2007). County of Los Angeles Public Works Department staff estimates that system performance is

[2] Dr Richard Bailey, Executive Director of the Lake Merritt Institute, January 2007
[3] Ed Teren, County of Los Angeles Department of Public Works Flood Maintenance Division, May 2007.

Figure 3. Los Angeles River litter boom system (courtesy of Los Angeles Department of Public Works).

approximately 80%. During FY 2006-2007, approximately 155 tons of trash was harvested from the system. Historical trash collection data indicates a large variation in the volume of trash harvested after each storm event. Approximately 90% of trash harvested from the first storm is vegetation. The remaining 10% is mostly Styrofoam and plastics (Teren, E[3], pers. comm. 2007).

In contrast, a Melbourne, Australia study (McKay and Marshall 1993, cited in Allison et al 1998) used tagged litter items, released upstream of litter booms to determine floating boom performance. The results varied from 12% to 50% recapture. These values were considered preliminary because of the low number of items released in the boom catchments. In addition, the items released in the study were highly floatable and do not represent the complete range of items found in urban stormwater. It is expected that the figures quoted by McKay and Marshall (1993) are higher than those expected for the total trash and debris load (i.e., including submerged material) (Allison et al 1998). Other Australian studies have reported capture rates of 24 to 71 kilograms per hectare (2.47 acres) from four booms in Sydney (Gamtron 1992 in Allison et al 1998).

A four-boom containment system was tested by New York City during a two-year pilot study in Jamaica Bay, NY. Floatables were contained by the booms and collected using a skimmer vessel. An assessment of boom effectiveness was made by measuring the quantities of floatable material in the waters and on the shorelines before and after boom installations. Results showed substantial improvements from pre-boom conditions, and indicated that containment booms provide a floatables retention of approximately 75%[4]. During the two-year test period, approximately 40,640 kilograms (44.8 tons) of trash were removed from the containment area (USEPA 1999).

Alameda County installed a sea curtain/litter boom on the Oakland Slough in 1999. The City of Oakland Public Works Department removes debris an average of eighteen times per year. This frequency was higher in the early years of installation. The average amount of debris removed per cleaning is 16 cubic yards. The total debris removed to date is in excess of 3000 cubic yards. The unit has now reached its useful life and needs to be replaced (Bavinger, M[5], pers. comm. 2007).

The angle and manner that a boom is attached to the shore can have an impact on its overall performance (Table 1). A recent study performed at the University of New Mexico (Ho 2005[6]) evaluated the hydraulic performance of various boom designs in an experimental flume. The study used models of the North Pino Arroyo at two different scales. Experimental booms were constructed from various materials and tested in a rectangular flume at a scale of 1:18 under four flow conditions and in a trapezoidal flume at a 1:8 scale. To simulate the boom holding piers, screws were placed into the bottom of the flume. Major design differences include the style of connection to anchor the experimental boom. Test booms were either anchored using a hinge or by drilling a hole through the boom and pinning it. Researchers found that a 30° boom barrier approach angle works better than a 45° model because the smaller angle makes a longer and better performing screening area. In addition, when bending the pier 15° from vertical to the flow direction, the boom is able to move easier (Ho 2005). The researchers also recommended a high buoyancy boom for easy floating but cautioned that turbulent flows make boom movement unstable, reducing debris-keeping capacity. Moreover, it was found that cantilevered booms with piers did not perform well because of the disturbance of the boom movement from both boom cantilevering and piers. The hinge connected boom barrier without piers, which was installed at the sidewall, showed better performance in aspects of debris retention and model simplicity (Ho 2005).

[4] This study did not attempt to evaluate all litter and trash, only the floatable portion.
[5] M. Bavinger, Watershed Program Specialist, Environmental Services Division, City of Oakland, April 2007.
[6] Authors do not give details on how debris trapping was evaluated.

Litter Booms

Table 1. Floating boom scaled Arroyo task scenarios (1:8 scale) (Ho 2005).

Run#	Approach	Pier Bend	Boom Design	Results
1	45°	Vertical	PVC	Booms are submerged. All debris is passed.
2	45°	15°	PVC, Barriers	Booms move easier. Side boom barrier works.
3	30°	Vertical	PVC, Barriers	Approach angle 30° is better than 45°.
4	30°	15°	PVC, Barriers	Best boom setup. 43% of debris is excluded.
5	30°	15°	PVC, Barriers	Similar results as #4. No intake entry influence.

Allison et al (1998) found that only 20% of captured litter and less than 10% of the captured vegetation floats[7]. Since booms are only designed to capture floatable trash, a significant portion of trash in stormwater is likely not caught using these devices (Gordon and Zamist 2006). Staff and volunteers at the LMI have noted this particular problem and others with the booms installed in Lake Merritt. According to Dr. Richard Bailey, Executive Director of the Lake Merritt Institute, litter booms:

- Only allow floating trash to be easily removed (a lot of trash becomes waterlogged and sinks where it is hard to remove);
- Can be overtopped by high flows, especially if the barrier is too small for the outfall;
- Allow some material to flow underneath, especially if the barrier is too small for the outfall;
- Leak at the sides where they are attached to the wall. This is especially true because water level rises and falls. If the barrier at the attachment point does not rise and fall with the water, it will be submerged and trash will flow out; and
- Sometimes break and need to be repaired or replaced (Bailey, R. *pers. comm.* 2007)

Costs

The New York City studies found that the installed cost of a containment boom can range from $100,000 to $150,000 per site (USEPA 1999). Capital costs for the four-boom system pilot-tested in New York City (excluding engineering costs) was $240,000, while O&M costs were $5,000 over eighteen months, not including the cost of removing the captured floatables. The capital costs for skimmer vessels used to collect captured floatables ranged from $300,000 to $700,000, including shore conveyers for transporting the vessel from site to site. Annual operating costs average $75,000 to $125,000 per boat and include vessel maintenance and repair, crew wages, fuel, insurance and disposal fees for the collected material. Disposal costs for removing floatables are heavily dependent on the type of system used for removal, boom accessibility, travel time between locations and fuel use.

According to the Los Angeles County Department of Public Works, the purchase cost of the Los Angeles River litter boom system was $48,000. The amount of money encumbered for the annual operation, maintenance (i.e., collection and disposal) and monitoring of this system is $450,000 (County of Los Angeles 2003). A contractor is responsible for operating and maintaining the litter boom system. The contractor is paid monthly for operation, maintenance and repair; and paid separately for the quantity of trash harvested. The cost of operation and maintenance and the rate for each ton of trash harvested is the following:

[7] This experiment used a CDS™ unit to evaluate how much captured gross solids were buoyant vs. non-buoyant.

Table 2. Operation and maintenance costs and rate paid for each ton of trash harvested from the Los Angeles River litter boom system.

Season	Time Period	Cost
Wet Season	(10/15-4/15)	$12,992
Dry Season	(4/15-10/15)	$8,500
Trash Harvested	(Per Ton)	$1,071

The capital costs of the sea curtain installed at the Oakland Slough was $36,000 including purchase, installation and access improvements[8] (Bavinger, M[9]. *pers. comm*). The average cost per cleanout is approximately $3,378. Average annual cleanout costs are approximately $61,000. Other factors (e.g., hazardous materials disposal, access road maintenance, sea curtain repair and adjustment, vegetation removal to maintain operation of curtain) add an additional $16,000 annually to operation and maintenance expenses. Since 1999, total costs for installation, debris removal, repair of the sea curtain, hazardous material disposal, access maintenance (new road), crane for removal, etc. is in excess of $650,000 (Bavinger, M[10]. *pers. comm*).

Pros

Litter booms are relatively easy to install and come in a wide range of sizes and models to accommodate different situations. Litter booms can trap large quantities of floatable materials. Individual maintenance (i.e., collection and disposal) is relative simple and does not require any confined space entry.

Cons

Litter booms do not necessarily perform well. They are designed to capture only the floatable portion of gross solids loading, which might be a very low fraction of the total loading. Smaller mesh sizes could impede capacity of the storm drain system if not designed properly. Nets which break away could reintroduce trash into the water body if not designed properly. Booms are relatively expensive and can be maintenance intensive.

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[8] Costs for labor and fees to acquire permits, design and inspect project are unknown.
[9] Ibid
[10] Ibid

Litter Booms

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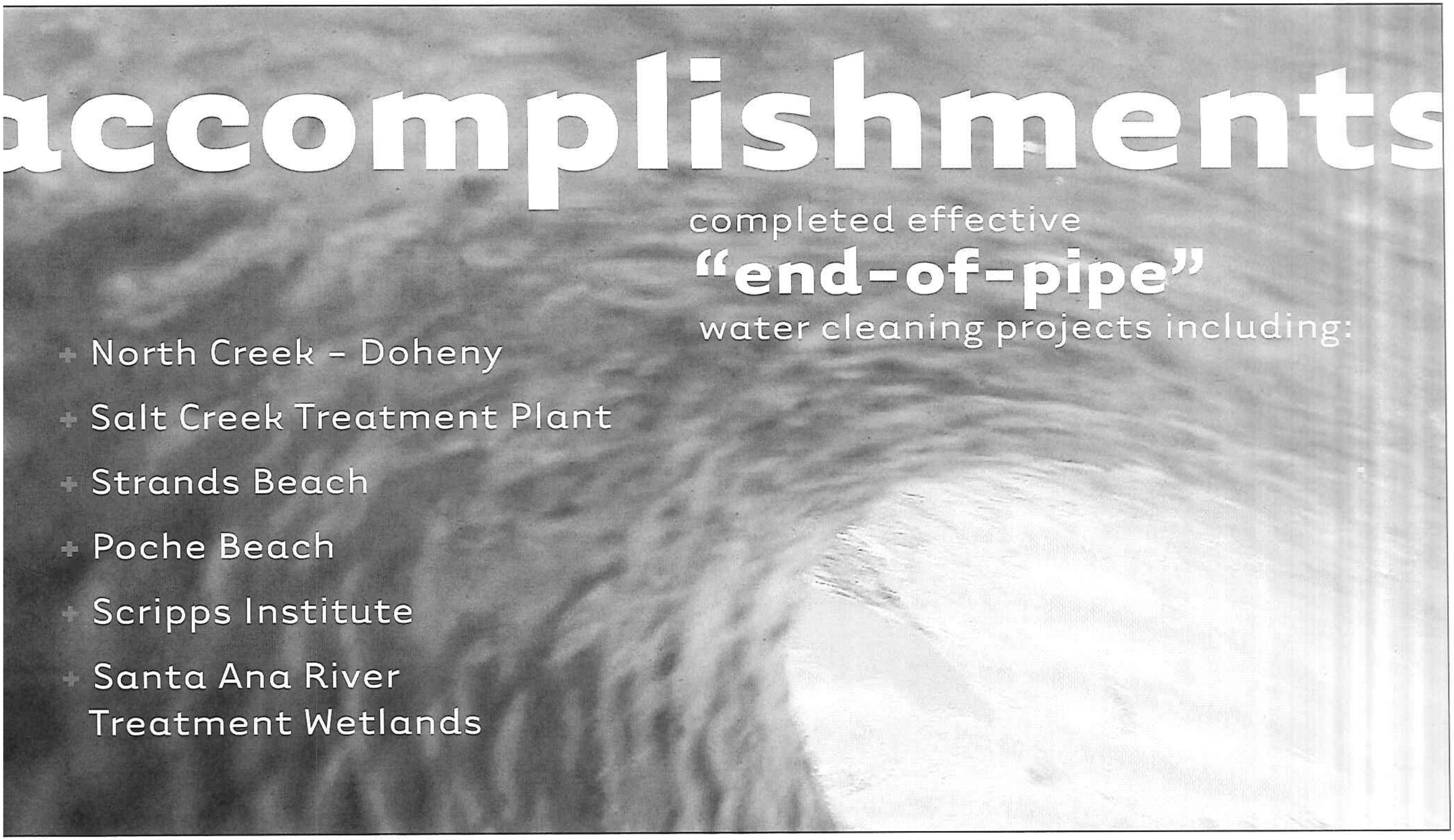
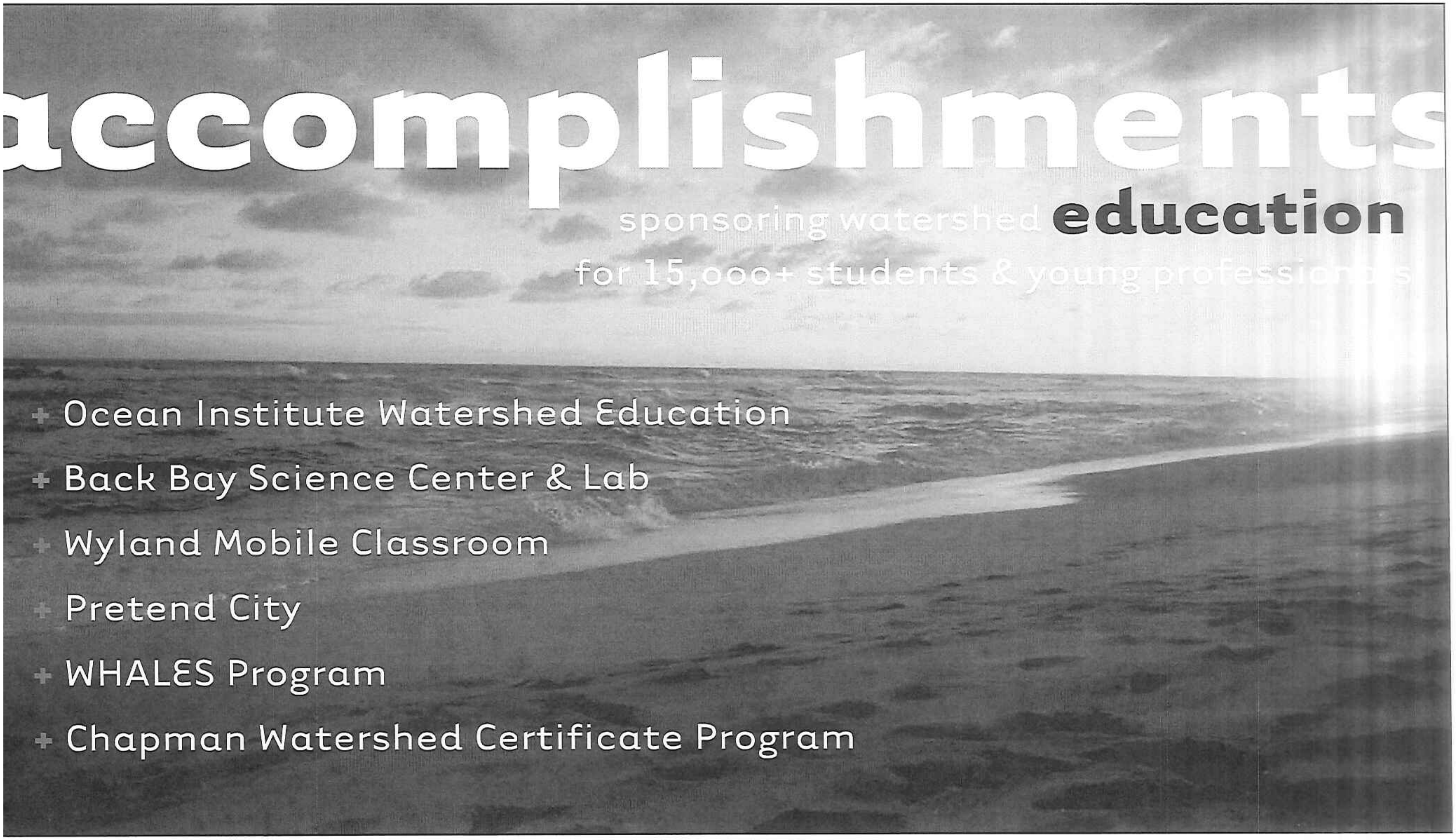

accomplishments
completed effective
"end-of-pipe"
water cleaning projects including:
North Creek – Doheny
Salt Creek Treatment Plant
Strands Beach
Poche Beach
Scripps Institute
Santa Ana River
Treatment Wetlands


accomplishments
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+ Ocean Institute Watershed Education
+ Back Bay Science Center & Lab
+ Wyland Mobile Classroom
+ Pretend City
+ WHALES Program
+ Chapman Watershed Certificate Program


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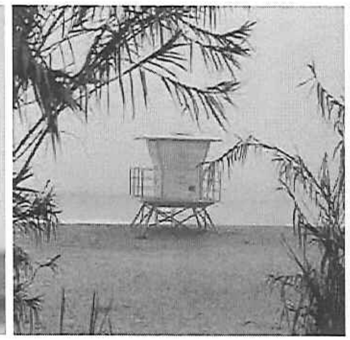
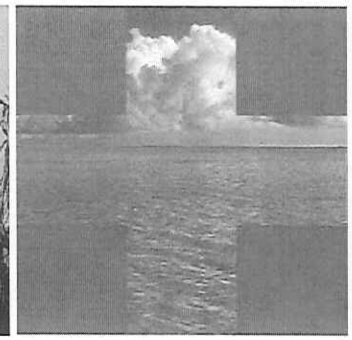
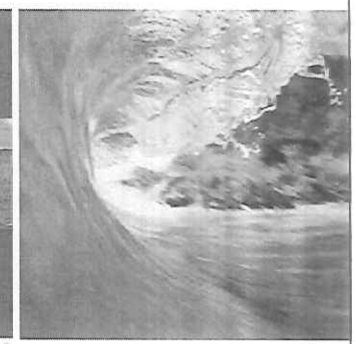

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