2014 Self-Monitoring Report
Baumberg Complex - Hayward, California
Eden Landing Ecological Reserve

Order Number: R2-2008-0078

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Table of Contents

Introduction

This annual self-monitoring report summarizes the pond operations, management and monitoring conducted by the Department of Fish and Wildlife (Department) from May through October 2014 at the former Baumberg Complex salt ponds, also known as the Eden Landing Ecological Reserve (ELER), in Hayward, California. Monitoring is conducted for typical operations as required by the Regional Water Quality Control Board (RWQCB) in 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. The U.S. Fish and Wildlife Service (USFWS) submits a report for the Alviso Ponds separately.

ELER pond systems operated by the Department in 2014 are fully described in the attached Operations Plans. Current pond operations are modified from the Initial Stewardship Plan (ISP) and reflect implementation of the adaptive management strategies developed from the South Bay Salt Pond Restoration Project (SBSPRP) in Ponds E9, E8A and E8X (full tidal restoration) and E10, E12, E13 and E14 (reconfigured/managed ponds), as well as modified pond operations in System E6A (Ponds E8, E6B and E6A).

Data was collected by Department staff in accordance with the Final Order requirements. Water quality monitoring was performed in 2014 using grab samples only. Continuous data recorder use was not required and receiving water monitoring was not conducted because observed water levels and salinity values from grab samples had values within ranges specified in Water Quality Objectives and adequately protected receiving waters. Pond operations and management activities were conducted to meet objectives of the managed ponds as described in the Final Order and the Department's Operations Plans for each system.

Data was collected at the locations described in 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 larger SBSPRP.

The ponds are generally being operated as "muted tidal" systems with intake and discharge at the same location, augmenting flow-through systems described in the ISP. Pond operations are fully described in the updated 2015 Operations Plans. In general, bay water enters ponds directly from San Francisco Bay (Bay) on high tides or through hydrologically linked sloughs ; flowing to one or more ponds; discharging 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 of Bay/slough water 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 estimated from interpreting continuous in-pond data from previous years.

The Final Order established discharge from the ponds with maximum salinity levels below 44 parts per thousand (ppt). In 2014, operation of all systems was monitored and

discharge was generally below 40ppt, except as noted below. Other water quality parameters were not regularly sampled. In ponds not affected by construction and operated as open water or seasonal (dry) as typical, 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, including Best Management Practice (BMP) implementation. Pond operations were similar to previous years, except in System E12 ponds where major construction occurred, as discussed later. 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 in functional slough and lagoon environments of the South San Francisco Bay. Correspondingly, low DO water (of Bay origin) has been observed at pond intake locations. Regular DO monitoring was not required nor conducted in 2014. Additional analysis and interpretation of monitoring data is not expected to be completed nor submitted for 2014.

2014 Annual Summary

The calendar year 2014 was another drought year and the warmest year in recorded history for many areas of California, including Hayward and the Bay Area. Similarly, 2013 was the driest year on record, with drought conditions persisting since 2011. The effect of low and episodic rainfall on pond operations was notable, with higher salinity values year-round, particularly during the summer months. The result of low rainfall is apparent in terms of less direct input into ponds, thereby maintaining higher salinity than expected. Similarly, low rainfall results in higher salinity in San Francisco Bay and sloughs, with higher sustained intake salinity. Therefore, in-pond salinity averages were elevated and sustained, and periodically spiked, particularly during neap tide periods.

Major construction activities continued to implement Phase One of the South Bay Salt Ponds Restoration Project (SBSPRP). In 2014, continuous circulation operations 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. Water quality monitoring in 2014 did not include continuous discharge monitoring and no applied studies were conducted.

In 2014, capital improvement activities included commencement of the final actions to reconfigure Ponds E12 and E13, including construction of a new water control structure (WCS), a new pump station, a new boat launch for management and monitoring purposes, and new public access improvements such as a boardwalk into managed pond E13 and a kayak launch into Mt. Eden Creek. Pond operations in 2014 included

successful, limited "test" operations in reconfigured Ponds E12 and E13 and modified seasonal operations for Ponds E6A, E6B and E8. Ponds E12 and E13 will be fully reconfigured in 2015 as part of completion of the SBSPRP Phase One actions. Ponds E12 and E13 will be operated year round as an intensively managed series of pond "cells" to provide salinity gradients in shallow, shorebird habitat. We expect to obtain information regarding the management of reconfigured ponds from an on-going study by USGS that will characterize water quality, depth and habitat use that will be applied to future SBSPRP actions. Major new WCS's include a 10,000 Gallon Per Minute (GPM) intake pump and a WCS with five 36-inch culverts with gates and weirs in a mixing basin which will be fully operational in 2015. The reconfigured Ponds E12 and E13 will have the first full operation year in 2015. Habitat enhancements were also completed in Pond E14 by placement of approximately 50-acres of oyster shells within two plots, as a nesting and fledging habitat improvement. In order to minimize sedimentation within the shell plots, E14 is operated with shallow water in winter and summer operations maintain water mainly within the borrow ditches.

For the 2014 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 2014 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. It is expected that there may have been brief periods of low DO within ponds in 2014, although no DO or continuous data was collected. In previous years with continuous monitoring data collected by instruments deployed in ponds (2004-09), low DO levels were observed in a number of the South Bay Salt Ponds (SBSP), including ELER ponds, notably in the late-summer/early-fall when temperatures, winds and evaporation were highest. High wind and ambient temperature result in greater evaporation are of greatest concern during neap tide cycles, when circulation is reduced. Review and analysis of data from previous years indicated there appears to be some correlation with abiotic factors, such as spring and neap tide periods, weather conditions, and seasonal variation. It is likely that biotic factors affect DO levels, such as consumption of DO by pond invertebrates or larger animals, including fish, and algal growth, respiration and decomposition. Observations made in 2014 included typical amounts of macroalgae found in the water column and living and necrotic algal mats that may be observed within the ponds.

Pond operations were similar in 2014 to previous years in systems that were operated "normally" (as compared to modified operations associated with construction activities, or for multi-season, multi-species objectives begun in 2012 in System E6A). For example, in System E2, pond discharge from one-48-inch gate in Pond E2 to the Bay was set at approximately 25% open during the May-October monitoring season. System E2C

intake and discharge was periodically minimized to maintain water levels during neap tide periods and/or during high ambient temperatures. Temporary suspension of discharge operations was only occasionally conducted in 2014, in cases where brief periods of elevated salinity were observed at the discharge.

In 2014, for the first time since the Baumberg Complex ownership and operation by the Department, we worked with Cargill Salt in the winter to transfer moderate salinity (concentrated) brines to active Cargill Salt solar salt operations. Cargill continues to operate salt production ponds south of Alameda Creek Flood Control Channel, in the Mowry Pond and other Complexes, which are USFWS Refuge ponds managed by Cargill. Cargill transferred approximately 500 acre-feet of System E2C pond water via the existing siphon under ACFCC by a temporary pump operations managed by Cargill. This operation was suggested by the Department to help manage higher salinity pond conditions due to the on-going drought. Similarly, Cargill agreed it would benefit their production operations and conducted the activities in the winter months (February-March). Such operations are not likely to regularly occur. Rather, the transfer of brines was intended to reduce salinity and water level in System E2C because the warm, dry winter resulted in undesirable conditions in System E2C that would have posed constraints on E2C pond operations at the start of the summer monitoring season. The system was "reset" when intake/discharge operations resumed. Nonetheless, active salinity management of System E2C continued to be required in 2014, though it is likely that had the brine transfer not been done, salinity management would have been more challenging. Brine transfer operations may be considered similar to a BMP used in previous years, wherein the Department's pond operations included transferring pond water to the seasonal ponds E5C (and E4C and E1C) during the summer.

System E6A ponds (E8, E6B, E6A) were managed in winter for waterfowl and shorebird roosting, while in summer, the ponds are operated more like seasonal ponds, albeit with higher intake and discharge volumes. In the winter, System 6A ponds were managed for waterfowl, specifically for diving ducks. In the summer, System 6A ponds were managed for western snowy plover (WSP), stilt and avocet breeding by draw down 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 the 2014monitoring season, discharge operations were conducted. In previous years, the ponds were primarily seasonally dry, with minimal intake to maintain foraging habitat. Beginning in 2012, System 6A ponds began modified operations, with increased intake and discharge volumes via Old Alameda Creek (Pond E6A) and North Creek (Pond E6B and E8). Pond management was primarily focused on providing WSP nesting and foraging habitat as well as shorebird foraging and roosting areas, while maintaining low salinities within the primary circulation patterns within borrow ditches. During 2014, 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 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. Seasonal (dry) ponds were managed to facilitate nesting substrate and foraging habitat, in particular for WSP. Since 2009, the Department has determined optimum pond operations such that discharge settings were less frequently adjusted and sustained discharge operations improved water quality, particularly salinity. Current or anticipated weather and predicted tidal conditions are also considered, since those factors affect intrinsic pond dynamics. Frequent adjustment of intake and discharge gates does not appear warranted as part of regular operations. Reduced pond discharge volume is infrequently used to meet water quality objectives (WQO's) as part of salinity management, since this ultimately increases residence time. More consistent, moderate volume discharges improved (lowered) recorded salinity and may improve overall water quality based on observed in-pond conditions. During summer operations, water levels in the ponds are maintained throughout the season primarily by adjusting discharge gates, depending on tide cycles, weather, habitat targets and species use. Management activity for the systems was typical for summer operations.

For all pond system operations, adjustment to intake, discharge and pond-to-pond culvert gates for continuous circulation were similar in 2014 to recent years. A summary of discharge events is shown on Table 1.

System E2C:

Pond E2C was operated in 2014 similar to previous years. A continuous monitoring device was not utilized or required. Management of this system was performed as described in the Operations Plan and was informed by grab samples collected on an approximately weekly basis to monitor salinity, and water levels from staff gauges as well as waterbird use was recorded to inform operations. This system presumably had periods of low DO levels, as observed during continuous discharge monitoring in 2005-09, but continued to provide good habitat conditions for numerous waterbirds. Discharge was at or below 25% of capacity; therefore, no receiving water monitoring was required, as reflected in the Final Order.

For 2014, System E2C operations continued to use previously developed BMP's, such as weekly discharge timing and flow and transfer of concentrated water (brines) into adjacent ponds (E5C, E4C E1C and Cargill Pond 3C, via E2C). Prior to the summer monitoring season, System E2C brines were transferred from ELER via a temporary pump and existing siphon to on-going solar salt production ponds managed by Cargill south of Alameda Creek Flood Control Channel. This helped in management of target salinities and water levels within the system at the start of the summer monitoring season.

System E2:

Pond E2 operations in 2014 were similar to previous years. In the summer, intake to E1 is circulated to discharge from E2. There is also limited flow from E1 to E7 to E6 to E5 to E4 and finally E2. Refer to Table 1: Summary of Intake/Discharge Activities for pond operations information during this period. A continuous water quality monitoring device was not used, and management of System E2 was informed by grab samples collected on approximately a weekly basis as noted previously for System E2C and as described in the Operations Plan. It is assumed that during 2014 this system had periods of low DO levels, as observed in 2005-09, however habitat conditions continued to be sufficient to support substantial waterbird use. No abnormal conditions were observed and no receiving water monitoring was required. Discharge directly to the Bay from Pond E2 was maintained at 25% of capacity of one 48-inch gate for much of the year. The system was operated with primary flow entering the system through Pond E1 from Old Alameda Creek. Muted tidal intake from the Bay into E2 also provided supplemental intake to this system. Managed "batch" ponds, which entails maintaining water levels by providing "make up" water (for that lost to evaporation), allowed salinity to increase to as high as 120-parts per thousand (ppt) in batch ponds (E6, E5). Batch ponds are recirculated in winter to maintain low salinity in the spring. the summer season. E6C was managed as a seasonal pond and allowed to mostly dry. System E2 discharge operations via E2 during the winter successfully recirculated higher salinity conditions in "batch" and seasonal ponds (E5, E6 and E6C).

System E10:

Typical operations were conducted in 2014 in System E10 ponds and Pond E10 was operated as a circulation pond during the monitoring season. Pond E11 was operated as a seasonal pond, as described in the Operations Plan. Pond E10 is operated as a continuous circulation, low salinity pond, and pond E11 is operated as a seasonal pond. Pond E10 provides year round open water as suitable habitat for waterfowl in winter and in summer for piscivorous waterbirds such as terns, cormorants, and egrets, as well as wading birds, including avocets and stilts. E11 is shallowly flooded to provide foraging and roosting habitat for migratory waterbirds during the spring and fall. Pond E10 has intake from and discharge into the Bay at the mouth of Mount Eden Creek (MEC) and E11 has intake and discharge from MEC and periodic flow from Pond E10. Continuous monitoring devices (Datasondes) were not utilized nor did they appear necessary based on monitoring in Pond E10 during May-October and receiving water sampling was not required.

System E6A:

In 2014, System E6A ponds (E8, E6B, E6A) were managed with continuous circulation in winter for diving waterfowl as deep water roosting and foraging. During spring migration the ponds were drawn down while maintaining continuous circulation for shorebird roosting and foraging. In summer the ponds were further drawn down for shorebird nesting as partially dry/exposed bottom under continuous circuation. In summer, System E6A management targets WSP nesting. In the winter, System 6A ponds

were managed with deeper water levels to target foraging and roosting habitat for diving ducks. Prior to 2011, System E6A was operated as a seasonal pond, with minimal intake and discharge in summer, and allowed to dry by evaporation. Dry pond bottoms were used by WSP for nesting and salinities were typically high in shallow water and borrow ditches. The dry summer conditions resulted in the loss of most, if not all, invertebrates that tolerate only low salinity conditions, although a suite of invertebrates with a tolerance for high salinity conditions was able to persist. While low salinity conditions were restored in winter with resumed intake and discharge operations, invertebrate communities were distinctly different than in year-round, open water, low salinity ponds where continuous circulation operations occur. Therefore, (unmanaged) seasonal ponds would have complete turnover of invertebrate communities between seasons.

In an effort to maintain more suitable habitat for diving waterfowl in winter, while maintaining sufficient suitable nesting habitat for WSP in summer, pond management objectives were modified. Under this modified, seasonal pond operation, 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.

In summer 2014, discharge operations and monitoring were conducted in System E6A ponds to promote WSP nesting objectives. Monitoring showed consistent use by WSP and successful nesting by WSP as well as continued breeding, foraging and roosting by other shorebirds. System E6A ponds were drawn down and maintained as partly flooded, low salinity circulation ponds with intake and discharge operations via Old Alameda Creek (Pond E6A) and North Creek (Ponds E6B and E8). Modified seasonal 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 2014.

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. The remaining actively managed ponds in this system are described in System E12, below.

System E12:
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 and former pond E9 (tidally restored), and Pond E8X was operated with intake from and discharge to North Creek via the portion of pond E8X restored to full tidal action in 2011. Construction continued in 2014 in Ponds E12 and E13, which are expected to be fully operational in 2015 for intensive, reconfigured pond management as part of the SBSPRP Phase 1 Actions. In the winter of 2013-14, System E12 ponds were managed to promote foraging and roosting habitat for shorebirds and dabbling ducks. Diving ducks also use the deeper portions of these ponds, such as borrow ditches, but to a lesser extent than dabbling ducks and shorebirds which utilize the majority of the pond, depending on water

levels and conditions. Pond management in summer was primarily focused on conducting "test" operations of the reconfigured E12-E13 "salinity experiment" which provided a series of shallow, open water cells of progressively increasing salinity. Significant use of the cells by small and medium shorebirds 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. E12, E13 and E14 operations maintained low salinity discharge conditions, as well as to moderate salinity conditions (40 to 120ppt) in the ponds.

In 2014, intake/discharge operations and monitoring were conducted in the summer in System E12 ponds. Pond E8X was operated as a forebay for intake and discharge operations in ponds E12 and E14. Pond E12 was operated with primary intake and discharge via Mt. Eden Creek using the new WCS (2x48") constructed in 2011. System E12 was operated to determine what water level and salinity levels may be expected in the system. Pond E12 and E13 will be fully operational as reconfigured in 2015, to be year-round shorebird foraging and roosting habitat with a salinity gradient. System E12 ponds operated with continuous intake and discharge operations for much of the year. E14 and E8X were generally operated as mixing basins for Ponds E12 and E13 to ensure discharge to tidal areas occurred within parameters of continuous circulation in Mt. Eden Creek and North Creek. Pond E14 was operated similarly to other seasonal ponds in ELER, with limited intake from tidal areas, as needed to support WSP nesting under continuous circulation. Ponds E12 and E13 discharged to pond E14 and subsequently into tidal areas via E9 and E8X. Ponds E12 and E13 were drawn down via the E12 intake WCS and pond bottoms were allowed to dry in late summer through early fall to allow construction of islands to be completed. In winter 2014, the ponds were refilled to resume full operations in 2015. This system provided good habitat conditions for waterbirds, including shorebirds, particularly WSP, as well as waterfowl throughout 2014.

Table 1: Summary of Intake/Discharge Activities

Complete datasets and field notes for pond operations/conditions and management activities were 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 some figures, nomenclature for ponds "B" & "E" are interchangeable (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
2C	E2c-14	4/29/2014	32	3.4	1x48" Disch. at 25%, summer ops.
2C	E2c-14	5/6/2014	48	1.0	Reduced 1x48" Disch. to 5%, water level too low, reflood, neap tide
2C	E2c-14	5/14/2014	34	3.3	Increased 1x48" Disch. to 20% for spring tides, max circulation
2C	E2c-14	5/23/2014	48	3.0	Closed 1x48" Disch. Neap tides, salinity mgmt.
2C	E2C-14	5/27/2014	35	3.55	Opened 1x48" Disch. to 25%, max circ.for salinity mgmt.in spring tides
2C	E2c-14	6/2/2014	44	below	Reduced 1x48" Disch.to 5%, low water levels, salinity mgmt. in neap tides
2C	E2c-14	6/3/2014	36	3.05	Opened 1x48" Disch. to 10%, salinity mgmt. cont. Neap tide
2C	E2c-14	6/6/2014	43	below	Reduced 1x48" Disch. to 5% to increase water level, cont. salinity mgmt.
2C	E2c-14	6/12/2014	35	3.45	Increased 1x48" Disch. to 20% for salinity mgmt. Spring tide
2C	E2c-14	7/2/2014	47	1.8	Reduced 1x48" Disch to 5%, reflood and salinity mgmt.
2C	E2c-14	7/10/2014	36	3.45	Increased 1x48" Disch. to 25% for salinity mgmt, spring tides
2C	E2c-14	8/4/2014	55	0.6	Reduced 1x48" Disch. to 5%. Reflood for salinity mgmt, neap tides
2C	E2c-14	8/12/2014	38	3.6	Increased 1x48" Disch. to 25%, salinity mgmt. Spring tide
2C	E2c-14	8/18/2014	48	3.2	Reduced 1x48" Disch. to 5%. Reflood for salinity mgmt, neap tides
2C	E2c-14	8/26/2014	39	3.2	Increased 1x48" Disch. to 10%. Cont. salinity mgmt. Neap tide
2C	E2c-14	9/2/2014	47	3.2	Reduced 1x48" Disch. to 5%, salinity mgmt. Neap tide
2C	E2c-14	9/5/14	38	3. 5	Opened 1x48" Disch. to 10%, cont salinity mgmt. Neap tide.
2C	E2c-14	10/16/14	47	3.7	Reduced 1x48" Disch. to 5%, cont salinity mgmt. Neap tide.

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
2C	E2c-14	10/23/14	39	4.0	1x48" Disch. 5% cont. Spring tide. Transition to Winter Ops.
2	E2-10	3/18/14	37	3.35	2x48" Discharges 25%. Transition from winter ops, Closed 1x48" Disch. 1x48" Disch. at 25% cont.
2	E2-10	5/23/14	44	3.35	1x48" Disch. 25% continued, summer ops
2	E2-10	6/6/14	55	3.25	Closed 1x48" Disch. in neap tides
2	E2-10	6/12/14	38	3.45	Opened 1x48" Disch. 20%, Resume salinity mgmt, spring tides.
2	E2-10	6/18/14	45	3.55	Opened 2x48" Disch. to 25%; Cont. salinity mgmt.
2	E2-10	6/24/14	52	3.2	Reduced to 1x48" Disch. 25% for neap tide salinity mgmt.
2	E2-10	8/28/14	50	3.65	Closed 1x48" Disch. for neap tides
2	E2-10	9/9/14	50	4.0	Opened 1x48" Disch. 10%, Resume salinity mgmt, spring tides.
2	E2-10	12/9/14	40	4.5	Opened 1x48" Disch. to 25%, Winter ops
10	E11-1	3/21/14	34	3.7	1x48" Disch. at 5%, winter ops.
10	E11-1	5/6/14	38	3.6	1x48" Disch. at 10%, summer ops.
10	E11-1	6/3/14	41	3.75	Increased 1x48" to 20%, salinity mgmt. Cont. summer ops
10	E11-1	10/16/14	43	3.8	1x48" Disch. 20%, transition to winter ops
10	E11-1	11/4/14	37	3.65	Reduced 1x48" Disch. to 5%, winter ops
8X	E8X- Tidal Discharge	3/27/14	26	*4.80	Continued Circ. Ops 1x48" Intake Open to 25%, 1x48" Disch. to 75%.
8X	E8X- Tidal Discharge	6/16/14	43	*4.05	Reduced 1x48" Disch.to 50%, increased 1x48" Intake to 50%; E14 SNPL ops
8X	E8X- Tidal Discharge	7/2/14	40	*4.0	Increased Intake to 75%,1x48" Disch. 50% cont; E14 & SNPL ops
8X	E8X- Tidal Discharge	7/3/14	44	*4.0	Reduced 1x48" Disch. to 20%, 1x48" Intake 75% cont; Salinity Mgmt.
8X	E8X- Tidal Discharge	7/8/14	38	*5.1	Increased 1x48" Disch. to 50%. Reduce WSE, max circ.
8X	E8X- Tidal Discharge	8/4/14	60	3.35	Reduced 1x48" Disch. to 15%, Intake 75% cont, neap salinity mgmt.
8X	E8X- Tidal Discharge	8/7/14	38	*5.4	Intaking. 41ppt @ E8X-14. Increase 1x48" Disch. to 25%, Intake 75% cont, neap tide salinity mgmt. cont.
8X	E8X- Tidal	8/15/14	38	*5.6	Increase 1x48" Intake to 100%,

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
	Discharge				Disch. 25% cont, salinity mgmt.
8X	E8X- Tidal Discharge	10/3/14	38	*5.3	Reduced 1x48" Intake to 50%, Increased Disch.to 35%.
14	E14-E9 new WCS	4/11/14	28	*5.05	1x48" Discharge 25%, Intake 25**%**, Circ.ops/SNPL ops cont.
14	E14-E9 new WCS	7/11/14	38	*5.3	1x48" E9 Intake gate 10%, maint. E14 WSE, E14-E8X = *5.1'.
14	E14-E9 new WCS	11/4/14	38	*5.75	1x48" Intake to 25%, Disch. 50%. E14 intake/discharge at E9. T'sition to low WSE (shallow) Winter Ops.
12	E12-1	1/2/2014	34	below	Opened 2x48" Intakes 100%, Closed 2x48" Disch. gates. Resume E12-13 circulation ops
12	E12-1	8/26/14	42	*6.6	Opened 2x48" Disch. to 25%. Begin Reverse flow, draw down ops for island construction. E12-RES-6.6-(40ppt)<->1x18" gate 20%<->E12-Lo-6.3-(44ppt)<->E12-DC-6.35')<->E12-Med-6.3-(60ppt<**-**>E12Hi-6.1-(80ppt)->E13MB-5.9-(94ppt).-E12-DC-5.9
12	E12-1	9/2/14	45	Below staff (<*4.0')	Red.2x48" Disch. to 5%. Neap tide salinity mgmt.(Cont.draw down ops. 2x18" gates opened 100%<**-**E12-Lo-5.5-(58ppt)<-(E12-DC-5.8')<-E12 Med-5.95-(68ppt)<**-**E12Hi 5.95 (96ppt) <-E12-DC-5.8-->E13MB-5.85-(110ppt).
12	E12-1	9/4/14	38	*6.0	Increased 1x48" Disch. to 25%, salinity mgmt.Cont.draw down ops; E12-RES-6.0-(45ppt)-2x18" gates opened 100%<**-**E12-Lo-6.0-(58ppt)-(E12-DC-5.8')<-E12-Med-5.95-(68ppt)**-**E12Hi-5.85-(100ppt)->E12-DC-5.8-->E13MB-5.45-(110ppt).
12	E12-1	9/5/14	38	*5.9	Increased to 2x48" Disch. to 25%. Salinity mgmt/draw down ops. E12-RES-5.9<-(44ppt)-2x18" gates open 100%<**-**E12-Lo-6.0-(44ppt)(E12-DC-5.8')<-E12-Med-6.0-(76ppt)->E12Hi-5.9-(100ppt)->E12-DC-5.8->E13MB 5.45-(110ppt).
12	E12-1	9/9/14	38	*5.55	Reduced 2x48" Intake to 50%, 2x48" Disch. 25% cont. Salinity mgmt/draw down ops. E12-RES-5.75<-(40ppt)-2x18" gates open 100%<-E12-Lo-6.1-(40ppt)(E12-DC-5.8')<-E12-Med-6.1-(57ppt)->E12Hi-5.85-(110ppt)->E12-DC-5.8>E13MB-5.25-(110ppt).
12	E12-1	9/15/14	44	below	Reduced to 1x48" Disch. 25%,

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
					2x48" Intake 50% cont. draw down ops; E12-RES-4.9<-(40ppt)<-E12-Lo-5.85-(75ppt)(E12-DC-5.8')<-E12-Med-5.9-(75ppt)->E12Hi-5.75-(120ppt)->E12-DC-5.6-->E13MB-5.35-(120ppt).
12	E12-1	9/24/14	41	*4.6	Reduced 2x48" Intake to 25%, 1x48" Disch. 25%, cont. draw down ops; E12-RES-4.6<-(42ppt)<-E12-Lo-5.6-(43ppt)(E12-DC-5.75')<-E12-Med-5.7->(70ppt)->E12Hi-5.6-(98ppt)->E12-DC-5.6-->E13MB-5.20-(120ppt).
12	E12-1	10/3/14	40	*5.3	Reduced to 1x48" Intake 25%, 1x48" Disch. 25% cont, draw down ops; E12-RES-5.3<-(40ppt)<-E12-Lo-5.4-(44ppt)(E12-DC-5.75')<-E12-Med-5.7->(70ppt)->E12Hi-5.6-(98ppt)->E12-DC-5.6-->E13MB-5.20-(120ppt).
12	E12-1	10/7/14	38	*5.5	Increased to 2x48" Disch. 25%, 1x48" Intake 25% cont, draw down ops; E12-RES-5.5<-(38ppt)<-E12-Lo-5.0->(38ppt)(E12-DC-5.45')<-E12-Med-5.25->(70ppt)->E12Hi-5.25-(120ppt)->E12-DC-5.3-->E13MB-5.0-(120ppt).
6B	E6A-2	3/11/14	29	2.00	Reduced 1x48" Intake to 15%, Disch.to 50%, draw down, SNPL ops
6B	E6A-2	5/6/14	36	0.50	Discharging. Increased 1x48" Intake to 25%, SNPL ops.
6B	E6A-2	6/19/14	42	1.00	Increased 1x48" Intake to 20%, maint.circ. SNPL/Summer ops
6B	E6A-2	6/24/14	34	2.00	Reduced 1x48" Intake to 10% (Reduce WSE, maint. Circ/SNPL ops
6B	E6A-2	8/4/14	42	0.50	**Red. 1x48" Disch. To 50%**, 1x48" Intake 10% cont. circ.ops/SNPL ops
6B	E6A-2	8/7/14	38	1.80	Increased 1x48" Disch. to 75%, 1x48" Intake at 5%. Circ/SNPL ops
6B	E6A-2	8/15/14	42	0.80	Increased 1x48" Intake to 25%, Disch. 75%, cont. circ /SNPL ops
6A	E6A-10	1/18/2014	31		Increased 1x48" Disch. to 100%, draw down ops, prep for construction
6A	E6A-10	1/21/2014	35		**Reduced 1x48" Intake to 25%**. Cont. draw down, begin SNPL ops
6A	E6A-10	10/30/2014	40		Discharging. Reduced 1x48" Disch. to 50%, 1x48" Intake 25%, begin T'sition to Winter/Diving Duck ops.

Pond	Location	Date	Salinity (ppt)	Staff	Activity and notes
8	E6A-1	3/7/14	30	(4.0)	Opened 1x48" Disch. to 25%, Increased 1x48" Intake to 75%, prep for WCS construction, SNPL ops.
8	E6A-1	3/11/14	35	(3.35)	Increased 1x48" Disch. to 50%, 1x48" Intake 75%. SNPL ops. Construction WCS E6A-2a (replaced 36" gate E8-E6B 3/13/14)
8	E6A-1	10/16/14	39	*5.1	Discharging. Reduced 1x48" Disch. to 25%, 1x48" Intake 50% cont. E8 = 2.4' (40ppt) at south staff.

Water Quality Monitoring Requirements

Water quality monitoring was performed at the sampling stations shown in Figure 2. The water quality parameters are provided in the Final Order and are summarized 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] = Limitation applies when receiving waters contain ≥ 5.0 mg/L of dissolved oxygen (DO). When receiving waters do not meet the Basin Plan objective, pond discharges must be ≥ DO receiving water level. Dissolved Oxygen (DO) Trigger: At each pond discharge location when using a continuous data recorder (Datasonde), if the DO concentration is < 3.3 mg/L, calculated on a calendar weekly basis, values below the trigger shall be reported promptly to RWQCB, corrective measures shall be implemented in an attempt to increase DO concentrations, receiving waters shall be monitored and Operation Plans shall be revised, as appropriate, to minimize reoccurrence.

[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 Ponds E2, E2C and E6A, E6B, E8, E8X, E14, E12 and E10 as described in the Final Order, as modified by RWQCB. The Department did not utilize continuous monitoring devices in 2014. Pond salinity was monitored using grab samples, and water levels and waterbird use were also monitored weekly. The operation of these ponds 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 obtained. RWQCB previously modified ASMR requirements such that volume estimates are not required.

Discharge time period information can be used as a proxy for discharge volume, and may be interpreted from monitoring data and predicted tides. Table 1: Summary of Discharge Events, provides context for management operations. Discharge event information is useful to contextualize management actions and BMP's implemented during ponds operations and provides information to complement the broader information contained in the Operations Plans. Time-period each day that a pond discharges is not specifically provided in this report. It should be noted that the daily discharge time-period information is based on predicted tidal elevations, not actual tide stages and time periods because there is currently no tide stage or other instrumentation installed to record actual discharge time-periods. Discharge periods in the ISP were assumed to be approximately 8 hours per day. We assumed that discharge would occur once tide stage was below pond water elevations, estimated to occur for approximately 13-16 hours daily. This assumption may over-estimate discharge time periods (and volumes) because it disregards affects of head (pressure) that may alter typical discharge flows through culverts. Lower pond water elevation would be expected to discharge for a reduced period of a daily tidal range, therefore fewer hours per day. Based on observed data, intake requires tide stages that are approximately 1 ½ to 2 feet higher than pond water elevations.

Receiving Water Sampling:

Receiving water was not monitored in 2014 as approved by RWQCB. Ponds E2 and E10 discharge to the Bay, while limited discharge occurs into sloughs via Ponds E2C, E6A, E6B, E8, E8X and E12.

Sampling requirements under the Final Order were modified by RWQCB in 2008, such that receiving water sampling needed only be conducted when water quality objectives are not expected to be met; particularly when adverse conditions are observed concurrent with pond discharge operations occur at volumes greater than 25% capacity of the system water control structure(s). Discharges were maintained at greater than 25% capacity in System E6A and in Pond E8X in order to maintain nesting habitat for WSP in ponds E6B, E6B and in ponds E12, E13, E14, respectively.

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/B	A/B	A/B	A/B	Discharge
E2C-	C	C	C	C	Receiving Water
E2C-	C	C	C	C	Receiving Water
E2C-	C	C	C	C	Receiving Water
E2C-	C	C	C	C	Receiving Water
E2C-	C	C	C	C	Receiving Water
E6A-10, E6A-1, E6A-2	A	A	A	A	Discharge
E8X Tidal, E14-E9	A*	A*	A*	A*	Discharge

LEGEND FOR TABLE 3

A = For time periods between May and October when the Discharger is not monitoring its discharge continuously in accordance with Table 2B and 4A/B, it 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 report the time of sample collection and 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 consider implementing continuous monitoring, as necessary, to determine pond operations and management.

B = From July 7 to October 10, the Discharger shall monitor discharge ponds at the point of discharge using a continuous monitoring device if adverse conditions are expected or observed within ponds discharging at greater than 25% of capacity.

C = Receiving water samples shall be collected at discrete locations near the surface and bottom from downstream to upstream of the discharge point. Receiving water slough samples shall be collected monthly from July through October as close to low tide as practicable, if pond waters are discharging at greater than 25% capacity from the E2C system. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP, and document if it collect samples at flood tide, ebb tide, or slack tide. Additionally, the Discharger shall record a daily estimate of the quantity and time-period of discharge based on pond water levels and the strength of tides. No pond water quality monitoring was conducted during period when pond was dry (seasonal/construction ops).

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. As no Datasondes were used, no calibration of this equipment was required.

Pond Management Sampling:

The Department regularly conducted pond management sampling in 2014 in all ponds in each system. This data was used in adjusting pond management and discharge operations. Data include pond water elevation (staff gages), salinity (hand-held refractometer), wildlife use (observations), meteorological/tidal conditions and physical pond conditions.

Chlorophyll-a Sampling:

Chlorophyll-a sampling in all ponds was not conducted due to limited analysis and applicability, as approved by RWQCB in 2005.

Metals- Annual Water Column Sampling:

The Department did not collect water column samples, as approved by RWQCB in 2005, because previous data showed metals concentrations were within WQO's.

Sediment Monitoring

The Department did not conduct sediment sampling because previous analysis showed metals concentrations were within WQO's. In 2006, RWQCB supported redirection of SBSPRP monitoring efforts to address specific issues rather than generalized pond monitoring; accordingly, mercury studies were focused on areas of concern, such as the USFWS Alviso Pond Complex, in Pond A8 and Alviso Slough, reported by USFWS separately.

Invertebrate Monitoring

Invertebrate monitoring was conducted in 2014 only as part of a separate study underway by USGS for Systems E12 and E6A. Those ponds were operated as modified seasonal ponds with continuous circulation as part of efforts to inform multi-species, multi-season pond operations. The System E6A operations provide modified seasonal pond habitat to promote WSP nesting in summer and diving duck habitat in winter. The reconfigured System E12 operations provide modified seasonal pond habitat with an increasing salinity gradient for shorebirds year-round, with WSP nesting on berms and levees in summer and shorebird roosting and foraging in spring, fall and winter. Invertebrate and other physical data will be presented in subsequent years' reports, once data collection, analysis and interpretation is completed. Previous collections for background and ambient conditions (2005-06) proved to be of limited use for analysis and had little applicability to current goals and objectives for pond operations and is no longer required under the Final Order.

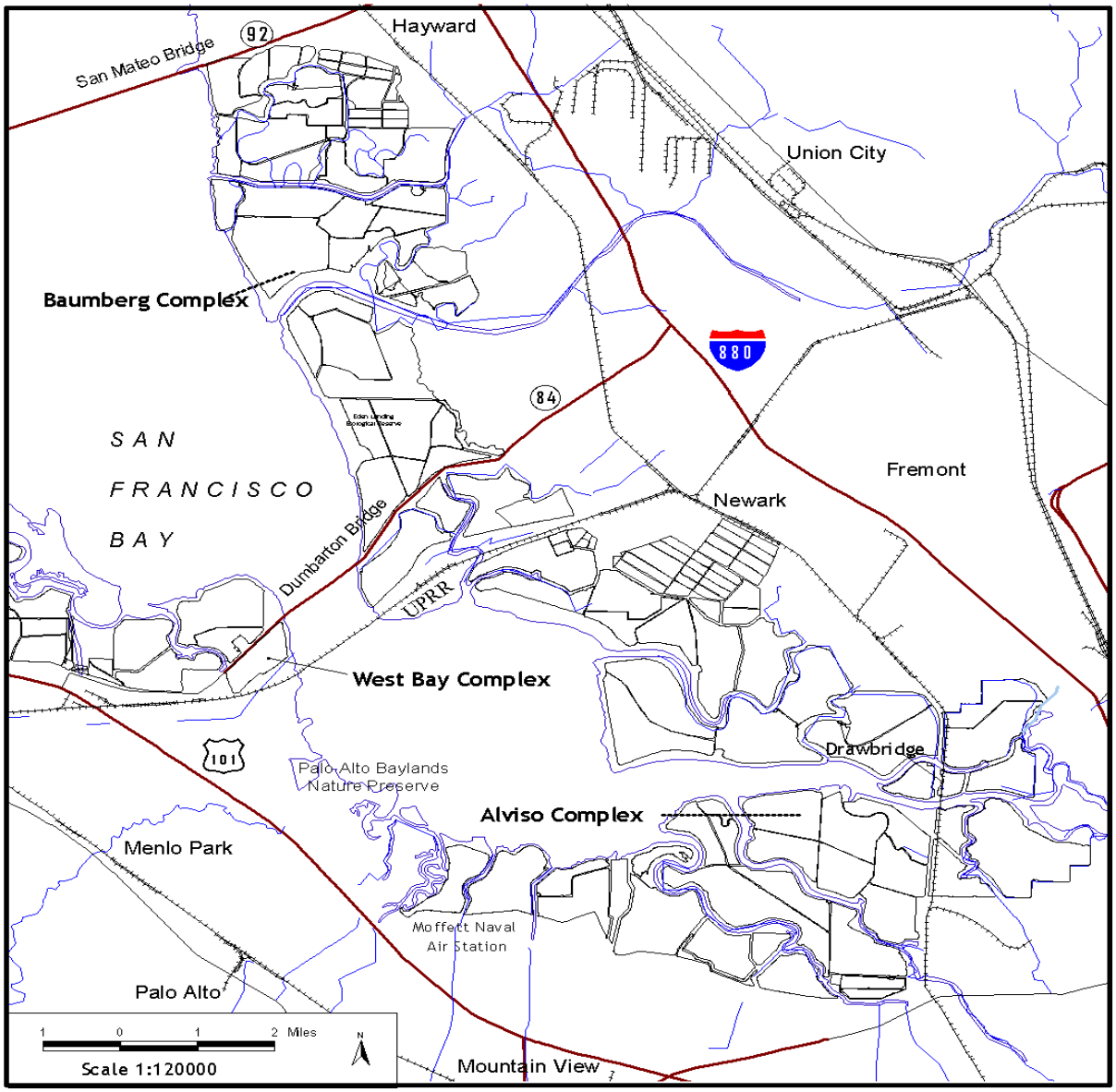

Figure 1. Vicinity Map of the Eden Landing Ecological Reserve (Baumberg Complex) Ponds

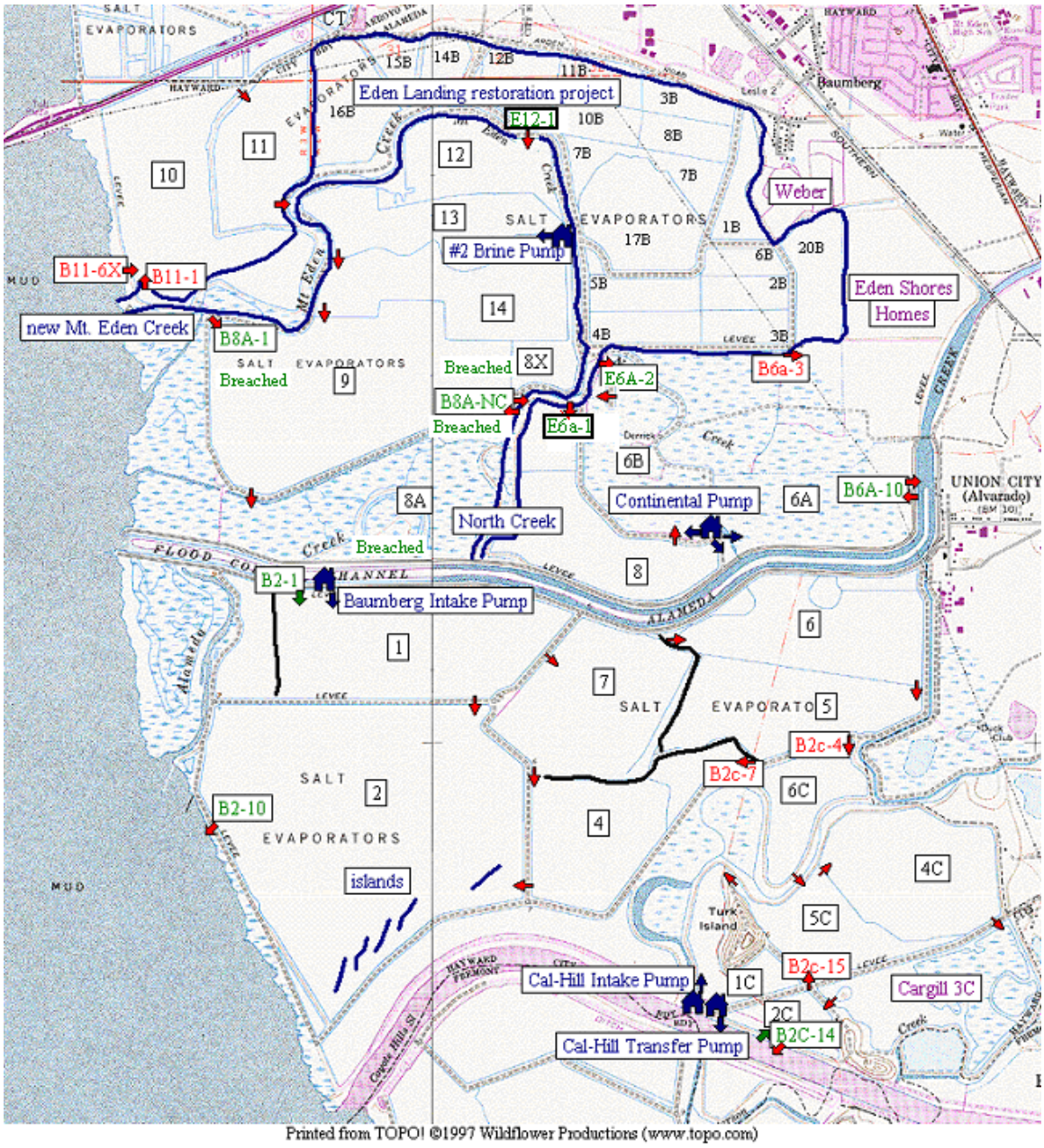

Figure 2. Eden Landing Ecological Reserve (Baumberg Complex) Ponds: Discharge and Intake Locations

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. 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 resulted in suspending or modifying discharges. During the 2014 water quality monitoring period, salinity appeared to follow the typical patterns and ranges as in previous years. While pH, temperature and DO were not monitored directly, it is presumed that those parameters continued to present the typical patterns and ranges in 2014 as in previous years, based on visual observed conditions.

Salinity data from 2014 were generally consistent with data collected during previous years on comparative calendar dates in Systems E10, E12/E8X, E6A, E2, E2C, and E10. Salinity values in the past few years under drought conditions have been higher due to below average rainfall and periods of higher temperatures. Modified pond operations sustained more consistent and 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.

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 2014 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 the Department 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, as well as resident piscivores and wading birds.

Salinity

Pond salinities in 2014 were similar to those found in preceding years, reflecting current management operations which sustain higher volume discharges. Salinities were generally maintained below the 44 ppt limit based on information provided by on-going monitoring. Short term observations of elevated salinity were noted and normalization of salinity typically occurred within one day of pond operations changes. Refer to Table 1 and comprehensive pond management data files for observed salinity values, pond management and related construction modifications and overall pond conditions.

The salinities for all system ponds are expected to remain operating with low salinity discharge conditions in future normal rainfall years, and will continue to function chiefly as low to medium salinity managed ponds, reflecting only relatively higher salinities than the intake waters from the Bay and sloughs, except in seasonal or managed "batch" ponds. Differences in mean salinity between low salinity ponds and Bay waters are more apparent during neap tide periods and higher salinity should be expected during drought years. Review of data collected to date indicates that management operations provide sufficient maintenance of salinities in seasonal or batch pond operations, where a limited number of ponds are allowed to reach moderate salinities, and do not prevent continued management of primarily low salinity ponds. Batch ponds are sufficiently mixing with system ponds before discharge.

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 the late winter to early spring 2014, System E2C operations were modified such that intake and discharge were suspended to allow Cargill Salt to drain System E2C to their active production pond operations, as described more fully below. Following resumption of intake/discharge operations, grab samples obtained during routine pond operations in April, 2014 showed values ranging from 32-35 ppt. In previous years, salinity values in winter through early spring ranged from 20 to 36 (2013), 23 to 28ppt (2012) and 9 to 23 ppt (2011).

Grab sample monitoring values during the monitoring season from May to October 2014 showed pond salinities from 34 to 48 ppt (29 to 49 ppt in 2013, 30 to 47 ppt in 2012; 9 to 38 ppt in 2011), with a few notable exceptions noted below. Elevated salinity values are typically observed with a brief neap tide between two stronger spring tide periods which may have resulted in circulation of a "pocket" of higher salinity water to the discharge location. Sufficient tidal mixing resulted in more typical salinity ranges. Observed E2C salinity was below 44 ppt throughout much of the 2014 monitoring season, except on the following dates. Elevated salinity values were observed on May 6, 2014 (48ppt), May 23 (48ppt), July 2 (47ppt), August 18 (48ppt), August 9 (110ppt) and September 2, 2014 (47ppt). Higher salinity likely occured due to flow from Cargill Pond 3C and seasonal pond E5C, when pond E2C water level became drawn down, particularly during neap

tides. Best Management Practices (BMPs) for pond operations were implemented. The primary BMP was to reduce discharge to a minimum or temporarily suspend discharge after each observed elevated salinity episode to allow pond E2C to restore typical water levels and salinity (below 44 ppt). During spring tides periods we resumed continuous discharge operations.

In the summer of 2014, Pond E2C infrequently mixed with Pond E5C (and E4C and E1C) to maximize circulation and increase intake at Pond E2C. Other BMP's such as weekly discharge timing and minimizing discharge volumes adequately protected receiving waters. The system was operated under atypical conditions (low rainfall) but maintained low salinity conditions generally below 44ppt). Average salinity over the May to October monitoring season, including the brief, elevated salinity periods, was 41 ppt (46ppt in 2013, 38 ppt in 2012; 27 ppt in 2011).

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, as 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. Observed salinity at the E2-10 discharge at the beginning of May, 2014 was approximately 38 ppt (40 ppt in 2013, 37 ppt in 2012; 25ppt in 2011) and ranged from 35 to 55 ppt during the season (39 to 50 ppt in 2013, 29 to 46 ppt in 2012; 25 to 42ppt in 2011). Salinity for the majority of the 2014 season based on grab samples averaged 46 ppt (40 ppt in 2013, 40 ppt in 2012; 29 ppt in 2011) and were generally slightly above 44 ppt**.** Despite elevated salinity readings being observed, however, discharge was maintained with one gate at 25% open. The BMP for temporary suspension of discharge was not implemented because the size (and volume) of Pond E2 precludes substantial change (increase) in water level and salinity over shorter periods (weeks). Furthermore, without continued discharge, salinity would be expected to continue to rise due to continued evaporation. E2 discharge occurs directly in the open bay and is quickly normalized in receiving waters.

E10:

System E10 was operated in 2014 as open water for the summer under typical management activities, 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 2014 monitoring season averaged 40 ppt (36 ppt in 2013) and ranged from 38-43 ppt (31-43 ppt in 2013; 27-39 ppt in 2012; 20-33 ppt in 2011). Prior to the start of the monitoring season, salinity in E10 was approximately 33 ppt (31 ppt in 2013; 29ppt in 2012; 20 ppt in 2011). Average salinity did not exceed 44 ppt in 2014 (0 days in 2013, 2012 and 2011) 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 will be fully operational in 2015 as part of and applied science study and pond management as part of the SBSPRP Phase 1 Actions. These actions are described briefly below and more fully in the updated Operations Plan and within the environmental compliance documents for the SBSPRP.

E12:
System E12 was operated as shallow, open water for much of 2014 with intake and discharge via MEC, as part of test operations of the reconfigured ponds providing increasing salinities in a series of pond cells terminating in a mixing basin to ensure low salinity discharge. Major construction activities continued in Ponds E12 and E13 as part of Phase One of the SBSPRP, as noted above. Ponds E12 and E13 were previously operated as seasonal ponds and allowed to dry in the summer. Pond E14 was operated as a seasonal pond with discharge from E12-E13 pond operations via Pond E8X, which acts as a mixing basin for E14. Pond E8X will operate as a supplemental intake forebay for Ponds E12 and E13 when the ponds are reconfigured and fully operational. Pond E14 was allowed to draw down and be mostly dry during the summer, with limited intake and discharge to maintain nesting, roosting and foraging habitat for the federally threatened species, western snowy plover (WSP), as well as other resident waterbirds.

E14:
E14 was primarily operated as a seasonal pond in prior years. Pond E14 was operated in 2014 as a seasonal pond, with shallow water in the borrow ditches to provide circulation to Pond E8X and a mostly dry pond bottom to provide nesting habitat. Limited inflow from pond E13 and outflow via Pond E8X occurred throughout most of the year, as part of test operations of the reconfigured ponds E12 and E13. Supplemental intake/discharge operations were undertaken via former pond E9. Pond E9 was fully restored to full tidal action in 2011 and represents the E14 receiving waters near the mouth of Mt. Eden Creek. Pond E14 provided very good habitat conditions for WSP nesting and fledging habitat, as well as foraging and roosting habitat for other shorebirds in 2014.

Prior to the monitoring season, salinity in E14 at the E9 discharge location was approximately 30 ppt in 2014. E14 salinity during the 2014 monitoring season ranged from 28-43 ppt and averaged 42 ppt; Weekly observed salinities were not above 44 ppt in 2014 except as observed on the following date: July 3 (80 ppt). This coincided with a lower than typical water level, such that shallow water was isolated at the WCS due to a high borrow ditch bottom elevation during very warm weather. During this period, intake was limited to ensure water levels remained low to protect nests known to occur on the dry pond bottom areas, as higher tides may cause slight temporary increases in wetted pond bottom areas, particularly during spring tides. Little actual discharge likely occurred. Active pond water level and salinity management was conducted as part of

typical pond operations and observed salinity quickly normalized to ambient conditions. Pond E14 typically had low salinity conditions throughout most of the 2014 season.

E8X:

Prior to the monitoring season, salinity in E8X at the discharge location was approximately 32 ppt in 2014 (34 in 2013; 30 ppt in 2012). E8X salinity during the 2014 monitoring season ranged from 36-44 ppt (32-38 ppt in 2013; 30-42 ppt in 2012) and averaged 41 ppt during the 2014 summer monitoring season (36 ppt in 2013; 35 ppt in 2012; E8X was operated as a seasonal pond in 2011 and prior). Weekly observed salinities were above 44 ppt in 2014 on the following dates: Aug. 4 (60 ppt) and August 18 (45 ppt). However, active salinity management as part of typical pond operations and implemented BMP's quickly normalized elevated values. Observed salinity did not exceed 42ppt in 2013 or 2012. Pond E8X had typical low salinity conditions throughout most of the 2014 season.

Pond E8X provided good habitat conditions for numerous waterbirds, including piscivores and wading birds in 2014. Ponds E12, E13 and E14 provided seasonal nesting, foraging and fledging habitat for WSP.

E6A:

Beginning in 2012, System E6A ponds (E8, E6B, E6A) were 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 in summer for shorebird foraging, roosting and nesting. In 2014, System E6A continued operations as a modified seasonal pond system, with continuous circulation via muted tidal intake and discharge at the same location. In the winter, System 6A ponds are managed with deep, low salinity water for waterfowl to support benthic invertebrates as the prey base for diving ducks. In spring, the ponds are drawn down and operated such that pond conditions are similar to seasonal ponds, albeit with higher intake and discharge volumes, lower salinity and a slightly higher water surface elevation. Typically, seasonal ponds have little or no discharge, limited intake and are allowed to draw down, resulting in elevated salinity in late summer and mostly dry. 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 maintained below 44 ppt near the discharges, and is less varied because the pond is operated at a low water surface elevation with ample mixing and a low residence time.

System E6A ponds generally maintained continuous circulation and discharge salinity below 44 ppt. In previous years, observed pond E6A salinities were below 44 ppt (43 ppt in 2012) at the discharge throughout the season, except on 08/30/13 and 09/19/13 when salinity was 44ppt, and were generally 28-41 ppt (25-38 ppt in 2012). Observed weekly System E6A discharge salinities were below 44 ppt throughout the 2014 monitoring season (in 2013, salinity above 44 ppt was observed on two days in E8, on 08/30/13 and 09/19/13; in 2012, 44 ppt salinity was observed in E8 on 05/15/12 only). Higher salinity observations can occur in late spring though late summer and may be attributed to higher

lower water levels or reduced intake associated with neap tides and on-going operations targeting WSP nesting and fledging habitat. Elevated salinity values occur infrequently and are typically brief and may be observed during neap tide periods, which may result in a "pocket" of higher salinity water at the discharge location when intake is more limited. Sufficient tidal mixing during spring tide periods results in more typical salinity ranges. BMP's such as weekly discharge timing adequately protected receiving waters.

Grab samples obtained during routine pond operations prior to May 2014 showed values in pond E6A ranging from 24 to 38 ppt (19 to 24 ppt in 2013; 24 to 26 ppt in 2012), in pond E6B from 26 to 34 ppt (24 to 32 ppt in 2013; 26 to 30 ppt in 2012), and in pond E8 from 30 to 37 ppt (24 to 36 ppt in 2013; 28 to 38 ppt in 2012). During the 2014 monitoring season from May to October, pond salinity values were as follows: from 35 to 43 ppt in pond E6A (28 to 44 ppt in 2013; 25 to 43 ppt in 2012) with average salinity in pond E6A of 41 ppt (36 ppt in 2013; 32ppt in 2012). In pond E6B, salinity ranged from 32 to 43 ppt (32 to 43 ppt in 2013; 29 to 49 ppt in 2012), with average salinity of 39 ppt (38 ppt in 2013; 37 ppt in 2012). In pond E8, salinity ranged from 33 to 39 ppt (35 to 37 ppt in 2013; 30 to 44 ppt in 2012) with average salinity of 36 ppt (36 ppt in 2013; 37 ppt in 2012).

pH

Pond water quality conditions were assumed to be typical of similar previous years during the 2014 monitoring period, based on observed salinities, pond depth, conditions and waterbird use. Compliance with the Final Order allowed pH levels to be measured in either the pond or receiving waters, as determined by the discharger. There is no apparent pattern in pH values as related to discharge operations. For 2014, no Datasondes were utilized to collect instantaneous or continuous pH values, rather, ponds were managed based on construction, biological resource objectives and habitat requirements for sensitive species.

As background, in 2009, under previous Final Order requirements, we collected pH (other WQ parameter) monitoring data at the E10 discharge using a Datasonde for continuous data collection. Daily mean and grab sample data ranged from approximately 7.9 to 8.5 throughout the monitoring season, including at the discharge and in-pond transects. Higher values were found in more distant areas of E10 associated with poor circulation (8.2-9.6 pH during August transects). In other ELER pond systems in 2009, pH similarly ranged approximately one point over the season. In Pond E2C, grab sample pH values ranged from approximately 8.0 to 8.6 during the 2009 season and pH averaged 8.2 throughout the season. In Pond E9 during 2009, grab sample pH values ranged from approximately 8.1 to 8.6 and pH averaged 8.1. In Pond E2, grab sample pH values ranged from approximately 8.0 to 8.6 during the 2009 season and averaged 8.2 pH. Receiving water sampling in 2007 showed that a discharge "signal" was not discernable except in the immediate vicinity of the discharge.

Temperature

Water temperature data were not collected in 2014. Beginning in 2004 when the Department began operations and management of the ponds at the ELER for waterbirds,

continuous monitoring data collected through 2009 showed pond water temperatures were generally similar to ambient Bay and slough temperatures, with the exception of in-pond temperatures being approximately 5-degrees warmer during hot weather periods, primarily in shallower ponds. Managed ponds easily met the temperature discharge limits, not exceeding ambient temperatures of the receiving waters by 20^{o}F in any case.

Dissolved Oxygen (DO)

Continuous monitoring of dissolved oxygen (DO) is no longer conducted except as noted in the Final Order. Periodic grab samples may be taken as needed to inform pond management and operations. However, DO values are highly variable (considering the diurnal pattern observed in previous years). Therefore, no pond dissolved oxygen values were collected for the 2014 monitoring season. Managed pond and receiving water data from previous years showed a pattern of periods of low or sustained depressed DO, demonstrating that achieving continuous compliance with the Final Order is problematic. Monitoring efforts showed that DO levels in the ponds generally exhibited a strong diurnal pattern, where lower DO is observed near dawn and higher DO is observed at mid-day. Substantial algal growth and decomposition in the ponds is assumed to be a primary cause of diurnal fluctuations of DO levels throughout the ELER Ponds during the summer. In 2014, large algal blooms were noted and not perceived as more prevalent and persistent than in previous years. Annual variations and other confounding factors are not well understood with respect to correlations with weather patterns, observed pond conditions and pond management operations. Little immediate change within ponds can be affected since managed ponds have high residence times. Pond management changes require several days to several weeks to result in observable changes in water quality conditions, habitat quality and use.

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, including site-specific standards work in past years in the Everglades and Virginian Province (Cape Cod, MA to Cape Hatteras, NC), as well as work from more local activities 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; hence low DO is not necessarily indicative of pond discharges.

Several operational strategies and BMPs were routinely implemented, as described below and in the attached pond system operations plans. The Department used BMPs such as the temporary closure of discharge gates during periods of time when pond DO was assumed to be below 5.0 mg/L standard and 3.3 mg/L trigger values. For example, we implemented a BMP to temporarily cease discharge or reduce discharge volume during periods when low DO could occur within the ponds, using water levels and salinity values as a proxy for low DO conditions. After subsequent intake is sufficient to lower

salinity and/or increase water levels, pond discharge resumed, which adequately achieves standards described in the Final Order. As stated in previous SMR's, a daily discharge timing BMP is not practicable at the ELER due to staffing and budget constraints. The Department did periodically cease discharge, as well as allow reduced discharge during predicted neap tides, thereby implementing the weekly timed discharge BMP. These BMP's adequately protect receiving waters, based on previous monitoring and analysis, to ensure similar conditions minimize discharge of low DO waters during potential "trigger" value periods. Weekly discharge timing entailed setting pond discharges at greater volumes when spring tide periods occur, to maximize intake and mixing. The result of this BMP is that higher volume pond discharge occurs during the daytime when photosynthesis increases the pond DO levels or when discharge follows periods of sufficient intake.

During particularly weak (neap) tide periods, intake is limited and pond water has the least mixing and turnover. Based on previous years' data, it appears that ceasing discharge for prolonged periods of depressed DO levels may even 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 intake is more limited.

Refer to Table 1 for a full summary of discharge events and gate settings in 2014.

Compliance Evaluation Summary

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 during 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 help to achieve successful management of dissolved oxygen levels and other water quality parameters in the ponds. Some BMPs are more effective and practicable than others and it is a matter of evaluation and interpretation of data collected whether the BMPs maintained or improved DO levels. 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, the Department will continue to determine which operations, management and monitoring activities adequately protect water quality and best achieves Final Order compliance.

Some of the BMPs, including installation of baffles to direct water from portions of ponds expected to have higher DO values and block algal mats expected to have lower DO water conditions are not practicable. The Department has not installed baffles since they were not practicable or expected to improve DO levels at discharge ponds. Deep borrow ditches do not generally surround ELER ponds, which are shallow and not as

deeply subsided as ponds in the Alviso Complex (managed by USFWS). Infrastructure improvements, such as major changes in pond management/operations, topography or geometry, could improve compliance and better achieve water quality objectives and may be implemented as part of future actions. The Department expects to apply lessons learned from applied science actions, such as the reconfiguration, operations, monitoring and other studies associated with ponds E12 and E13 in 2015 as well as reconfigured, managed ponds operated by USFWWS (Pond A16, and RSF 2).

As discussed above, strong diurnal patterns of DO levels are known to occur at the ELER and other managed pond complexes. A BMP such as ceasing discharge on a daily basis is not practicable to eliminate discharge of low DO waters, nor is such pond management/operation likely to improve overall water quality. Cessation of daily pond discharges may, in fact, decrease water quality because of more limited intake and mixing. Weekly discharge timing, reduced discharge gate settings and other BMPs were implemented by the Department at ELER to address expected low DO conditions and appear to be sufficiently protective of receiving waters, as noted previously. For Systems E10 and E2, pond water is discharged to the open Bay and quickly disperses in the open water or over extensive mudflats. In 2014, discharge gates were generally set to allow increased discharge volumes, similar to the three previous years to decrease residence time and improve mixing. More continuous operational periods, rather than intermittent operations, appear to help raise water quality values, at least with respect to salinity, and may be affective for other parameters as well.

The Department routinely manages pond systems with periodic and seasonal outflow and inflow to dry seasonal ponds adjacent to open water circulation ponds to improve water quality in discharge ponds. Muted tidal ponds with modified pond operations that maintain low water surface elevations, such as in System E6A, or ponds which are drained for construction are expected to have water quality values similar to ambient conditions in sloughs and the Bay.

Data Collection, Evaluation and Communication

In 2014, sufficient data were collected for monitoring purposes using salinity grab samples. When recording salinity values, we also noted pond water levels, as well as waterbird counts and patterns. The Department provides detailed operations and monitoring data to the RWQCB staff electronically, and data are summarized within this report. It should be noted that pond operations were monitored as often as possible, given staff limitations. The Department conducted all of the monitoring considered in this analysis for 2014. One Department biologist conducted pond operations, management, monitoring, review, and interpretation of data. Despite staffing and other challenges, the Department has successfully managed the pond systems and implemented the BMPs discussed herein in such a manner as to both comply with regulatory standards and continued to provide high-quality waterbird habitat conditions on and around ELER.

Final Order requirements regarding communication of compliance to the RWQCB were satisfied by email, telephone and in-person meetings. Additionally, the Department has

provided extensive data to RWQCB for review and interpretation. We expect that continued collaboration and discussion between the Department and RWQCB staff is useful for on-going pond management and operations.

Summary, Completion of Phase 1 Actions and Requests for Revisions to SMP:

SBSPRP Phase One actions at ELER included tidal salt marsh habitat restoration, managed pond reconfiguration, recreation/public access features, maintenance of the existing level of flood protection. Monitoring activities and applied studies are expected to inform future SBSPRP actions. SBSPRP Phase One actions are expected to restore and enhance a mosaic of habitats, including tidal salt marsh, tidal mudflat, salt panne, subtidal flats and channels, sloughs, ponds, upland transition zones, and open water habitats (managed ponds). ELER continues to support healthy populations of fish and wildlife, special-status species, migratory waterfowl, shorebirds, and anadromous and resident fishes. Full tidal action was restored to former ponds E9, E8A and E8X in 2011. Development of tidal salt marsh habitat in ponds E9, E8A and E8X continues as expected Pond management and operations in all ELER pond systems continued to provide high-quality waterbird habitat conditions in the region.

Ponds E12 and E13 were reconfigured to create 230 acres of high quality shallow water foraging areas at varying salinities and 6 constructed nesting islands. The first full year of operation will occur in 2015. The reconfigured E12-E13 managed ponds represent the most extensive infrastructure improvements undertaken by the Department at ELER, including a new intake pump, installation of new water control structures for intake and discharge, an elaborate water conveyance system via a series of pond cells composed of berms, ditches and weirs, and construction of new nesting islands. Ponds E12 and E13 provide a series of pond cells with shallow water foraging and roosting habitat for resident and migratory shorebirds with similar water depths, increasing salinity and six islands for nesting. Pond operations in E12 and E13 will help determine if intensive management of shallow water habitats can increase migratory shorebird densities and support adequate primary productivity and prey resources. Pond E14 has been enhanced for shorebird management, with seasonal operations expected to maintain WSP nesting and fledging, as well as support migratory waterbirds. On-going monitoring and study will inform whether future actions should be taken to reconfigure other ponds or systems. In 2015, E12 and E13 operations are expected to include periodic use of Datasondes and/or other continuous data recorders.

Operations and Maintenance activities in 2014 were appropriately covered under the Final Order for the SBSPRP. The Department will continue to review the SBSPRP Final Order with respect to the proposed 2014 operations and monitoring results, and will make requests for alterations to the new Final Order as appropriate in future reports. Planning for SBSPRP Phase Two actions continues, and the Department expects to develop additional restoration actions with other SBSPRP partners in 2015.

The Department expects to continue modified pond operations, such that Table 3 "Water Quality Monitoring For Eden Landing Ponds" only require type "A" monitoring activities. Type "B" and "C" monitoring, during discharge periods of greater than 25% of WCS capacity, does not appear necessary.

Sustained, higher-volume discharges and corresponding reduced residence time of pond water is expected to improve overall DO levels; therefore, allowing discharges at greater than 25% provides for increased circulation and mixing. This is particularly important in System E6A ponds, which require lower water surface elevations in order to maintain WSP nesting habitat. 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.

ATTACHMENT:

2015 Pond Operations Plans