2017 Self-Monitoring Report
Baumberg Complex - Hayward, California
Eden Landing Ecological Reserve

Order Number: R2-2008-0078

Prepared for:

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Introduction

This annual self-monitoring report (SMR) summarizes the pond operations, management and monitoring conducted by the California Department of Fish and Wildlife (CDFW) from May through October 2017 at the Eden Landing Ecological Reserve (ELER), also formerly known as the Baumberg Complex salt ponds, in Hayward, California. For this 2017 SMR, CDFW has revised and removed outdated information that does not contribute relevant information for current and future compliance with the Final Order R2-2008-0078. We include the details of the request for revision in the final section of this report: Summary and Requests for Revisions to SMP.

Monitoring is conducted for pond operations as required by the Regional Water Quality Control Board (RWQCB) Final Order R2-2008-0078 (Final Order). The Final Order for the South San Francisco Bay Low Salinity Salt Ponds covered 15,100 acres of ponds in Alameda, Santa Clara and San Mateo counties. Phase One of the South Bay Salt Ponds Restoration Project (SBSPRP) was completed in 2016. Data for pond management was collected according to the Self-Monitoring Program outlined in the Final Order. The initial "B" for the Baumberg Complex ponds has been changed to "E" for Eden Landing, in accordance with the nomenclature used for the SBSPRP. The U.S. Fish and Wildlife Service (USFWS) separately submit reports for the Alviso and Ravenswood Complexes.

ELER pond systems operated by CDFW in 2017 are fully described in the attached, Operations Plans updated for 2018. Current management reflects implementation of the adaptive management plan for the South Bay Salt Pond Restoration Project (SBSPRP) in Ponds E10, E12, E13 and E14 (reconfigured, managed ponds), including multi-season and multi-species modified pond operations in System E6A (Ponds E8, E6B and E6A.

CDFW staff collected pond operations data in accordance with the Final Order requirements. Water quality monitoring was performed in 2017 using pond grab samples; continuous monitoring devices are not required for Dissolved Oxygen, pH, temperature and salinity. Receiving water monitoring was not conducted. Observed water levels and salinity from grab samples had values within ranges specified in the Operations Plans and Final Order Water Quality Objectives (WQO's) and adequately protected receiving waters. Pond operations and management activities were conducted to meet objectives described in the Final Order and CDFW's Operations Plans for each system.

The ponds are generally being operated as "muted tidal" systems with intake and discharge at the same location, with continuous circulation. Pond operations are fully described in the updated 2018 Operations Plans. Water enters ponds directly from San Francisco Bay (Bay) or sloughs on high tides via Water Control Stuctures (WCS's), with flow to one or more ponds, then discharges at low tide. The ponds discharge at tide stages lower than pond water elevations, typically averaging 3.5-feet (NGVD). Discharge is presumed to occur for approximately 13 to16 hours per day (based on predicted tides and spring or neap tide cycle variation). Pond intake is presumed to occur at elevations of approximately 1.5- feet or more above pond water levels due to required

head (pressure) for in-flow. This head requirement is assumed from continuous in-pond data values from previous years.

The Final Order established maximum salinity levels below 44 parts per thousand (ppt) for discharge from the ponds. In 2017, operation of all systems was monitored and discharge was below 44ppt. Other water quality parameters were not regularly sampled. Ponds were not significantly affected by major construction actions and were operated as open water or seasonal (dry) habitat. No adverse conditions were observed in ponds or receiving waters. Water quality monitoring activities were conducted as described in subsequent sections of this report.

As in previous years, the Self Monitoring Report (SMR) includes summary information of pond operations and management. Pond operations were similar to previous years. System E12 ponds were reconfigured as part of SBSPRP Phase 1 actions. Intensive pond management actions continue in E12 and E13, as discussed later. More typical, less intensive pond management occurs in other pond systems (E11, E6A, E2/E2C).

Low dissolved oxygen (DO) levels at the point of discharge have previously been observed to fall below a 10^{th} percentile value of 3.3 mg/L (calculated on a calendar weekly basis). Low DO conditions may be expected during extended periods of high air and water temperature and appear to represent natural DO variations in sloughs or lagoon systems. It has been documented that DO levels below the Basin Plan standard of 5.0 mg/L are observed in sloughs not affected by any pond discharge and are within the natural range of variation of the South San Francisco Bay. A summary of grab sample data and discharge events are included in this report. Full data sets were provided to RWQCB staff. Additional analysis and interpretation of monitoring data is not expected to be completed nor submitted for 2017.

2017 Annual Summary

The calendar year 2017 was the first year with significant rainfall after the historic five year drought between 2011 and 2016. In 2017, rainfall totals significantly increased and drought conditions waned. After relatively modest rainfall in March, 2017, the season ranked as the second wettest in 122 years. According to data collected between October 2016 and March 2017 by the National Oceanic and Atmospheric Administration (NOAA), California averaged 30.75 inches of precipitation, the second-highest average since such records began being kept in 1895 by NOAA.

The effect of 2017 rainfall reversed prolonged periods of higher salinity observed in 2016. High episodic rainfall generally affected pond operations positively. Salinity values were lower year-round, including during the summer months. The effects of high rainfall are apparent in terms of more direct input of freshwater into ponds and SF Bay resulting in sustained lower salinity conditions.. Salinity was observed to be only 10ppt continuously for at least two months.. Similar low salinity to near fresh water conditions were observed in sloughs. Higher sustained intake and discharge operations also helped maintain low salinity during the summer operation period. In-pond salinity averages

were reduced and sustained in summer 2017, and fewer spikes were observed, particularly during neap tide periods.
In 2017, continuous circulation occurred during the summer monitoring season as described in Operations Plans. Pond operations included intake to, and discharge from, Pond E10, E12, E14, E8X, E6A, E6B, E2C and E2. Pond management and water quality monitoring in 2017 was conducted using grab samples.

In 2017, operations and maintenance (O&M) activities were completed for habitat restoration and enhancement in managed ponds at ELER. O&M included replacement of existing Water Control Structures (WCS's) at Ponds E10 and E11. Trail maintenance was completed on public access features, such as the year round Bay Trail spur and seasonal loop trails, the boardwalk into the historic Oliver Salt Works and the kayak launch into Mt. Eden Creek. Operation of the 10,000 Gallon Per Minute (GPM) intake pump at Pond E12 did not occur except periodic preventative maintenance to check pump operability. Pumps were found to be operating normally. The Pond E13Mixing Basin WCS (five 36-inch culverts with gates and weirs) has been fully operational since 2015. In 2017, more consistent but limited of each operable gate occurred.

Pond management in 2017 included successful operations in reconfigured Ponds E12 and E13. This was the third full year of reconfigured operations in Ponds E12 and E13. Ponds E12 and E13 are operated year round as a series of pond "cells" to provide salinity gradients in shallow, shorebird habitat. More typical, modified seasonal operations were undertaken for Ponds E6A, E6B and E8.

The 2017 monitoring results indicate that while reconfigured Ponds E12 and E13 were intensively managed, water quality was maintained but not significantly improved overall. It appears that use of a mixing basin for discharge may help meet water quality objectives, but still may not meet all Basin Plan objectives. Such features of managed ponds will continue to be evaluated as an element of adaptive management studies for future pond reconfiguration and enhancement activities.

In 2017, CDFW completed O&M activities to replace WCS's at Ponds E10 and E11. A missing flap gate was discovered at the Pond E10 WCS in June, 2015. This WCS was replaced with a single 48-inch culvert with combination gates on both sides. Normal operations resumed, such that discharge was decreased and the pond operated at a higher water level. The old wooden WCS between Ponds E10 and E11 was replaced with a single 48-inch culvert with combination gates on both sides. Pond E10 and Pond E11 water levels were consistent with normal operations year-round in 2017. No problems were encountered 2017. Pond operations were normal.

For the 2017 monitoring season, periodic (weekly) collection of monitoring data was sufficient to inform pond management (summer and winter). Pond management and operations are discussed in greater detail in the Operations Plans and briefly described herein as related to compliance with the RWQCB Final Order.

Water quality monitoring at the ELER ponds conformed to the Final Order. Salinity, water levels and waterbird use were the primary basis for determining pond management activities for the 2017 season. Typical pond operations and monitoring of salinity and water levels indicated that the ponds were operating within parameters that met biological and water quality objectives. No abnormal conditions, such as fish kills, were observed.

Pond operations were similar in 2017 to previous years in systems that were operated "normally" (as compared to modified operations associated with major construction activities), and operated for multi-season, multi-species objectives, as described in the subsequent paragraph. Temporary suspension of discharge operations was not conducted in 2017, as no periods of elevated salinity were observed at the discharge.

In 2017, System E6A ponds (E8, E6B, E6A) were managed for multi-season, multi-species objectives that were implemented in 2012. As currently operated, System 6A ponds sustain decreased intake and increased discharge volumes via Old Alameda Creek (Pond E6A) and North Creek (Pond E6B and E8). In winter, the System is operated primarily for waterfowl foraging and roosting, specifically for diving ducks, though dabbling duck use is supported. System 6A ponds are managed in summer for western snowy plover (WSP), black-necked stilt and American avocet breeding, with drawn down water levels and subsequent exposure and drying of much of the pond bottoms. Spring and fall season conditions supported shorebird foraging and roosting during migration periods. During 2017, this system provided good habitat conditions for waterbirds, including WSP.

The ELER site location is shown on Figure 1; sampling and water control structure (WCS) locations are shown on Figure 2.

For all pond systems:

Grab samples were collected at pond-to-pond, intake and/or discharge locations to monitor pond conditions and meet habitat management and water quality objectives. Salinity, water level and circulation patterns such as flow direction at a culvert location, as well as bird guild/species and abundance were monitored throughout the pond systems. We observed conditions which indicated improved water quality, particularly for salinity. During summer operations, water levels in the ponds are maintained throughout the season primarily by adjusting discharge gates, rather than intake gates, with consideration of neap tide cycles, weather conditions, habitat objectives and targeted species use.

In 2017, pond management for continuous circulation was typical for summer operations. A summary of discharge events is shown on Table 1.

System E2C:

Pond E2C was operated in 2017 similar to previous years. A continuous monitoring device was not utilized or required. Pond management in this system occurred as described in the Operations Plan. Monitoring included grab samples collected on an

approximately weekly basis to monitor salinity and water levels recorded from staff gauges. Waterbird use was recorded to inform operations and meet habitat objectives. Discharge was at or below 25% of capacity; therefore, no receiving water monitoring was required, as prescribed in the Final Order. System E2C operations were normal and regular flow occurs only between E2C and Cargill Pond 3C.

System E2:

Pond E2 was operated in 2017 similar to previous years. Discharge directly to the Bay from Pond E2 was maintained at 25% of capacity of two 48-inch gates for much of the summer. There is also limited flow from E1 to E7 to E6, and to E5 from E4. Pond management in this system occurred as described in the Operations Plan. A continuous monitoring device was not utilized or required. Monitoring included grab samples collected on an approximately weekly basis to monitor salinity, and water levels recorded from staff gauges. Waterbird use was recorded to inform operations and meet habitat objectives. Managed "batch" ponds (E6, E5) allow salinity to increase to approximately 120-parts per thousand (ppt), maintaining water levels by providing "make up" water (lost to evaporation) from adjacent ponds (E7 or E4). Batch ponds are recirculated in winter to maintain low salinity in the spring and summer monitoring season. E6C was managed as a seasonal pond and allowed to mostly dry. System E2 discharge operations during the winter successfully recirculated higher salinity conditions in "batch" and seasonal ponds (E5, E6 and E6C).

System E10:

Typical operations were conducted in 2017 in System E10 ponds. Pond E10 is operated as a continuous circulation, low salinity pond, and pond E11 is operated as a seasonal pond. Pond E10 has intake from and discharge into the Bay at the mouth of Mount Eden Creek (MEC). The E10 WCS was replaced in 2017, as it had not been operable since 2015. With replacement of the WCS normal operations resumed, such that discharge was decreased and the pond operated at a higher water level throughout the year. A new WCS between Pond E11 and E10 was installed, replacing the existing wooden WCS between Pond E10 and E11. E11 has intake and discharge from MEC and periodic flow from Pond E10. Continuous monitoring devices (Datasondes) were not used and receiving water sampling was not required.

System E6A:

In 2017, operations were conducted similar to previous years in System E6A ponds (E8, E6B, E6A) In summer, System E6A management targeted western snowy plover (WSP) nesting. In the winter, System 6A ponds were managed with deeper water levels to provide foraging and roosting habitat for diving ducks. Continuous circulation intake/discharge operations were conducted, whereby low salinity conditions were maintained throughout the year in most of the borrow ditch and ponded areas throughout the system. Pond operations successfully provided target conditions for multi-season, multi-species management, including WSP nesting, and maintained low salinity conditions in the ponds subsequently benefiting migratory shorebirds and overwintering waterfowl in 2017.

System E9:

Ponds E9, E8A and E8X in System E9 were restored to full tidal action in 2011 as part of Phase One of the SBSPRP. Managed ponds E12, E13 and E14 previously linked to E9 and E8X are in System E12, below.

System E12:

The reconfigured ponds E12 and E13 were fully operational for the third year in 2017, and intensive pond management continued. Ponds E12 and E13 were reconfigured as a "salinity experiment" providing a series of shallow, open water cells of progressively increasing salinity with similar water levels. Significant use of the cells by small and medium shorebirds was observed as part of on-going, regular surveys and use occurred as expected. WSP continued to use System E12 ponds, including dry bottom areas of E14, and dry berms, levees and islands in the reconfigured Ponds E12 and E13. Pond operations in E12, E13 and E14 maintained low salinity discharge (<44 ppt). Moderate to high salinity conditions (80 to 120ppt) targeted within cells in ponds E12 and E13 were maintained in summer.

In 2017, intake/discharge operations and monitoring were conducted in System E12 ponds. Pond E8X was operated as a forebay for intake and discharge operations in ponds E12 and E14. E14 and E8X were generally operated as shallow, muted tidal basins and periodically used as mixing basins during brief periods to help Ponds E12 and E13 meet water quality objectives for continuous circulation. Pond E14 was operated similarly to other seasonal ponds in ELER, with limited intake from tidal areas as needed under continuous circulation to support sufficient dry areas for WSP nesting. Ponds E12 and E13 discharged primarily to Mt. Eden Creek via the "mixing basin" area within E13. Periodically, E14 received low-volume flow from E13 to maintain more constant water surface elevations in E14. This system provided good habitat conditions for shorebirds, particularly WSP, as well as waterfowl throughout 2017.

Table 1: Summary of Intake/Discharge Activities

Complete data and field notes for pond operations/conditions and management activities provided electronically to RWQCB and are otherwise available upon request.

NOTE: Table 1 salinity values obtained from a hand-held refractometer (Parts Per Thousand, or ppt). In previous reports, Baumberg aka Eden Landing. Staff gauge readings are specific to each pond (or pond system), and vary between NGVD 29, NAVD 88 or relative to pond bottom.

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
E2C	E2c-14	4/26/17	3	below	Reduced Discharge to 1x48" at 25%, begin summer ops.
E2C	E2c-14	5/8/17	18	3.3	1x48" Disch. 25% cont**,** maintain depth, spring-> neap tide
E2C	**E2c-14**	**5/25/17**	**23**	**3.70**	**Increased 1x48" Disch. to 20%**, spring tide
E2C	E2c-14	6/7/17	22	3.00	1x48" Disch. 20%, -> neap tide
E2C	**E2C-14**	**6/19/17**	**25**	**below**	**Increased 1x48" Disch. to 25%**, max circ. for spring tide
E2C	E2c-14	7/6/17	26	2.9	1x48" Disch. 25% cont, neap tides
E2C	E2c-14	7/27/17	29	3.30	1x48" Disch. 25% cont, spring tide
E2C	E2c-14	8/4/17	28	3.20	1x48" Disch. 25% cont, neap tide.
E2C	**E2c-14**	**8/18/17**	**28**	**3.30**	**Increased to 2x48" Disch. 25%**, spring tide
E2C	**E2c-14**	**9/6/17**	**28**	**3.30**	**Reduced to 1x48" Disch. 25%**, spring->neap tide.
E2C	E2c-14	9/12/17	36	3.20	1x48" Disch. 25% cont, neap tides
E2C	E2c-14	9/25/17	41	below	1x48" Disch. 25% cont.
E2C	**E2c-14**	**10/5/17**	**32**	**3.20**	**Reduced 1x48" Disch. to 5%**, spring tide, begin transition to winter ops.
E2	E2-10	5/1/17	18	3.10	2x48" Discharge 25%, 2x48" Intake 100% cont.
E2	**E2-10**	**5/18/17**	**24**	**3.00**	**Reduced to 1x48" Disch. 25%**; 2x48" Intake 100% cont. Summer ops
E2	**E2-10**	**5/25/17**	**20**	**3.25**	**Increased to 2x48" Disch. 25%**, 2x48" Intake 100% cont, summer ops.
E2	E2-10	6/20/17	26	3.10	2x48" Disch. 25% cont, 2x48" Intake 100% cont, summer ops
E2	E2-10	7/19/17	30	3.10	2x48" Disch. 25% cont, 2x48" Intake 100% cont, summer ops
E2	E2-10	8/18/17	32	3.45	2x48" Disch. 25% cont, 2x48" Intake 100% cont, summer ops
E2	E2-10	9/6/17	38	3.50	2x48" Disch. 25% cont, 2x48" Intake 100% cont, summer ops
E2	E2-10	9/21/17	40	3.65	2x48" Disch. 25% cont, 2x48" Intake 100% cont, summer ops

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
E2	E2-10	10/5/17	32	3.20	2x48" Disch. 25% cont, 2x48" Intake 100% cont, summer ops
E10	E11-1	3/10/17	7	3.30	Middle 1x48" intake flap gate missing. Discharging. Low tide
E10	E11-1	5/31/17	dry	below	Construction: pond drained, Coffer dam, no intake. Beginning to remove 3x48" WCS, install 1x48" WCS.
E10	E11-1	6/12/17	dry	Not installed	Construction complete: Resume intake, 1x48" Intake opened 100%. 1x48" Discharge 0%. Refilling pond
E10	**E11-1**	**6/22/17**	**25**	**Not installed**	**Opened 1x48" Discharge to 10%**, 1x48" Intake open 100% cont. Resumed summer ops.
E10	E11-1	7/21/17	35	Not installed	1x48" Discharge 10%, 1x48" Intake open 100% cont. Summer ops.
E10	**E11-1**	**8/4/17**	**35**	**Not installed**	**Increased 1x48" Discharge to 25%**, 1x48" Intake 100% cont. Summer ops.
E10	E11-1	8/21/17	32	Not installed	Increased 1x48" Discharge to 50%, 1x48" Intake open 100% cont. Summer Ops, allow E10<-E11 as WSE feasible, E11 salinity mgmt.
E10	E11-1	10/12/17	37	Not installed	Reduced 1x48" Discharge to 5%, 1x48" Intake open 100%. Transition to Winter Ops (E10<->E11).
E8X	E8X- Tidal Discharge	4/25/17	13	*6.2	1x48" Intake 100% 1x48" Disch. 10%. E14->E9 Winter Ops
E8X	E8X- Tidal Discharge	7/11/17	27	*5.8	1x48" Intake 100% 1x48" Disch. 10%. E14->E9 Summer Ops
E8X	E8X- Tidal Discharge	9/26/17	35	*4.85	1x48" Intake 100% 1x48" Disch. 10%. E14->E9 Summer Ops
E8X	E8X- Tidal Discharge	10/5/17	32	6.25	1x48" Intake 100% 1x48" Disch. 10%. E14->E9 Summer Ops
E14	E14-E9 new WCS	7/11/17	30	*4.4	1x48" Discharge 50%, 1x48" Intake 5% cont. E14->E9 Summer Ops
E14	E14-E9 new WCS	9/12/17	33	*5.4	1x48" Discharge 50%, 1x48" Intake 5% cont., E14->E9 Summer Ops.
E14	E14-E9 new WCS	10/5/17	32	*5.35	Reduced 1x48" Discharge to 10%, 1x48" Intake 5% cont., E14->E9 Transition to Fall/Winter Ops.
E12	**E12-1**	**4/25/17**	**16**	***6.65**	E12-RES-6.65-(16ppt)-1x18" gate 10%, 1x18" gate 5%->E12-Lo-6.35-(21ppt)-(E12-DC-6.25')->E12-Med-6.15-(24ppt)->E12Hi-6.15 (30ppt)-

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
					>E12-DC-6.1->E13MB- 6.0-(16ppt). Weirs Reset at 5.0' NAVD. 2x36" Discharge (100%), Opened 2x36" Intakes 100%. [E12-1: 2x48" Intakes 100%, Disch. 0%.]
E12	**E12-E8X**	**4/25/17**	**16**	***6.75**	E13-RES-6.65 (16ppt)-1x18" gate 15%, 1x18" gate 5% cont->E13-Lo-6.35-(19ppt)->-(E12-DC-6.25)-E13-Med-6.15-(23ppt)->E13Hi-5.85-(28ppt)->E13MB 6.0-(16ppt) E12-DC-(*5.8'). Weirs set at 5.0' NAVD. 2x36" Opened Discharge (100%), 2x36" Intakes Open 100%. [E12-1: 2x48" Intakes 100%, Disch. 0%.]
E13	**E12-E13 Mixing Basin**	**4/25/17**	**16**	**(*6.0)**	**Opened 2x36" Discharge (100%)**, 2x36" Intake 100%, (Reconfig. Ops w/MB Intake/Disch). Weirs set at 5.0' NAVD. New Staff Gauge. (SNPL in MB).
E13	**E12-E13 Mixing Basin**	**5/25/17**	**20**	**(*5.85)**	**Red. 2x36" Intake to 25%** (SNPL-AMAV nest protection). 2x36" Discharge Open 100%, Weirs set at 5.0' NAVD.
E13	**E12-E13 Mixing Basin**	**5/30/17**	**20**	**(*5.5)**	2x36" Discharge Open 100%, **Opened 3x36" Intake to 100%** (no SNPL nests, increase WSE, circulation). Weirs set at 5.0' NAVD. Reconfig. Ops w/MB Intake/Disch).
E13	E12-E13 Mixing Basin	6/28/17	24	(*5.75)	Discharging. 2x36" Discharge 100%, 3x36" Intakes Open 100%. Weirs set at 5.5' NAVD.
E13	E12-E13 Mixing Basin	7/27/17	30	(*5.85)	Discharging. 2x36" Discharge 100%, 3x36" Intakes Open 100%. Weirs set at 5.5' NAVD.
E13	E12-E13 Mixing Basin	8/31/17	35	(*5.3)	Discharging. 2x36" Discharge 100%, 3x36" Intakes Open 100%. Weirs set at 5.5' NAVD.
E13	E12-E13 Mixing Basin	9/26/17	40	(*5.25)	Discharging. 2x36" Discharge 100%, 3x36" Intakes Open 100%. Weirs set at 5.5' NAVD.
E13	E12-E13 Mixing Basin	10/5/17	32	(*6.1)	Discharging. 2x36" Discharge 100%, 3x36" Intakes Open 100%. Weirs set at 5.5' NAVD.
6B	E6A-2	3/29/17	1	1.85	Discharging. 1x48" Disch. 75%, 1x48" Intake 25% cont. Transition to Spring/SNPL Ops.

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
6B	E6A-2	5/8/17	21	2.1	Intaking. 1x48" Disch. 75%, 1x48" Intake 25% cont. Spring/SNPL Ops.
6B	**E6A-2**	**7/25/17**	**35**	**1.85**	**Discharging. Increased 1x48" Disch. to 80%, Red.1x48" Intake to 10%**, Reduce WSE for SNPL nest Ops.
6B	E6A-2	8/14/17	32	0.9	Discharging. 1x48" Disch. 80%, 1x48" Intake 10%, Maint. WSE for SNPL nest Ops.
6B	**E6A-2**	**9/6/17**	**30**	**1.8**	Intaking. **Red.1x48" Disch. to 50%, Increased 1x48" Intake to 25%**, Begin T'sition to Fall Migrant Ops
6B	E6A-2	9/21/17	35	2.55	1x48" Disch. 50%, 1x48" Intake 25%, Cont. T'sition to Fall Migrant Ops
6B	**E6A-2**	**10/31/17**	**31**	**2.55**	**Increased 1x48" Intake to 100%, Reduced 1x48" Disch. to 25%.** Begin T'sition to Winter Ops
6A	E6A-10	4/26/17	(7)	(2.3)	(Salinity & Staff at E6A-3). 1x48" Intake 100%), 1x48" Disch. 25%. Begin T'sition to Summer/SNPL-E6B Ops.
6A	E6A-10 (E6A-3)	5/22/17	(12)	(2.25)	1x48" Intake 100%), 1x48" Disch. 25%. Summer ops. cont. (Salinity/Staff at E6A-3; 1x48" gate 5%, E6A->E6B).
6A	E6A-10 (E6A-3)	7/19/17	(25)	(2.25)	1x48" Intake 100%), 1x48" Disch. 25%. Summer ops. cont. (Salinity/Staff at E6A-3; 1x48" gate 5%, E6A->E6B).
6A	E6A-10 (E6A-3)	8/21/17	(28)	(2.6)	1x48" Intake 100%), 1x48" Disch. 25%. Summer ops. cont. (Salinity/Staff at E6A-3; 1x48" gate 5%, E6A->E6B).
6A	E6A-10 (E6A-3)	9/18/17	(31)	(2.8)	1x48" Intake 100%), 1x48" Disch. 25%. (Salinity/Staff at E6A-3; 1x48" gate 5%, E6A->E6B). Increase WSE, T'sition to Fall Migrant Ops.
8	E6A-1	3/29/17	7	*4.9	NAVD Staff at B6A-1a. 1x48" Disch. 75%, 1x48" Intake 25% cont. Transition to Summer/SNPL Ops.
8	E6A-1	5/8/17	16	5.1	NAVD Staff at B6A-1a. 1x48" Disch. 75%, 1x48" Intake 25% cont. Summer/SNPL Ops.
8	E6A-1	6/2/17	17	4.8	NAVD Staff at B6A-1a. 1x48" Disch. 75%, 1x48" Intake 25% cont. Summer/SNPL Ops.

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
8	E6A-1	6/20/17	26	5.1	NAVD Staff at B6A-1a. 1x48" Disch. 75%, 1x48" Intake 25% cont. Summer/SNPL Ops.
8	**E6A-1**	**7/25/17**	**32**	**4.9**	NAVD Staff at B6A-1a. **Reduced 1x48" Intake to 15%**, 1x48" Disch. 75%, cont. Summer/SNPL Ops.
8	E6A-1	8/14/17	32	4.9	NAVD Staff at B6A-1a. 1x48" Intake 15%, 1x48" Disch. 75%, cont. Summer/SNPL Ops.
8	**E6A-1**	**10/5/17**	**32**	***4.5**	Intaking. **Reduced 1x48" Disch. to 5%**, 1x48" Intake 50% Cont. T'sition to Fall Migrant/Winter Ops.

Water Quality Monitoring Requirements

Water quality monitoring was performed at various locations shown in Figure 2. Final Order water quality parameters are provided below for reference:

Table 2 Continuous Circulation Period Discharge Limits
All pond waters discharging to the Bay or Sloughs shall meet the following limits:

Constituent	Instantaneous Maximum	Instantaneous Minimum	Units
Salinity	44	n/a	Ppt
Dissolved Oxygen[1]	n/a	5.0	Mg/L
pH[2]	8.5	6.5	

[1] = Basin Plan objective; pond discharges must be ≥ DO receiving water level. Dissolved Oxygen (DO) Trigger: when using a continuous data recorder (Datasonde), if the DO concentration 10th Percentile value is < 3.3 mg/L, on a calendar weekly basis, values shall be reported promptly to RWQCB, corrective measures shall be implemented as needed.
[2] = The Discharger may determine pH compliance at the discharge or in the receiving water.

Water Quality Monitoring Methodology

Pond Discharge Monitoring/Sampling:

Continuous data were not required in Pond Systems E2, E2C, E6A/B/8, E8X and E14, as previously modified by RWQCB. In 2017, continuous data were not collected, in compliance with the Final Order. Pond management targeted waterbird habitat goals and objectives, and operational changes were generally determined based on salinity grab samples, water level monitoring and waterbird use observations on approximately a weekly, monthly and seasonal basis. Pond management conformed to previously submitted operations plans.

Discharge Time-Period and Volume Estimates:

Estimates of discharge volume may provide context for monitoring of management activities but are not easily calculated. RWQCB previously modified ASMR requirements such that volume estimates are not required. We use discharge time period

information as a proxy for discharge volume, as interpreted from monitoring data and predicted tides. Table 1: Summary of Discharge Activities, provides context for management operations.

We assume that discharge occurs when tide stage is below pond water elevations, estimated to occur for approximately 13-16 hours daily. This may over-estimate actual discharge time periods (and volumes) because it disregards affects of head (pressure) that may alter discharge flows from culverts with tide gates. Based on observed data, intake requires tide stages that are approximately 1 ½ feet higher than pond water elevations.

Receiving Water Sampling:

Receiving water was not monitored in 2017 as previously approved by RWQCB. Ponds E2 and E10 discharge to the Bay, while limited discharge occurs into sloughs via Ponds E2C, E6A, E6B, E8, E8X, E14 and the mixing basin for reconfigured Ponds E12/E13.

Sampling requirements under the Final Order were modified by RWQCB in 2008. Receiving water sampling was required only when adverse conditions are observed, concurrent with Pond E2C discharge volumes greater than 25% of capacity of the 2x48" water control structure. As previously approved by RWQCB, discharges are maintained at greater than 25% capacity in order to maintain nesting habitat for WSP in ponds E8X, E6B, E6B, E8 and E14, as well as in reconfigured ponds E12 & E13. Table 3 below describes the water quality monitoring requirements for discharge from this complex at greater than 25% capacity during the period May through October.

CDFW requests that type "A" monitoring only be required for all ponds, and approved as a revision to the Final Order.

Table 3 –Water Quality Monitoring For Eden Landing Ponds

Sampling Station:	D.O.	pH	Temp	Salinity	Sample Function
E2-10	A	A	A	A	Discharge
E2C-1 (E2C-14)	A	A	A	A	Discharge
E6A-10	A	A	A	A	Discharge
E6A-2	A	A	A	A	Discharge
E6A-1	A	A	A	A	Discharge
E8X-Tidal	A	A	A	A	Discharge
E12-E13	A	A	A	A	Discharge
E14-E9	A	A	A	A	Discharge

LEGEND FOR TABLE 3

A = For time periods between May and October the Discharger shall collect weekly grab samples before pond water mixes with receiving water. The Discharger shall also report standard observations, as described in Section D of the SMP. Additionally, the Discharger shall alternate the time it collects weekly grab samples between the morning and the afternoon to the maximum extent practicable. Based on weekly grab samples and standard observations, the Discharger shall determine pond operations and management.

Calibration and Maintenance:

The refractometer instrument used for salinity sampling as part of the Self-Monitoring Program was calibrated by using pure water to reset the instrument to zero.

Pond Management Sampling:

CDFW regularly conducted pond management sampling in 2017 in all ponds in each system. This data was used to inform pond management and adjust discharge operations. Data include pond water elevation (staff gages), salinity (hand-held refractometer), wildlife use (observations), meteorological/tidal conditions and physical pond conditions.

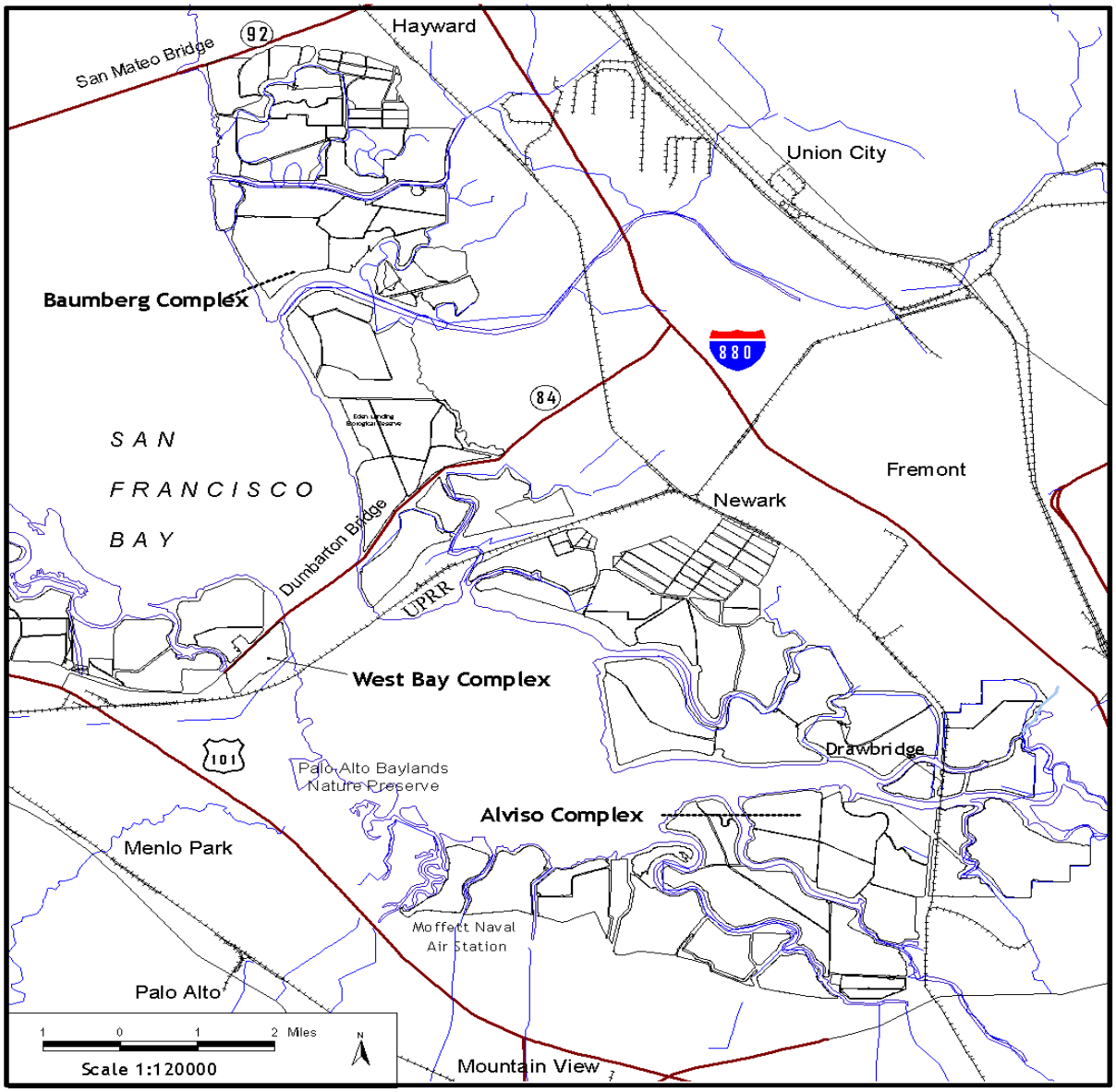

Figure 1. Vicinity Map of the Eden Landing Ecological Reserve (Baumberg Complex) Ponds

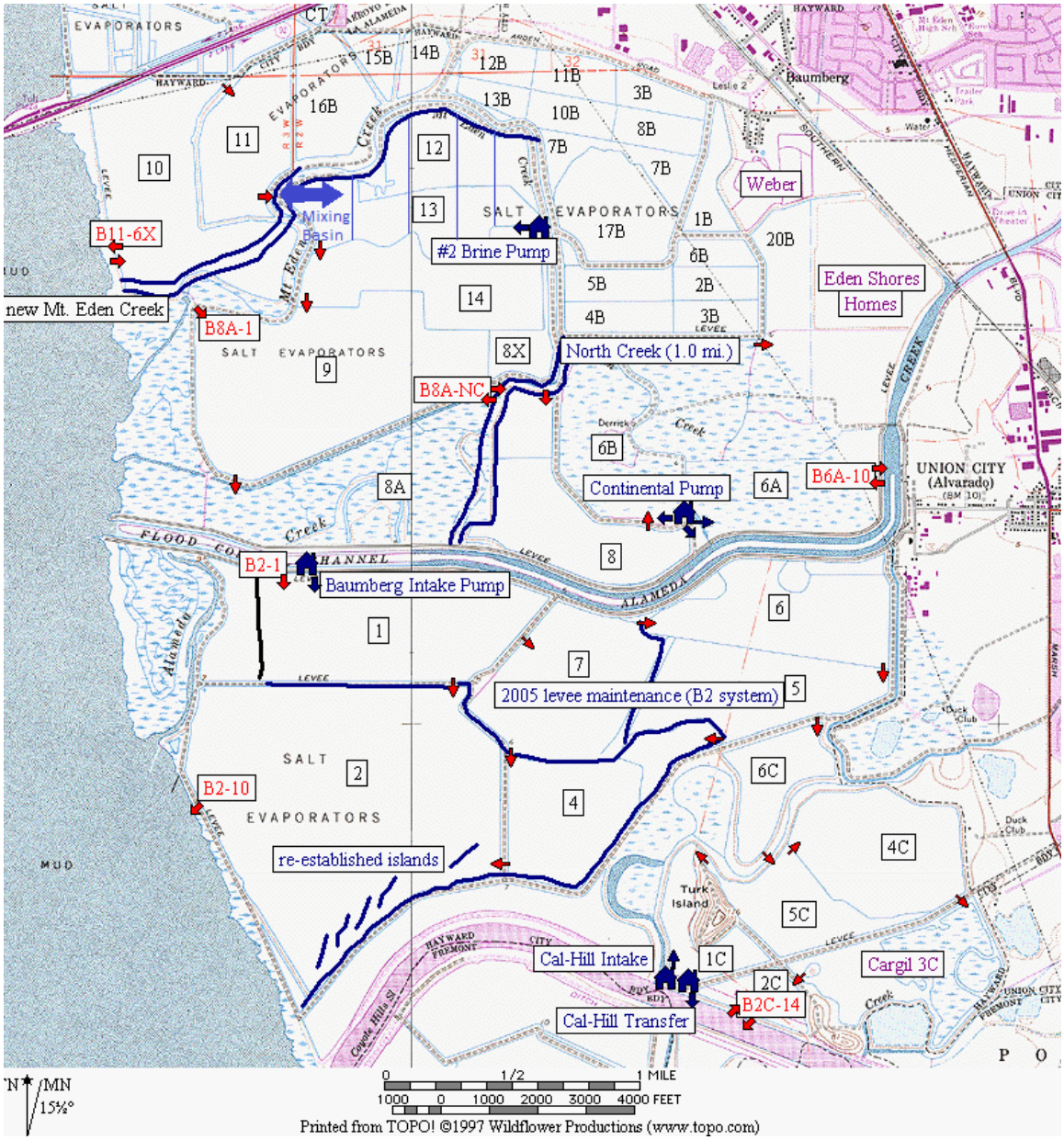

Figure 2. Eden Landing Ecological Reserve (Baumberg Complex) Ponds: Discharge and Intake Locations

Green text boxes note Intake and Discharge Locations, Red text boxes note other key pond operation and monitoring locations. ("B" nomenclature from water control structure names for ISP is replaced by "E" in most documents and field notes. SBSP Restoration Project naming convention uses "E" on ponds, WCS)

Water Quality Monitoring Results

Discharge and Receiving Waters

Results from the monitoring of pond waters at discharge locations are summarized below. During the 2017 water quality monitoring period, salinity was lower overall, while it appeared to follow the typical patterns and ranges as previously observed in previous wet

years. In 2017 pH, temperature and DO were not monitored directly, as previously approved by RWQCB in the Final Order. It is assumed that those parameters continued the typical patterns and ranges as in previous years, based on visual observed conditions. Pond discharges do not occur continuously. Pond discharge data should be reviewed with consideration of the variation in tide stage and cycles, and operational activities which may affect discharges.

Salinity data from 2017 were generally consistent with data collected during previous years in Systems E10, E12/E13, E8X-E14, E6A, E2, E2C, and E10. As 2017 was a relatively wet year, salinity was lower than on comparative calendar dates during the 2011-2016 drought. Salinity values in recent years under drought conditions were higher due to below average rainfall and periods of higher temperatures. In 2017, pond operations sustained more continuous circulation with higher discharge gate settings and associated discharge volumes.

System E6A was successfully managed as a modified seasonal pond system, with salinity and water levels managed for WSP nesting habitat and migratory shorebird foraging in spring through fall, with deeper, low salinity open water habitat in the winter. Modified seasonal operations are typified by large areas of dry pond bottom exposed, with areas of shallowly inundated pond, and deeper water levels in circulation areas, primarily within borrow ditches. Overall pond conditions within this system allowed for continuous circulation discharge operations below 44 ppt.

Reconfigured Ponds E12 & E13 were successfully managed as open water ponds with increasing salinity and nearly constant levels of shallow, open water for migratory shorebird foraging and roosting habitat across both ponds, with islands as nesting habitat and deeper water levels in borrow ditches. Overall pond conditions within this system allowed for continuous circulation discharge operations below 44 ppt.

Water temperature generally has consistent trends across wet and dry years. As determined from previous years' data analysis, dissolved oxygen data is difficult to interpret with respect to actions related to management, and is assumed to be more related to (in-situ) pond conditions and (external) climate trends. Similarly, pH is also variable and difficult to interpret in regards to the effects of management activities on observed levels. Therefore, pH, temperature and DO are not regularly monitored at ELER

The 2017 pond water monitoring results (grab samples) and field observations are large files and are not included in this SMR. Rather, this data is provided in electronic format. Please contact CDFW for requests to cite, distribute or utilize this information for purposes other than in the context of this report.

Table 1 lists the observed (grab sample) values for salinity at the discharge location on dates that changes were made to pond operations. Refer to the electronic pond management and field observations files for data on weekly monitoring and for other monitoring locations**.**

Pond Systems consistently provided good habitat conditions for numerous waterbird species, including migratory shorebirds and waterfowl, resident piscivores and waders.

Salinity

Pond salinities in 2017 were lower compared to the previous drought conditions, though within normal ranges of prior similar water years. For 2017, pond operations and management sustained higher volume discharges. Salinities were maintained below 44 ppt as recorded during on-going monitoring. Short term observations of elevated salinity were not noted. Normal salinity values were typically observed daily during tidal flux and as a result of pond operations. Refer to Table 1 for observed salinity values, water levels and pond management activities. Refer to detailed pond management electronic data files for overall pond conditions.

The salinities for all system ponds were observed to maintain low salinity discharge conditions in 2017. Eden Landing continues to function chiefly as low-salinity ponds, with some medium-salinity ponds, as discussed below. Reconfigured ponds E12 and E13 include a series of cells in each pond, with progressively higher salinities than the intake waters, and a mixing basin to maintain intake from and discharge to the Bay via Mt. Eden Creek. On a larger scale, Pond Systems in Eden Landing include some seasonal ("dry") or managed "batch" ponds. Differences in mean salinity between low salinity ponds and Bay waters are more apparent during neap tide periods. Higher salinity is observed during drought years. Review of data collected to date indicates that pond management and operations effectively maintain low salinity discharge in all pond systems, thereby meeting standards. Higher salinity pond water is sufficiently mixed at the discharge location to adequately protect receiving water quality objectives.

E2C:

System E2C is operated as a muted tidal pond, characterized by intake and discharge at the same location. Salinity varied depending on duration of intake periods resulting from spring and neap tide cycles and other environmental factors. During 2017, System E2C was managed with typical operations, as described below. Grab samples obtained during routine pond operations in April, 2017 showed near freshwater values, ranging from 2-3 ppt. In winter through early spring 2017, salinity values ranged from 0-28ppt. In previous years, salinity values in early spring ranged from 0-44ppt in 2016, 30-33ppt (2015), 30 to 35ppt (2014), 20 to 36ppt (2013), and 23 to 28ppt (2012).

Grab sample monitoring values during the monitoring season from May to October 2017 showed pond salinities from 18-41 ppt (25-50 ppt in 2016; 33-52 ppt in 2015; 34-48 ppt in 2014; 29-49 ppt in 2013, 30-47 ppt in 2012), with a few exceptions. Elevated salinity values are typically only observed during brief neap tide periods that could result in brief periods where circulation of higher salinity water occurs at a discharge location. Sufficient tidal mixing results in typical salinity ranges. Observed E2C salinity was below 44 ppt throughout the 2017 monitoring season. Best Management Practices (BMPs) for pond operations were not necessary or implemented in 2017.
In the summer of 2017, Pond E2C infrequently mixed with Pond E5C (and E4C and E1C). Higher, sustained gate settings maximized circulation at Pond E2C. The system

was operated under wet winter conditions (high rainfall) and easily maintained low salinity conditions well below 44ppt). Average salinity over the May to October monitoring season, with no elevated salinity periods, was 27 ppt (37 ppt in 2016; 40 ppt in 2015; 41 ppt in 2014; 46ppt in 2013; and 38 ppt in 2012).

E2:

System E2 is operated as a circulating system, rather than a primarily muted tidal system as is operated in all other pond systems except System E12 described below. However, System E2 is augmented by muted tidal intake at the E2-10 discharge location to the Bay. The system was operated as low salinity, continuous circulation ponds for the season, with muted tidal intake/discharge directly on the Bay, with primary inflow from E1. Discharge was maintained with one to two gates approximately 25% open. Observed salinity at the E2-10 discharge at the end of April, 2017 was approximately 18 ppt (31 ppt in 2016, 35 ppt in 2015, 38 ppt in 2014, 40 ppt in 2013, 37 ppt in 2012) and ranged from 18 to 40 ppt during the May-October operational season (26 to 44 ppt in 2016, 37 to 53 ppt in 2015, 35 to 55 ppt in 2014, 39 to 50 ppt in 2013, 29 to 46 ppt in 2012). Salinity for the majority of the 2017 season based on grab samples averaged 28 ppt (38 ppt in 2016, 46 ppt in 2015, 46 ppt in 2014, 40 ppt in 2013, 40 ppt in 2012) and was below 44 ppt throughout the season. In late May 2017, the E2-10 WCS discharge gates (two) were set at approximately 25% each and was sustained at that setting for the remainder of the summer. This operation appears to have resulted in lower overall salinity values in 2017 which were not above 44 ppt (due to greater intake and discharge volumes near the WCS), compared to previous years when only one gate was open 25% (with reduced intake/discharge volumes). In 2017, no adverse effects were observed. The BMP for temporary suspension of discharge was not implemented in 2017.

E10:

The E10 WCS was replaced in 2017, which only briefly affected normal summer operations. Discharge decreased per normal operations, and the pond maintained higher water levels (discharge gate normally set at 5-25% open).

System E10 was operated in 2017 as shallow open water for the summer, with intake and discharge at the same location (muted tidal operations) at the mouth of MEC. Pond E11 is operated as a seasonal pond and allowed to draw down and be mostly dry during the summer. E10 salinity in the May-October 2017 monitoring season averaged 31 ppt (32 ppt in 2016, 35 ppt in 2015, 40 ppt in 2014; 36 ppt in 2013) and ranged from 23-37 ppt (30-35 ppt in 2016, 32-40 ppt in 2015, 38-43 ppt in 2014; 31-43 ppt in 2013; 27-39 ppt in 2012). Before the monitoring season, salinity in E10 was approximately 7 ppt in March, and the pond was drained for construction to replace the Intake/Discharge WCS in May-early June, 2017 (Salinity in 2016 was 25 ppt, 32 ppt in 2015, 33 ppt in 2014, 31 ppt in 2013; 29ppt in 2012). Average salinity did not exceed 44 ppt in 2017 (0 days in 2016, 2015, 2014, 2013 and 2012) and the system had typical (low) salinity conditions throughout the season.

E9:
System E9 ponds, including E9, E8A and E8X, were restored to full tidal action in 2011. Seasonal ponds previously operated via pond E9, including E14, E13 and E12 were operated with intake from and discharge to Mt. Eden Creek via pond E12 as well as via the remaining managed pond E8X. Ponds E12 and E13 were reconfigured in 2013-2014 and were fully operational in 2017 and described below.

E12:
Major construction activities were completed in 2015 to reconfigure Ponds E12 and E13 as part of Phase One of the SBSPRP. System E12 was operated as shallow, open water in 2017 with intake and discharge via MEC, as part of full, reconfigured operations of Ponds E12 and E13. These ponds are managed with nearly constant water levels across three cells in each pond which provide progressively increasing salinities (not maintained in winter), terminating in a mixing basin to ensure low salinity discharge. Pond E8X may be operated as a supplemental intake forebay for Ponds E12 and E13 or a mixing basin for pond E14. Only brief, planned discharges occurred from Pond E12 in 2017, immediately followed in subsequent days to resume normal intake (only) operations. Brief E12 discharges "reset" water quality parameters by increased circulation. System E12 met expected salinity conditions throughout pond cells during the summer discharge monitoring season. Ponds E12 and E13 provided seasonal nesting, foraging and fledging habitat for WSP, primarily on graveled levees, berms and islands.

E13:
Grab sample salinity in E13 Mixing Basin was lower on more occasions in 2017 than 2015 and 2016. E13 Mixing Basin salinity during the May-October 2017 monitoring season averaged 28 ppt (41 ppt in 2016, 40 ppt in 2015) and ranged from 20-40 ppt (32-53 ppt in 2016, 32-50 ppt in 2015). Prior to the start of the 2017 monitoring season, salinity in the E13 Mixing Basin was approximately 16 ppt (32 ppt in 2016, 34 ppt in 2015). Grab sample salinity did not exceed 44 ppt in 2017 (eight days in 2016, two days in Sept. 2015). WSE fluctuate as a result of reduced intake and discharge operations implemented early in the season to protect WSP nests established on dry pond bottom areas during a neap tide period.

E14:
Pond E14 was operated as a seasonal pond in 2017 and allowed to draw down and mostly dry during the summer, with shallow water circulation in the borrow ditches via Pond E8X and tidal areas. The mostly dry pond bottom provided nesting, roosting and foraging habitat for the federally threatened species, western snowy plover (WSP), as well as other resident waterbirds. Nearly 100 WSP nests were monitored in 2017. Pond E14 provided very good habitat conditions for WSP nesting and fledging habitat, as well as foraging and roosting habitat for other shorebirds in 2017.

Weekly observed salinities were not above 44 ppt in 2017. Higher salinity values were noted in May, June and September 2015 (48-62 ppt) and in July 2014 (80 ppt).
Intake to and discharge from E14 occurs from pond E8X, a de-facto mixing basin for E14 when higher salinity conditions occur in E14. Limited inflow from the Pond E13 Mixing

Basin and outflow via Pond E8X occurred throughout most of the year. Supplemental intake/discharge operations for E14 via former pond E9 occurs also. Pond E9 was fully restored to full tidal action in 2011 and is the de-facto receiving water for E14, reaching the bay at the mouth of Mt. Eden Creek.

In March, 2017, salinity in E14 at the E9 discharge location was approximately 12 ppt (15ppt in 2016, 60 ppt in 2015). Low salinity values reflect high rainfall observed in winter. Intake was allowed from E9 in 2017, while discharge was regularly allowed to maintain adequate dry nesting areas and shallow foraging habitat for WSP. E14 salinity at the E9 discharge was only periodically monitored during 2017 because salinity was observed to be consistently well below 44 ppt at the E13-E14 WCS where water was sufficiently deep. At the E14-E8X location, salinity ranged from 16-35 ppt and averaged 28 ppt (at E9-E14 salinity ranged 23-42 ppt in 2016, 35-62 ppt in 2015, 28-43 ppt in 2014; and average salinity at E9-E14 was 34 ppt in 2016, 45 ppt in 2015, 42 ppt in 2014).

E8X:

Prior to the monitoring season, salinity in E8X at the discharge location was approximately 13 ppt in 2017 (25 ppt in 2016, 33 ppt in 2015, 32 ppt in 2014; 34 in 2013; 30 ppt in 2012). E8X salinity during the 2017 monitoring season ranged from 13-35 ppt (25-35 ppt inn 2016, 33-45 ppt in 2015; 36-44 ppt in 2014; 32-38 ppt in 2013; 30-42 ppt in 2012) and averaged 27 ppt (35 ppt in 2016; 39 ppt in 2015; 41 in 2014; 36 ppt in 2013; 35 ppt in 2012). E8X was operated as a seasonal pond in 2011 and prior. Weekly observed salinities were not above 44 ppt in 2017 (0 days in 2016, 2015; in August 2014, salinity was above 44 ppt on two dates (60 ppt and 45 ppt); observed salinity did not exceed 42ppt in 2013 or 2012). Active salinity management was limited, as typical pond operations maintained normal values. Pond E8X had typical low salinity conditions throughout the 2017 season. Pond E8X provided good habitat conditions for numerous waterbirds, including piscivores and wading birds in 2017.

E6A:

In 2017, System E6A continued operations as a modified seasonal pond system, with continuous circulation via muted tidal intake and discharge at the same location. Since 2012, System E6A ponds (E8, E6B, E6A) have been managed as modified seasonal ponds with a multi-season, multi-species management objective, providing deep water in winter for waterfowl roosting and foraging, and shallow water to partly dry pond bottoms in summer for shorebird foraging, roosting and nesting. Under modified seasonal operations, salinity is generally low in the borrow ditches that act as water conveyance for continuous circulation and discharge, while some interior areas of the ponds are a mosaic of dry bottom and shallow water areas which have moderate salinity conditions. Salinity is generally below 44 ppt near the discharges, and is less varied because the pond is operated at a low water surface elevation with ample mixing.

Grab samples from System E6A routine pond operations prior to May 2017 showed salinity values in pond E6A ranging from 6-21 ppt (15-18 ppt in 2016, 21-25 ppt in 2015; 24-38 ppt in 2014; 19-24 ppt in 2013; 24-26 ppt in 2012). In pond E6B, salinity was 6-25 ppt (20-29 ppt in 2016; 25 to 29 ppt in 2015; 26-34 ppt in 2014; 24-32 ppt in 2013; 26-30

ppt in 2012). In pond E8, salinity was 3-33 ppt (15-27 ppt in 2016; 26-32 ppt in 2015; 30-37 ppt in 2014; 24-36 ppt in 2013; 28-38 ppt in 2012). System E6A ponds maintained continuous circulation and discharge salinity was below 44 ppt in 2017 (below 44 ppt in 2016; above 44 ppt at E6A-10 in August, 2015, 47 ppt).

Salinity in 2017 in pond E6A at the discharge was not specifically monitored, as values at a WCS nearby were used and observed as noted above (In 2016, 31-33 ppt; 29-47 ppt in 2015; 28-41 ppt in 2014; 28-44 ppt in 2013; 25-43 ppt in 2012). Average salinity at the E6A-10 discharge in pond E6A was (32 ppt in 2016; 36 ppt in 2015; 41 ppt in 2014; 36 ppt in 2013; 32ppt in 2012).

In 2017, observed pond E6B salinity at the E6B-2 discharge was not above 44 ppt (0 days in 2016, 1 day in July 2015 (45ppt)). Observed salinity in E6B at the discharge ranged 7-35 ppt (24-42 ppt in 2016; 32-45 ppt in 2015; 32-43 ppt in 2014; 32 to 43 ppt in 2013; 25-38 ppt in 2012). Average salinity at the discharge in pond E6B was 27 ppt (35 ppt in 2016; 38 ppt in 2015; 39 ppt in 2014; 38 ppt in 2013; 37 ppt in 2012).

In 2017, observed pond E8 salinity was not above 44 ppt at the discharge (0 days in 2016; 2 days in May 2015 (57 ppt), September 2015 (47 ppt); none in 2014; two days in August and September 2013). Observed salinity in 2017 in pond E8 at the discharge ranged 16-32 (33-40 ppt in 2016; 32-41 ppt in 2015; 35-39 ppt in 2014; 35 to 37 ppt in 2013; 30 to 44 ppt in 2012). Average salinity in 2017 at the discharge in pond E8 was 25 ppt (37 ppt in 2016; 41 ppt in 2015; 38 ppt in 2014; 36 ppt in 2013; 37 ppt in 2012).

pH

For 2017, no Datasondes were utilized to collect instantaneous or continuous pH values.

Temperature

For 2017, no data were collected for instantaneous or continuous temperature values.

Dissolved Oxygen (DO)

Continuous monitoring of dissolved oxygen (DO) was not conducted in 2017. Two years (2014-15) of continuous data were collected per the Final Order in reconfigured Ponds E12 and E13 as part of SBSPRP Phase One actions. In general, managed ponds appear to meet water quality objectives (WQO) of the Basin Plan, with periodic, short duration periods below those standards.

DO values are known to be highly variable, with a diurnal pattern observed in all years. Regular DO monitoring is no longer conducted as previously approved in revisions to the Final Order. Patterns or periods of low or sustained depressed DO in previous years indicate that achieving compliance with the Final Order continues to be problematic.

In 2017, it is assumed that there were periods of low DO conditions, as were previously observed in managed ponds, including reconfigured ponds E12 and E13. In 2017, large algal blooms were not generally noted to persist nor perceived as more prevalent than in previous years.

Effectiveness of Dissolved Oxygen Best Management Practices (BMPs) for Pond Management

It is recognized by RWQCB that a well-operated lagoon/pond system may not necessarily continuously meet an instantaneous DO limitation of 5.0 mg/L as specified in the Basin Plan and Final Order. It is also understood that a stringent interpretation of this limit is not necessary to protect water quality, based on review of previous continuous monitoring data and other studies. These data and studies include site-specific standards and monitoring in the Everglades and Virginian Province (Cape Cod, MA to Cape Hatteras, NC), as well as San Francisco Bay studies and data collected by USGS in Newark Slough in 2005, 2006 and 2007. Monitoring programs have regularly recorded DO levels lower than 5.0 mg/l in estuaries under natural conditions, thus the phenomenon is not necessarily associated with pond discharges.

Operational strategies (BMPs) were implemented as needed and described below and in the enclosed Pond (system) Operations Plans. CDFW uses BMPs such as the temporary closure of discharge gates during periods when salinity values are at or above 44 ppt, when pond DO may be below 5.0 mg/L standard values. Weekly discharge timing to set pond discharges at greater volumes may occur during spring tide periods to maximize intake, discharge and mixing.
Based on previous years' data, it appears that ceasing discharge for prolonged periods may further degrade water quality. Reducing residence time of water in the ponds appears to improve overall DO levels; therefore, maintaining discharge, particularly at higher sustained volumes, provides for increased circulation and mixing. Muted tidal intake/discharge provides for the greatest circulation and mixing and is generally implemented in all ponds. It is presumed that DO levels in these ponds were similar to ambient conditions in sloughs and the Bay, notably during neap tides, when tidal ranges are more limited.

Refer to Table 1 for a full summary of discharge events and gate settings in 2017.

Compliance Evaluation Summary

Data collected in 2017 were comparable to values from previous years. Monitoring indicates that reconfigured ponds E12 and E13, which were intensively managed, did not significantly improve water quality overall, as compared to typical pond management and water quality in other systems in ELER.

Maintaining dissolved oxygen levels in the ponds within water quality objectives and Final Order requirements is expected to continue to be the most notable management challenge for operation of the ponds. The BMPs developed and implemented as corrective actions as part of the Initial Stewardship Plan and subsequent SBSPRP Phase One actions have maintained, but not improved, water quality parameters including salinity and dissolved oxygen levels in the ponds. It appears that little immediate change within ponds can be affected since high residence times are intrinsic to the nature of open-water managed ponds. Improved DO may be the result of a combination of factors,

both biotic and abiotic, as well as management actions, that are the driving factors in DO dynamics. Based on the observations recorded during pond management and operations, CDFW will continue to determine which operations, management and monitoring activities adequately protect water quality and best achieve Final Order compliance.

Infrastructure improvements, such as major changes in pond management/operations, topography or geometry, do not appear viable as a means of improving compliance with water quality objectives. Intensively managed, reconfigured ponds implemented as part of SBSPRP Phase One actions do not appear to provide the expected improvement in water quality. Pond management is expected to continue to be informed by on-going operations and any future applied studies implemented as part of SBSPRP Phase Two or other directed actions.
In 2017, discharge gates were generally set to allow greater discharge volumes, similar to 2016, to decrease residence time and improve mixing. Lower volume discharges were more regularly implemented for short periods in the four previous years during drought conditions. More continuous operational periods, rather than intermittent operations changes appear to help raise water quality values with respect to salinity, and may be affective for other water quality parameters as well.

Data Collection, Evaluation and Communication

In 2017, salinity grab samples and water depth was regularly recorded and used along with general habitat quality and bird use observations. This monitoring continued to be sufficient to manage ponds in accordance with the Final Order. Continuous data recorders were not used in 2017. CDFW provided detailed operations and monitoring data to the RWQCB staff electronically, and data are summarized within this report. Pond management, operations and monitoring was conducted as often as possible by CDFW, given staff limitations. One CDFW biologist conducted pond operations, management, monitoring, review, and interpretation of data. Despite on-going challenges, CDFW has successfully managed the pond systems to comply with regulatory standards and continues to provide high-quality waterbird habitat conditions on and around ELER.

Final Order requirements regarding communication of compliance to the RWQCB were completed by email, including transmittal of all Excel data on pond management and operations. We expect that continued collaboration between CDFW and RWQCB staff will be useful for on-going pond management and Final Order revisions and compliance.

Summary and Requests for Revisions to SMP:

SBSPRP Phase One actions were completed in 2016 at ELER. Full tidal action was restored to 630-acres of former ponds E9, E8A and E8X in 2011. Tidal salt marsh vegetation in ponds E9, E8A and E8X continues to develop at the expected rate. Ponds E12 and E13 were reconfigured to create an intake reservoir, six cells (each in a series of three) and a mixing basin within 230 acres of high quality shallow water foraging and roosting areas of increasing salinity with 6 constructed nesting islands. The first full year of operations occurred in 2015. ELER continues to support healthy populations of fish

and wildlife, special-status species, migratory waterfowl, shorebirds, and anadromous and resident fishes.

The SBSPRP also provided recreation/public access features and CDFW continues to conduct maintenance for the existing level of "de-facto" flood risk management. Pond management and operations in all ELER pond systems continued to provide high-quality waterbird habitat. 2017 monitoring activities continue to inform restoration actions and help plan future pond enhancement actions.

Operations and Maintenance activities in 2017 adequately addressed the requirements set forth in the Final Order. Planning for SBSPRP Phase Two actions continues with the intent of maintaining water quality and habitat conditions on ELER and using the information developed in this and previous reports to inform restoration alternative decisions. CDFW and SBSPRP partners expect to release the Draft Environmental Impact Report/Study for Phase 2 restoration actions in 2018.

CDFW requests revisions to the Final Order as noted below.

Table 3 "Water Quality Monitoring For Eden Landing Ponds" should be revised to require only type "A" monitoring activities for CDFW pond operations. Type "B" and "C" monitoring are not necessary because discharge at greater than 25% of WCS capacity in pond E2C is not typically sustained.

Sustained, higher-volume discharges and corresponding reduced residence time of pond water has been shown to improve overall DO levels; therefore, allowing discharges at greater than 25% of WCS capacity provides for increased circulation and mixing. This is particularly important in System E6A, which requires lower water surface elevations in order to maintain WSP nesting habitat. System E2 pond discharge may be regularly sustained above 25% because pond E2 discharges directly to the Bay (at E2-10). Maintaining low salinity in continuous circulation operations within borrow ditches is also important in order to meet the objective of providing for multi-season, multi-species management of the ponds, including winter operations for diving duck management.

Based on monitoring activities associated with the reconfigured Ponds E12 and E13, it appears that use of a mixing basin for discharge may improve water quality of the discharge of managed ponds, or at least improve compliance with water quality objectives. CDFW will not collect continuous monitoring data in 2018. We will continue to collect regular grab samples as part of normal operations.

ATTACHMENT:

2018 Pond Operations Plans