	A	B
1	**2013 State of the Bay Report - Summary of Indicators and Data Gaps**	
2		
3	**Habitat**	**Indicators**
4		
5		1.1. Natural Watershed Condition Index (% natural land cover, % intact active river area, and sedimentation risk)
6		1.2 Anthropogenic Watershed Condition Index
7		2 Habitat Vulnerability:
8		2.1 Climate Change Index
9		2.2 Land Cover Change Index
10		2.3 Water Use Index
11		2.4 Fire Index
12		3 Structure and Ecological Disturbance
13	Freshwater Aquatic and Riparian Habitats	3.1 Physical and Biological Habitat Condition Index
14		3.2 Water Quality Index
15		4 Biological Response
16		4.1 Algal Index
17		4.2 Benthic Macroinvertebrate index
18		4.3 Amphibians
19		4.4 Anadromous Fish
20		
21		1 Habitat Extent
22		1.1 Area of Habitat by Type
23		2 Habitat Vulnerability (No indicator identified)
24		3 Structure & Ecological Disturbance
25		3.1 Eutrophication
26		3.2 Sedimentation
27		3.3 CRAM – Buffer and Landscape Context
28	Wetlands	3.4 CRAM – Hydrology
29		3.5 CRAM – Physical Structure
30		3.6 CRAM – Biotic Structure
31		4 Biological Response
32		4.1 Benthic Invertebrate Community
33		4.2 Nursery Function for Fish
34		4.3 Forage Function for Birds
35		
36		1 Habitat Extent
37		1.1 Area of Beach Habitats
38		2 Habitat Vulnerability

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3	**Metric**
4	
5	% natural land cover, % intact active river area, and sedimentation risk
6	% artificial drainage area, dam storage ratio, and longitudinal connectivity
7	
8	Projected change in precipitation, min. temperature, mean temperature, max temperature, snowpack, baseflow, and surface runoff
9	Projected land cover change
10	Predicted future water demand
11	Projected change in wildfire severity and fire regime condition class
12	
13	CRAM Wetland Habitat Assessment Score, PHAB Stream Habitat Assessment Score
14	Median stream summer conductivity, nitrate concentrations, turbidity, water temperature, and pH
15	
16	Hybrid Algae IBI
17	CSCI Stream Biological Assessment Score
18	% of monitored streams with species present,species diversity
19	% of monitored streams with species present, species diversity
20	
21	
22	Acres of unvegetated subtidal, vegetated subtidal, unvegetated intertidal, and vegetated intertidal habitat.
23	
24	
25	DO, SAV, nitrogen, and phosphorous levels. Thresholds from McLaughlin et al. (2012).
26	Channel cross-sections and flood-plain elevation.
27	CRAM index values for the buffer and landscape context component.
28	CRAM index values for the hydrology component.
29	CRAM index values for the physical structure component.
30	CRAM index values for the biotic structure component.
31	
32	This indicator needs to be developed.
33	This indicator needs to be developed.
34	This indicator needs to be developed.
35	
36	
37	Area of beach habitats providing ecosystem functions by type.
38	

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3	**Existing Data Sources Identified**
4	
5	Cadmus Group (2013)
6	Cadmus Group (2013)
7	
8	Cadmus Group (2013), UCLA
9	Cadmus Group (2013)
10	Cadmus Group (2013)
11	Cadmus Group (2013)
12	
13	Cadmus Group (2013)
14	Cadmus Group (2013)
15	
16	SCCWRP
17	SCCWRP, Cadmus Group
18	Santa Monica Mountains RCD, NPS
19	Santa Monica Mountains RCD
20	
21	
22	SCCWRP, SCWRP (historical wetland study)
23	
24	
25	SCCWRP (Bight' 08 Eutrophication study), SMBNEP (Malibu and Ballona Wetlands monitoring program
26	SMBNEP (Malibu and Ballona Wetlands monitoring program
27	SMBNEP (Malibu and Ballona Wetlands monitoring program
28	SMBNEP (Malibu and Ballona Wetlands monitoring program
29	SMBNEP (Malibu and Ballona Wetlands monitoring program
30	SMBNEP (Malibu and Ballona Wetlands monitoring program
31	
32	n/a
33	n/a
34	n/a
35	
36	
37	Historic mapping, and field surveys. Orme et al. (2011)
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3	**Additional Data Need and Pontential Sources**
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5	USGS/TNC data on natural flow conditions for all stream reaches, locations of existing seeps and springs (especially in Ballona), LA County SEA data
6	USEPA StreamCat database, SWAMP databases with stressor information, SPoT data (toxicity), Data compiled through various EWMPs
7	
8	UCLA (Alex Hall) and SW Climate Science Center downscaled predictions. Bark beetle and disease in forested area (related to drought and climate change)
9	General plan and zoning maps
10	City and county Water Action Plan reporting, EWMPs, SWRCB water conservation data, conservation (capture and reuse) maps and plans
11	CalFire Fire risk mapping, forest disease areas (see above)
12	
13	SMC has additional indicators related to physical habitat and channel armoring
14	SMC is working on an integrative water quality index. Lots of monitoring data from local municipalities
15	
16	There is a new algal scoring too - the ASCI
17	SMC and PSA data
18	USGS may have data - SMC has also been doing presence surveys
19	DFW Fish passage barrier assessment, DFW fish monitoring
20	
21	
22	Same
23	SLR vulnerability assessments - SLAMM (TNC), SCCWRP, USGS
24	
25	Largely the same, just updated with newly available data. Add additional information compiled by Karina as part of the EPA grant on wetland assessment
26	
27	
28	
29	
30	
31	
32	M-AMBI as a new index for lower salinity environments
33	Additional data from NOAA or DFW
34	Additional data from FWS or DFW
35	
36	
37	Photographic maps -- Californiacoastline.org or google maps street view
38	

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3	**Next Steps (if needed) and Additional Comments**
4	
5	I would not expect these variables to change a lot from survey to survey -- is there a question for this category, or is it just baseline information. Do we want to focus on specific more targeted
6	aspects, such as habitat linkages/corridors, size:perimeter:buffer issues for natural areas, etc. (this could also go in the vulnerability
7	
8	SCCWRP is currently working on a project with the LARWQCB looking at climate change risks to instream flows - we could fold that in and look at flow alteration
9	not sure how much this will change from the last assessment
10	See above comment about instream flows -- perhaps predict changes in streamflow due to anticipated increases in reuse
11	Update existing maps with any available data from CalFire
12	
13	Update existing maps with most current SMC & PSA data
14	There are lots of options for how to calculate an index -- perhaps partner with the SMC to piggy back on their index development. Could also look at the CCMP index from Regional Board 3
15	
16	Compile ASCI data -- discuss if we want to include data on freshwater HABS
17	Update CSCI maps -- could expand to include component metrics or functional traits
18	Determine if we want to assess suitable habitat in addtion to areas of know occupany or model potential for occupancy based on MaxEnt or a similar approach
19	Do we want to limitt this to just anadromous fish or include endemics or senstive fish too? Update with most current data
20	
21	
22	Review existing regional studies on wetland loss due to SLR
23	
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31	
32	Revisit questions that we would like to address relative to Bight, MPA or other monitoring programs
33	
34	
35	
36	
37	Should be classified by beach zone: low, mid, high, intertidal, wrack line, coastal strand, dunes
38	

	A	B
39	Sandy Shores	2.1. Beachfront Development
40		2.2 Coastal Armoring
41		2.3 Habitat Protection
42		2.4 Beach Replenishment (dredge and fill)
43		3 Structure & Ecological Disturbance
44		3.1 Sediment Supply
45		3.2 Beach Management Practices
46		3.3 Nutrient inputs
47		3.4 Invasive Species
48		4 Biological Response
49		4.1 Nursery Function for Fish
50		4.2 Roosting Function for Birds
51		4.3 Nursery Function for Birds
52		4.4 Native Fauna
53		
54	Rocky Intertidal	1 Habitat Extent
55		1.1 Extent of rocky intertidal habitat
56		2 Habitat Vulnerability
57		2.1 Potential for direct human disturbance
58		2.2 Potential for sediment deposition events
59		3 Structure & Ecological Disturbance
60		3.1 Collecting disturbance
61		3.2 Exposure to elevated nutrients levels
62		3.3 Invasive species
63		3.4 Presence of disease
64		4 Biological Response
65		4.1 Response to direct human disturbance
66		4.2 Response to collection
67		4.3 Response to nutrients
68		4.4 Bacteria Exposure
69	Rocky Reef	1 Habitat Extent
70		1.1 Rocky Reef Habitat
71		1.2 Kelp Canopy
72		2 Habitat Vulnerability
73		2.1 Exposure to Anthropogenic Discharges
74		2.2 Fishing Pressure
75		2.3 Landslides and Sedimentation
76		3 Structure & Ecological Disturbance
77		3.1 Purple urchin barrens
78		4 Biological Response
79		4.1 Invertebrate Indicator species

	C
39	Percentage of beach shoreline with beachfront infrastructure.
40	Percentage of shoreline that has been armored.
41	Percentage of habitats under various levels of protection. Need further development
42	Volume
43	
44	This indicator needs to be further developed.
45	The metric for this indicator needs to be further developed.
46	Presence of beach wrack and select native plant species
47	Presence of invasive plant species.
48	
49	Median grunion run size.
50	Number of western snowy plover observed in winter surveys. Winter shorebird counts not scored
51	Number of western snowy plover observed in summer surveys, number of California least tern nesting pairs and fledglings
52	Presence of native fauna.
53	
54	
55	Area of rocky intertidal habitat
56	
57	Intensity of use measured by the # of people in instantaneous count per unit area.
58	Proximity to areas with high landslide potential or frequency
59	
60	Visitor-hours spent collecting within rocky intertidal sites
61	Nutrient levels in discharges onto rocky intertidal sites
62	Diversity and percentage of intertidal area covered by non-native species.
63	% of diseased individuals per species per site.
64	
65	Abundance of upper shore rockweeds
66	Size frequencies of black abalone and owl limpets.
67	Percent cover of small, fastgrowing opportunistic algae.
68	Prevalence, Frequency
69	
70	Area of hard substrata by depth category
71	% of suitable rocky reefs covered by kelp
72	
73	Plume probability mapping
74	Index of fishing pressure
75	Proximity to land vulnerable to sliding and recent landslide events
76	
77	% of rocky reef habitat covered by purple urchins by density category. Threshold between Good and Fair is 2 per m2.
78	
79	Spiny lobster density. This indicator needs to be developed further.

	D
39	No data available
40	NOAA Office of Oil Spill Response and Restoration (Environmental Sensitivity Mapping)
41	n/a
42	USACE (Marina del Rey and redeposition along Dockweiler State Beach
43	
44	n/a
45	n/a
46	No data available
47	No data available
48	
49	Pepperdine University (Grunion monitoring program)
50	Los Angeles and Palos Verdes Audubon
51	Ryan Ecological Consulting.
52	Schooler and Dugan unpublished data
53	
54	
55	No quantatitive data available
56	
57	Ambrose and Smith (2005), Garcia and Smith (2013)
58	No quantatitive data available
59	
60	Ambrose and Smith (2004)
61	Cadmus Group (2013)
62	MARINe
63	No quantatitive data available
64	
65	Ambrose and Smith (2004, 2005)
66	Ambrose and Smith (2005), MARINe
67	MARINe biodiversity survey
68	SWAMP Areas of Biological Concern, small coastal outfalls/stormdrains, SCCWRP
69	
70	Quantatitive data exist but not available
71	Central Region Kelp Survey Consortium quarterly aerial survey
72	
73	Plume probability maps found in Schaffner, Steinberg, and Schiff (2015).
74	CPFVs by CDFW
75	Records of landslide events
76	
77	SMBNEP (Kelp Restoration Program
78	
79	Quantitative data are available from CDFW but not analyzed

	E
39	Californiacoastline.org, could do time series in certain areas
40	The NOAA OSPR Sensitivity map is probably outdated
41	Can use groomed areas, grunion grooming protocol, fencing for birds, enforcement of leash laws, fishing and collecting rules, etc.
42	
43	
44	There is some info on sand-sheds and sources and sinks, (Orme)
45	The Beach Ecology Coalition has some BMPs and is developing others. Restoration areas could be included in management practices.
46	These are two separate things -- kelp input can be lost by grooming; plants help stabilize shores but may not be able to get a foot-hold if grooming occurs.
47	This could be assessed easily with transects, comparison of % cover of native vs non-native plants, presence/ absence of plants of any kind
48	
49	
50	Shorebird use is important and should be monitored seasonally.
51	Nesting by WSPs and Least Terns
52	This is beach interstitial fauna; could also monitor marine mammals use for resting and pupping, and nearshore fish with beach seines.
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70	Data layers are available in Pondella et al. 2015, Claisse et al. 2012, Svejkovsky, J. 2015
71	Satellite imagery is now avalailable- Landsat data (Bell et al. 2015) and aerial imaging was completed in (Svejkovsky, J. 2015)
72	
73	
74	Fishing index is modelled in Zellmer et al. in review, it incorporates CPFV and Commercial data for reefs.
75	
76	
77	CRANE surveys of region
78	
79	Spiny lobster density and sizes are available in CRANE surveys Other important commercial invertebrates (i.e. Giant Keyhole Limpet, Kellet's Whelk, Wavy Turban Snail, Warty Seacucumber, Abalone, SeaStars etc.)

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69	
70	Manmade structures in Santa Monica Bay have not be adequately mapped. Sidescans of these habitats need to be conducted. Incorporate multispectral aerial imaging into habitat layers
71	Integrate SI with CRKS and aerial imaging (Svejkovsky, J. 2015) allowing bightwide comparisons. Analyze
72	
73	Update plume probability maps to include storm drains.
74	Data go through 2009, update to current. Incorporate Bay Foundation Flyover data.
75	Map the habitat lost or degraded by these landslides. Create a benthic sedimentation index.
76	
77	Identifiy other urchin barrens, specifically at Malibu, currently Malibu is not being monitored
78	
79	Develop stock and timeseries model for Santa Monica Bay

	A	B
80		4.2 Rocky Reef Fish Guild Index
81		INVASIVE SPECIES
82		1 Habitat Extent
83		1.1 Spatial extent
84		1.2 Vertical habitat availability
85		
86		2 Habitat Vulnerability (none identified)
87		2.1 Utility Line Placement
88		3 Structure & Ecological Disturbance
89		3.1 DDT
90	Soft-Bottom Benthos	3.2 PCB
91		3.3 Mercury
92		3.4 CECs
93		3.5 Nutrient Inputs
94		4 Biological Response
95		4.1 Benthic Community Condition
96		4.2 Fish Community Condition
97		
98		1 Habitat Extent
99		1.1 Hypoxia
100		2 Habitat Vulnerability
101		2.1 Ocean Acidification
102		3 Structure & Ecological Disturbance
103		3.1 Nitrogen and Phosphorous
104		3.2 Chlorophyll
105	Coastal Pelagic	3.3 Harmful Algal Blooms (HABs)
106		3.4 Nutrient Inputs
107		4 Biological Response
108		4.1 Forage Fish

	C
80	Fish guild index score (Bond et al. 1999)
81	Density and distribution of invasive algae and invertebrates
82	
83	Surface area of the soft-bottom habitat. This indicator will be developed further in the future.
84	This indicator needs to be developed.
85	
86	
87	Area
88	
89	% of surface area in each class of DDT concentration (ug/g %OC dw) as defined by TMDL targets for Santa Monica Bay
90	% of surface area in each class of PCB concentration (ug/g %OC dw) as defined by TMDL targets for Santa Monica Bay
91	% of surface area in each class of mercury concentration (mg/kg dw) based on regional results from the Bight '08 study.
92	Prevalence
93	Mass emissions
94	
95	% of surface area in each class of values for the benthic response index (Figure 2.1.6)
96	This indicator needs to be developed.
97	
98	
99	Area with and frequency of excursions into low DO in the bottom 5m of casts (or 100m)
100	
101	Area with and frequency of excursions into low pH in the bottom 5m of casts (at bottom or 100m)
102	
103	Five-year averages of DIN and DIP concentrations at 30m.
104	Five-year averages of Chl a concentrations integrated across all depths.
105	Seasonal averages of domoic acid concentrations and concentrations of P-N, toxic species, and all other HAB species (cells/Liter) in the Bay.
106	Mass emissions
107	
108	Landings by weight of forage fish caught (commercial) in the Bay by species.

	D
80	Quantitative data are available from standardized scuba diving by Ventura Research Group and others, but not analyzed
81	CRANE surveys of region
82	
83	n/a
84	n/a
85	
86	
87	e.g., TE Subcom,
88	
89	LACSD and CLA-EMD sediment and fish contamination monitoring
90	LACSD and CLA-EMD sediment and fish contamination monitoring
91	LACSD and CLA-EMD sediment and fish contamination monitoring
92	SCCWRP Bight Projects
93	POTWs, SCCWRP Bight Projects
94	
95	LACSD and CLA-EMD benthic infauna monitoring, SCCWRP (Bight-wide survey
96	n/a
97	
98	
99	LACSD and CLA-EMD quarterly pelagic monitoring
100	
101	LACSD and CLA-EMD quarterly pelagic monitoring, newly-installed pH, pCO2 sensors, C-CAN, SCCOOS
102	
103	CalCOFI
104	LACSD and CLA-EMD quarterly pelagic monitoring, CalCOFI
105	SCCOOS harmful algae and red tide monitoring program
106	POTWs, SCCWRP Bight Projects
107	
108	CDFW Marine Region Statistical Unit

	E
80	There is current data only for Palos Verdes, Malibu has not been surveyed since 2012, so surveys at Malibu need to be undertaken before any future analyses can be done
81	Current CRANE surveys
82	
83	
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86	Discuss need for indicator and identify appropriate metric and data availability with TAC and others.
87	
88	
89	Bight'18 Regional monitoring data
90	Bight'18 Regional monitoring data
91	Bight'18 Regional monitoring data
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95	Bight'18 Regional monitoring data
96	Bight'18 Regional monitoring data
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	F
80	Continue monitoring Palos Verdes reefs, begin monitoring Malibu reefs. Add an artificial reef component, as well.
81	CRANE surveys of Malibu and mamade structures
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84	
85	
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88	
89	Coordinate with Bight'18 planning committee to enhance sampling coverage of Santa Monica Bay.
90	Coordinate with Bight'18 planning committee to enhance sampling coverage of Santa Monica Bay.
91	Coordinate with Bight'18 planning committee to enhance sampling coverage of Santa Monica Bay.
92	
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94	
95	Coordinate with Bight'18 planning committee to enhance sampling coverage of Santa Monica Bay.
96	Coordinate with Bight'18 planning committee to encourage development of fish community condition index and enhance sampling coverage of Santa Monica Bay.
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	A	B
109		4.2 Predatory Fish
110		4.3 Marine Mammals
111		4.4 Sea Birds

	C
109	CPUE of young thresher shark by size category.
110	Dstribution, frequency of occurrence, seasonality, and behavior
111	Density of seabirds

	D
109	NMFS Southwest Fisheries Science Center
110	Limited data exist from the Ocean Conservation Society, National Marine Fisheries Service, and Southern California Cascadia Research Collective, but were not available.
111	CalCOFI and SCCOOS research surveys, but were not available

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