2011 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 summarizes the pond operations, management and monitoring conducted by the Department of Fish and Game (Department) from May through October 2011 at the former Baumberg Complex salt ponds, now known as the Eden Landing Ecological Reserve (ELER), in Hayward, California. Monitoring is conducted for typical operations as necessary and as required by the Regional Water Quality Control Board (Board) 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 under separate cover.

ELER pond systems operated by the Department in 2011 are fully described in the enclosed Operations Plans. Current pond operations are modified from the Initial Stewardship Plan (ISP) and reflect implementation of the South Bay Salt Ponds (SBSP) Restoration Project in Ponds E9, E8A and E8X (full tidal restoration) and E10, E12, E13 and E14 (reconfigured managed ponds).

Data was collected by Department staff in accordance with the waste discharge requirements. Water quality monitoring was performed in 2011 using grab samples only. Continuous data recorder use was not required. Pond operations and management activities were modified as necessary for the current configuration of managed ponds.

Data was collected at the locations described in the Self-Monitoring Program outlined in the Final Order. Previous nomenclature used the initial "B" for the Baumberg Complex ponds, which has been subsequently changed to "E" for Eden Landing, in accordance with the nomenclature used for the larger SBSPRP. This report uses the "E" nomenclature, except where noted and older figures or references provided by others are not easily modified.

The ponds are generally being operated as "muted tidal" systems, as described in the 2011 operations plans, augmenting flow-through systems described in the ISP. Bay water entered the ponds from San Francisco Bay (Bay) through associated sloughs at high tides; flowed to one or more ponds; and discharged from the (intake) structure at low tides. The ponds presumably discharge at tide stages lower than pond water elevations, typically 3.5-feet (NGVD), over a duration ranging approximately 13 to16 hours per day (based on predicted tides and spring or neap tide cycle variation). Pond Bay water intake is presumed to occur at predicted tide stages which are at elevations of approximately 1.5- feet or more above pond water levels due to required head (pressure) to allow in-flows. It is not known from interpreting the data whether discharge has a similar head requirement or if discharge begins after a similar time-lag when tide stages are just below pond water elevations.

The Final Order recognized discharges from the ponds would be characterized with maximum salinity levels below 44 parts per thousand (ppt) and would generally operate with discharge below 40ppt. In 2011, operation of all systems was within prescribed

salinity parameters. Other water quality parameters were not regularly sampled. In ponds not being affected by construction and operated as open water or seasonal (dry) as typical, no adverse conditions were observed. Water quality monitoring activities were conducted as described in subsequent sections of this report.

As in previous years, the Self Monitoring Report (SMR) includes typical reporting and Best Management Practice (BMP) implementation, particularly for periods of observed or expected low dissolved oxygen (DO). Low DO levels at the point of discharge have 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 2011. Operating ponds were noted to have conditions similar to previous years.

This Annual SMR incorporates information requested by the Board, as modified in previous years, except discharge volumes were not calculated. Discharge volumes would only be feasibly quantified by an intensive study effort similar to the one conducted by USGS under contract by USFWS in the Alviso Complex. The Department does not have staff or funding to conduct such a study, nor anticipates obtaining staffing or funding to conduct such a study. Furthermore, while calculated discharge volumes would be useful for context in evaluating water quality monitoring, discharge volume calculations would have limited utility with respect to altering pond operations. Additional analysis and interpretation of monitoring data is not expected to be completed nor submitted for 2011.

2011 Annual Summary

Pond operations were modified as required for construction activities implementing Phase One of the South Bay Salt Ponds Restoration Project (SBSPRP). In 2011, pond management and operations included intake to and discharge from all systems during the summer monitoring season, with specific management goals for a given system, as described more fully later in this document. Additionally, E9 operations were substantially modified and pond operations ceased due to construction activities and full tidal restoration in Ponds E9, E8A and E8X. For water quality monitoring, 2011 activities did not include continuous discharge monitoring and no applied studies were conducted. Pond operations were modified for construction activities during the monitoring period as needed. A summary of intake and discharge operations is provided in Table 1.

Construction activities implementing SBSPRP Phase One actions continued at ELER in summer, 2011, and included work in Ponds E10, E8X, E8A, E9, E12, E13 and E14. Phase One construction activities for each restoration action require two years to

complete because of seasonal biological restrictions and construction requirements (i.e. in 2010, Stage 1 construction, followed by Stage 2 in 2011). Pond E10 typical operations resumed in winter, 2010, after construction of a new levee segment within the pond. The E10 levee realignment was required to accommodate expected hydrological and geomorphological changes associated with SBSPRP Phase One actions to restore full tidal action in Ponds E9, E8A and E8X. Levee construction and levee lowering and breaching was completed in 2011. The first levee breach occurred in Pond E8A in mid-September, 2011, followed by additional breaches in E8A and E8X, and the final levee breach in Pond E9 was completed by the end of October, 2011.

Pond operations were modified in 2011 for Ponds E12, E13 and E14 following completion of construction activities. Ponds E12 and E13 will be fully reconfigured as part of the SBSPRP Phase One actions, with construction continuing in 2012-2013. E12 and E13 will subsequently be operated year round as an intensively managed pond to provide shorebird foraging habitat and obtain information regarding the management of reconfigured ponds that will be applied to future SBSPRP phases. The reconfiguration of Ponds E12-E13 is expected to be completed in 2013 and be fully operational beginning in 2014.

For the 2011 monitoring season, periodic (weekly) collection of monitoring data was sufficient to inform ELER pond management in the summer and winter seasons. Targeted monitoring efforts may be useful to address areas of uncertainty and may be conducted as necessary in future years. Pond management operations with consideration of intrinsic pond dynamics are discussed in greater detail below as related to compliance with the RWQCB Final Order.

Water quality monitoring at the ELER ponds conformed to the Final Order. Salinity and water levels were used for the 2011 season to monitor water quality and pond operations. Typical pond operations and monitoring of salinity and water levels indicated that the ponds were operating within 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 2011, although no DO or continuous data was collected. In previous years (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 seasonal temperatures, winds and evaporation were expected to be highest. 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 also 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 2011 included typical amounts of macroalgae found in the water column and living and necrotic algal mats were observed on the pond bottom.

Pond operations were similar in 2011 to previous years in systems that were operated "normally" (as compared to modified operations associated with construction activities). 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, with intake and discharge from Pond E2C, was periodically minimized to maintain water levels during neap tide periods and/or during high ambient temperatures. Temporary suspension of discharge operations was not regularly performed in 2011.

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 intake and/or discharge locations to ensure ponds were operating as expected. Some ponds were managed as seasonal (dry) ponds to facilitate construction activities and provide nesting substrate and foraging habitat for western snowy plover, in particular. By 2009, DFG had determined optimum pond operations such that discharge settings were less frequently adjusted since field observations and review of previous years' data showed that increased discharge operations improved water quality data, particularly salinity. Current or anticipated weather and predicted tidal conditions are also considered, but pond operations are apparently less affected by those factors than intrinsic pond dynamics. In previous years it was attempted to minimize discharge of pond waters not meeting water quality objectives (WQO's), including salinity and DO, however, this increased residence time. A preliminary review of data indicates that more consistent, moderate volume discharges improved (lowered) salinity conditions. Salinity, and presumably other water quality parameters were improved based on observed conditions overall. A summary of discharge events is shown on Table 1.

Under normal 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 relatively higher for much of the monitoring season than in previous years, considering construction activity around Ponds E8A, E8X, E9, E10, E12, E13 and E14.

To provide additional habitat for western snowy plovers (WSP), a federally threatened species, management of ponds in System E2 was performed to maintain sufficient dry pond habitat during SBSPRP Phase 1 construction. Ponds E6 and E5 within System E2 were operated as seasonal and drawn down and largely dried. Typically E6 and E5 are operated as "batch" ponds, which entails maintaining water levels and allowing salinity to increase to as high as 120-parts per thousand (ppt).

For all pond system operations, adjustments to intake, discharge and pond-to-pond culvert gates for continuous circulation were made less frequently in 2011.

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 other ponds in the System, E14, E13 and E12, continue

to be operated as seasonal ponds and are expected to be fully reconfigured in 2012-13 for intensive pond management as part of the SBSPRP Phase 1 Actions. These actions require multiple years for construction to be completed. These actions are described below and more fully in the updated Operations Plan and within the environmental compliance documents for the SBSPRP.

Pond System E9 had substantially modified operations in 2011. This operational modification was implemented to facilitate SBSPRP construction activities. Pond E9 was drained to the maximum extent feasible during extended periods to allow for construction activities, including ditch blocks, levee lowering, new levee construction along Pond E14 and subsequent levee breaches in Ponds E9, E8A and E8X. Prior to breaching, discharge from Pond E9 occurred to the Bay immediately adjacent to the mouth of Mt. Eden Creek (MEC). Pond E9 discharge operations were monitored using grab samples for salinity analysis, water levels, and waterbird use observations. A continuous water quality monitoring device was not used. Management of this system was maintained to provide habitat for waterbirds to the extent feasible while allowing construction activities to implement full tidal restoration in 2011. Intake to, and discharge from Pond E8A via North Creek was also similarly modified for SBSPRP Phase One construction activities.

When E9 dewatering occurred for construction activities, approximately 2/3 of the pond bottom would be exposed for tides below 4' NGVD. Waterbird use, particularly small and medium size shorebirds, was significant, with single species counts in the 1000-10,000 range. The use of the BMP allowing periodic draining of seasonal ponds was limited in 2011 to water transfers to Pond E14 (and subsequently E13) for WSP management and construction activities. Management for WSP is the primary use of the seasonal ponds.

System E10:

Typical operations were resumed in 2011 in System E10 ponds because on-going SBSPRP construction activities did not affect pond operations. Discharge from Pond E10 normally occurs to the Bay immediately adjacent to the mouth of MEC. Pond E10 was operated as a circulation pond in the 2011 monitoring season. Pond E11 was operated as a seasonal pond in 2011, as is typical and described in the ISP and previous Operations Plans. Continuous monitoring devices (Datasondes) were not necessary in Pond E10 during the July-October monitoring period and receiving water sampling was not required.

Pond E10 provided good open water habitat conditions for numerous waterbird species, including terns, egrets, cormorants and pelicans. E11 provided good seasonal pond habitat for small and medium shorebirds as well as avocets and stilts.

System E2:

Pond E2 operations in 2011 were similar to previous years, except for a brief period between 4/20/11-5/10/11 when Pond E2 was drawn down by maximizing discharge

briefly, followed by suspended intake/discharge operations while the E2-10 Water Control Structure (WCS) on the bayfront of Pond E2 was repaired. The E2-10 WCS had developed a sinkhole which quickly became a headwall-to-headwall void, whereby bay and pond water was flowing freely around the culvert pipes and through the WCS. DFG's contractor on the SBSPRP Phase One actions was mobilized and successfully repaired the structure. 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 an approximately a weekly basis as noted previously for System E2C and as described in the Operations Plan. It is assumed that this system also may have had periods of low DO levels, as observed in 2005-10, but continued to provide habitat conditions sufficient to support waterbird use. Discharge was never greater than 25% of capacity and occurs directly to the Bay. No abnormal conditions were observed and no receiving water monitoring was required. Discharge at the Bay from Pond E2 was maintained at 25% of capacity of one 48-inch gate. The system was operated with primary flow entering the system through Pond E1. Muted tidal intake from the Bay into E2 also provided supplemental intake to this system. Pond E1 continued to operate as the primary intake pond from Old Alameda Creek. System E2 management included typical discharge operations via E2 for the winter season, including successful recirculation of the higher salinity "batch" ponds (E5 and E6).

System E2 provided good open water habitat conditions for numerous waterbird species, including terns, egrets, cormorants and pelicans. Seasonal ponds provided good habitat for small and medium shorebirds as well as avocets and stilts.

System E2C:

Pond E2C was operated in 2011 similar to previous years. In 2011, 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. Grab samples were collected for salinity and water levels analyses and waterbird use was monitored to determine operational parameters. This system presumably had periods of low DO levels, as observed in 2005-10, but continued to provide good habitat conditions for waterbirds. Discharge was never greater than 25% of capacity; therefore, no receiving water monitoring was required, as noted in RWQCB's May, 2008 letter and reflected in the Final Order. For 2010, System E2C operations continued to use BMP's developed over the past five years, but the practice of periodically draining Pond E2C water into the adjacent seasonal ponds (E5C, E4C and E1C) to improve pond system water quality (due to greater intake volumes) was implemented less often. This BMP appeared not to be necessary in 2011 to help manage salinity, as other factors may have moderated DO and other water quality conditions. Furthermore, repeated wetting and drying events may be correlated with higher methyl-mercury production and would be undesirable, particularly for nesting and foraging waterbirds. System E2C provided good foraging and roosting habitat conditions for small to large shorebirds as well as avocets and stilts.

System E6A:

In 2011, System E6A ponds (E8, E6B, E6A) were managed in winter for waterfowl and shorebird foraging and roosting. In the summer, System 6A ponds were managed for WSP breeding and shorebird foraging during the monitoring season, therefore, discharge operations were conducted. In previous years, the ponds were primarily seasonal, with minimal intake to maintain foraging habitat within dry, playa habitat. Prior to the 2011summer monitoring season, System 6A ponds were drawn down after lowering system salinity by intake and discharge operations via Old Alameda Creek (Pond E6A) and North Creek (Pond E6B and E8). Pond management was primarily focused on providing WSP nesting foraging habitat as well as shorebird foraging and roosting areas. This system provided good habitat conditions for waterbirds, including WSP during the summer of 2011.

Table 1: Summary of Intake/Discharge Activities

Complete datasets and field notes for pond operations/conditions and management activities are available for review upon request, but not provided in this report due to their large size. Datasets are provided to RWQCB staff electronically via their File Transfer Protocol (FTP) site and are available to others upon request.

NOTE: Table 1 salinity values displayed are generally from a hand-held refractometer; When referring to pond locations, nomenclature for ponds "B" & "E" are interchangeable (Baumberg aka Eden Landing)

Pond	Location	Date	Salinity (ppt)	Staff (ft)	Activity and notes
2C	E2c-14	3/30/2011	9	4.10	1x48" Disch. set to 20%, begin seasonal draw down "C" ponds, Transition to summer ops.
2C	E2c-15	4/20/2011			Closed 1x36" gate, cease 2C->5C ops. Begin "C" Pond trans. to seasonal ops
2C	E2c-14	5/10/2011	19	below	Reduced 1x48"Disch. to 10% for neap tides (~50% Pond bottom exposed)
2C	E2c-14	5/20/2011	15	3.95	Increased 1x48" Disch. to 20% to reduce water levels.
2C	E2C-14	5/26/11	24	below	Reduced 1x48"Disch.to 10%
2C	E2c-14	5/31/11	24	3.20	Increased 1x48" Disch.to 15%, maint. water levels for shorebird foraging
2C	E2c-14	9/29/11	31	3.30	Increased 1x48" Disch.to 25% for incr. circ.during reflood "C" ponds.
2C	E2c-15	9/29/11			Opened 1x36" gate 25%. 2C->5C, begin seasonal reflood "C" ponds.
2C	E2c-14	10/4/11	33	2.0	Reduced 1x48" Disch.to 15%.
2	E2-10	3/24/2011	24	3.70	1x48" Disch. cont.at 25%.
2	E2-10	4/20/2011	14	2.85	WCS FAILURE: Sinkhole, Headwall has pond-to-bay cavity. Intaking
2	E2-10	4/22/2011	20	3.0	Opened 1x48" Disch. to 100%, 2nd 1x48"Disch.to 30% (max), draw down

Pond	Location	Date	Salinity (ppt)	Staff (ft)	Activity and notes
					ops for WCS repair
2	E2-10	5/5/2011	25	2.60	Resume 1x48" Intake 100%.
2	E2-10	5/10/2011	25	2.95	2x48" Intakes 100% resumed.
2	E2-10	5/20/2011	23	3.75	Opened 1x48" Disch. to 25%, Summer Ops resumed (WCS repair successful)
10	E11-1	3/23/2011	19	4.35	Opened 1x48" Disch.to 5%, begin recirc/prep for E11 drawdown.
10	E11-1	4/1/11	19	3.95	Increased 1x48" Disch.to 10%,discharging
10	E11-1	5/17/2011	21	4.20	Increased 1x48" Disch. to 20%, draw down for construction/summer ops.
10	E11-1	5/26/2011	24	3.40	Reduced 1x48" Disch. to 10% for neap
10	E11-1	5/31/2011	23	3.55	Increased 1x48"Disch.to 20% for summer ops.
10	E11-1	11/10/11	28	3.35	Intaking. Reduced 1x48" Disch. to 10%, reflood for winter ops.
9	E8a-1(E9-1)	2/11/2011	23	2.60	1x48" Disch.set to 5%, Opened 2x48" Supplemental Intakes 100%, cont.refill (ALA County E8A construction ops)
9	E9-1	5/5/2011	23	3.70	Closed 2x48" Supplemental Intakes to clear debris. Closed 1x48" Disch.
9	E8a-1	5/13/2011	26	3.50	Opened 2x48" Suppl.Intakes 75% to max E9 water, flow to E14, SNPL ops.
9	E8a-1	5/23/2011	23	4.0	Opened 1x48" Disch. to 10%, draw down for DFG Constr.(DUTRA) Ops.
9	E8a-1	5/31/2011	23	2.0	DUTRA ops: 2x48" Disch.to 35%, 2x48"Suppl.Intakes closed to 10%.
9	E8a-1	6/9/2011	35	2.60	DUTRA ops: Closed 2x48" Disch, Open 2x48" Suppl.Intakes 100% to reflood sys. (SNPL ops).
9	E8a-1	6/13/2011	27	3.50	DUTRA Ops- 2x48" Disch. Closed, 2x48" Suppl.Intakes 100% open.
9	E8a-1	6/27/2011	26	>2.0	DUTRA Ops- 2x48" Disch open, 2x48" Suppl.Intakes Closed (draw down for E14 WCS install).
9	E8a-1	7/19/2011	33	2.50	DUTRA Ops- 2x48" Disch closed, 2x48" Suppl.Intakes 100% open (refill for intake to E14, SNPL ops).
9	E8a-1	7/25/2011	31	3.4	DUTRA Ops- refilled for E14 intake (WCS operable) SNPL/Constr.ops
9	E8a-1	8/3/2011	33	3.05	DUTRA Ops 2x48" Disch. open 100%, 2xSuppl. Intakes 100% open. Draw down for remaining Constr.Ops, WCS demo/breach.
8A	E8A-NC	5/19/2011	23	below	DUTRA Ops 1x48" Disch. 50%, maint. water level, SNPL nests
8A	E8A-NC	6/14/2011	23	below	DUTRA Ops 1x48" Intake gate closed for SNPL/Constr. Ops, WCS demo/breaches.

Pond	Location	Date	Salinity (ppt)	Staff (ft)	Activity and notes
6A	E6A-10	4/1/2011	17	2.70	1x48" Disch. 10%, 1x48" Intake 100%, water level/SNPL mgmt.
6A	E6A-10	6/3/11	10	2.30	Intaking. Closed 1x48" Disch. & Closed 1x48" Intake, draw down for SNPL mgmt.
6A	E6A-10	8/15/11	(100)	1.45	No discharge. Opened 1x48" Intake 10%, begin reflood for migratory shorebird foraging
6A	E6A-10	8/23/11	19	1.40	Increased 1x48" Intake to 25%
6A	E6A-10	8/30/11	26	2.40	Opened 1x48" Disch. 10%, water level mgmt.
6A	E6A-10	9/6/11	20	2.75	Increased 1x48" Disch. to 25%, water level mgmt.
6B	E6A-2	8/23/11	65	1.80	Opened 1x48" Intake gate at North Creek to 25%, reflood for migratory shorebird foraging (no discharge)
6B	E6A-2	9/7/11	40	2.70	Opened 1x48" Disch. to 25%, water level mgmt.

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 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 $\geq$ 5.0 mg/L of dissolved oxygen (DO). When receiving waters do not meet the Basin Plan objective, pond discharges must be $\geq$ 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 E9 as described in the Final Order, as modified by RWQCB. The Department did not utilize continuous monitoring devices in pond E10 for the 2011 discharge monitoring season and did not conduct an applied study. Previous applied study efforts did not provide additional insights into pond management and operations, therefore because pond management and operations cannot be substantially changed without infrastructure reconfiguration, which would require construction activities. Pond salinity was monitored using grab samples and water levels, waterbird use and other observations were also monitored weekly.

The Department and its contractor modified operations in Pond E9, E8A and E8X to facilitate SBSPRP Phase One construction activities. Pond E9 was drawn down by discharge operations with gates opened 100% and supplemental intake gates 100% closed (2 culverts remained open). This condition may be described as muted tidal, with in/out-flow occurring continuously through two 48-inch open culvert pipes, and continued through the monitoring season until the water control structures were removed and levee breaches were completed. The first levee breach occurred in Pond E8A in mid-September, 2011, followed by additional breaches in E8A and E8X, and the final levee breach in Pond E9 was completed by the end of October, 2011. Thereafter, Ponds E9, E8A and E8X no longer functioned as managed ponds and were considered restored to full tidal action as a completed SBSPRP Phase One action.

Pond systems E2 and E2C were operated in 2011 in much the same as in 2010. The operation of these ponds conformed to previously submitted operations plans as no SBSPRP Phase One actions occurred in those systems. No Datasondes were utilized to collect continuous data. Grab samples were collected approximately weekly for salinity analyses along with water levels, waterbird use and other observations to determine pond operations and seasonal management actions in all ponds throughout these systems.

Discharge Time-Period and Volume Estimates:

Estimates of discharge volume provide useful information, used for monitoring of management activities such as modifications to water level operations, evaluation of the effects, if any, of the discharges on receiving waters, and determination of effectiveness of BMPs. RWQCB modified ASMR requirements similarly for the ponds operated by the USFWS. The USFWS contracted technical assistance from the United States Geological Service (USGS), which developed a methodology to estimate discharge volumes using a calculation model (PONDCALC). This method was used by the USGS to estimate discharge from five Alviso Complex ponds. The Department understands that such a tool may be useful to provide discharge volume estimates, however, this information would not provide any additional insights into improved pond management and operations.

Discharge time period information can be interpreted from previously collected continuous monitoring data and is available in the electronic data files. "Table 1: Summary of Discharge Events," provides context for management operations. By using discharge volume percentages (WCS gate settings), multiplied by discharge capacity described in ISP and Operations Plans, a generalized volume may be obtained. 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. For the initial evaluation of discharge time periods, it was 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. Based on observed data, intake requires tide stages that are approximately 1 ½ to 2 feet higher than pond water elevations. Although unknown, discharge from the ponds may have similar head requirements. Nonetheless, discharge event information is useful to put management actions in context with observed habitat and water quality conditions.

Receiving Water Sampling:

Receiving water was not monitored in 2011, since operated ponds discharged directly to the Bay, or, in the case of slough discharges, were maintained within parameters described in Operations Plans and conformed to the Final Order. Bay discharge locations include Ponds E2, E9 and E10. Slough discharge may occur for ponds E2C, E6A, E6B and E8. Receiving water sampling to determine water quality measurements are required only for slough discharges at a substantial volume where a pond is discharged into a slough at a substantial distance from the main body of San Francisco Bay. Pond E2C was operated below 25% discharge capacity.

Management operations for System E2C during 2011 maintained discharge at or below 25% for the entire season. Therefore, no receiving water sampling was conducted.

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
E9-1 (E8A-1)	A	A	A	A	Discharge
E10-1 (E11-1)	A/B/*	A/B/*	A/B/*	A/B/*	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. For days it collects pond water samples or downloads continuous monitoring data, 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 help craft management decisions.

B = From July 7 to October 10, the Discharger shall monitor discharge before pond water mixes with receiving water using a continuous monitoring device, if pond waters are discharging at greater than 25% of culvert 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 is conducted during period when pond was dry (seasonal/construction operations).

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 2011 in all pond systems, on an approximately weekly basis, to determine pond management, intake 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 in 2011 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 in 2011, 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 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, as part of the South Bay Mercury Study.

Invertebrate Monitoring

Invertebrate monitoring was not conducted in 2011. Previous collections (2005-06) proved to be of limited use for analysis and had little applicability to pond operations.

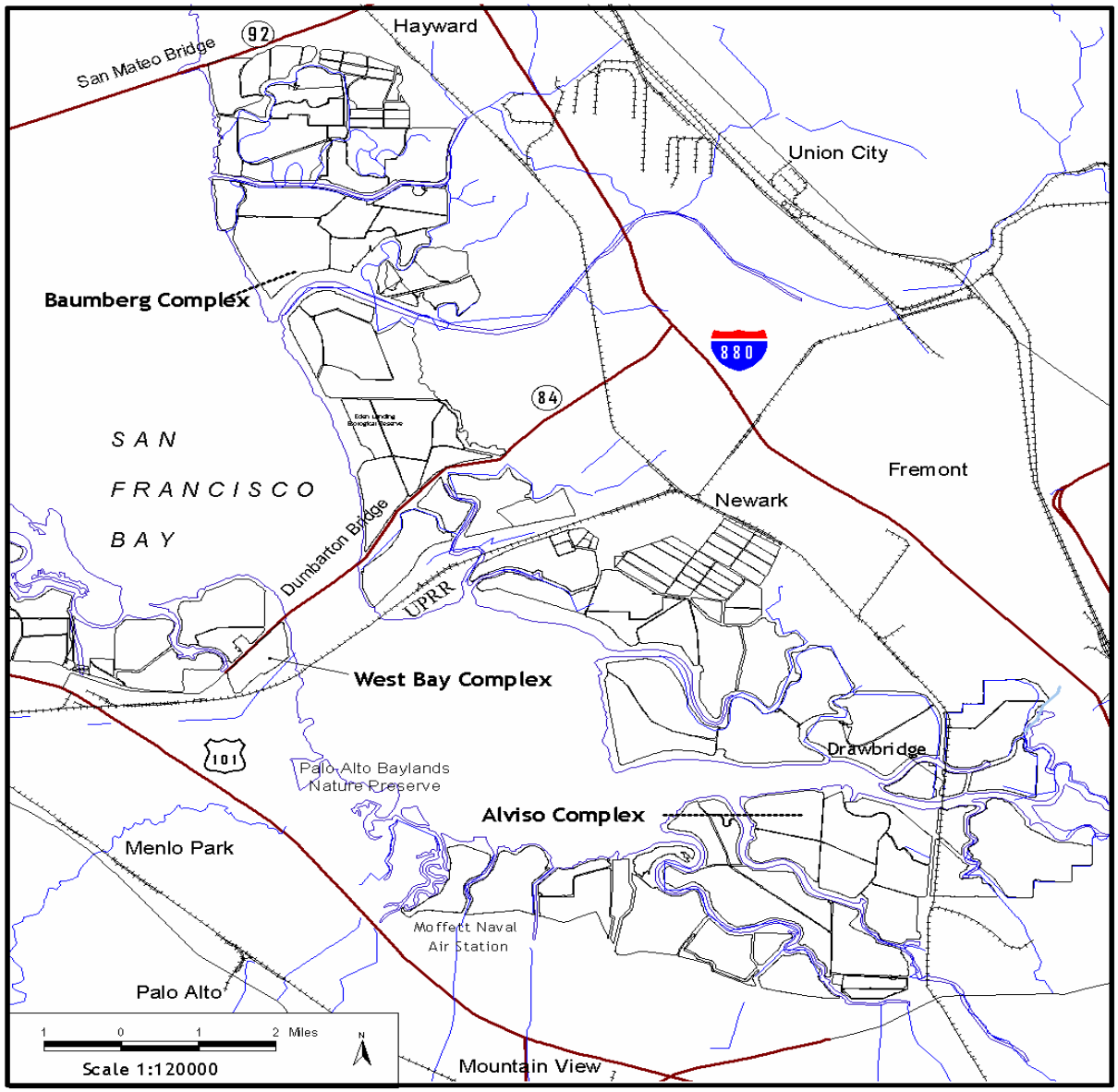

Figure 1. Vicinity Map of the Eden Landing Ecological Reserve (Baumberg Complex) Ponds

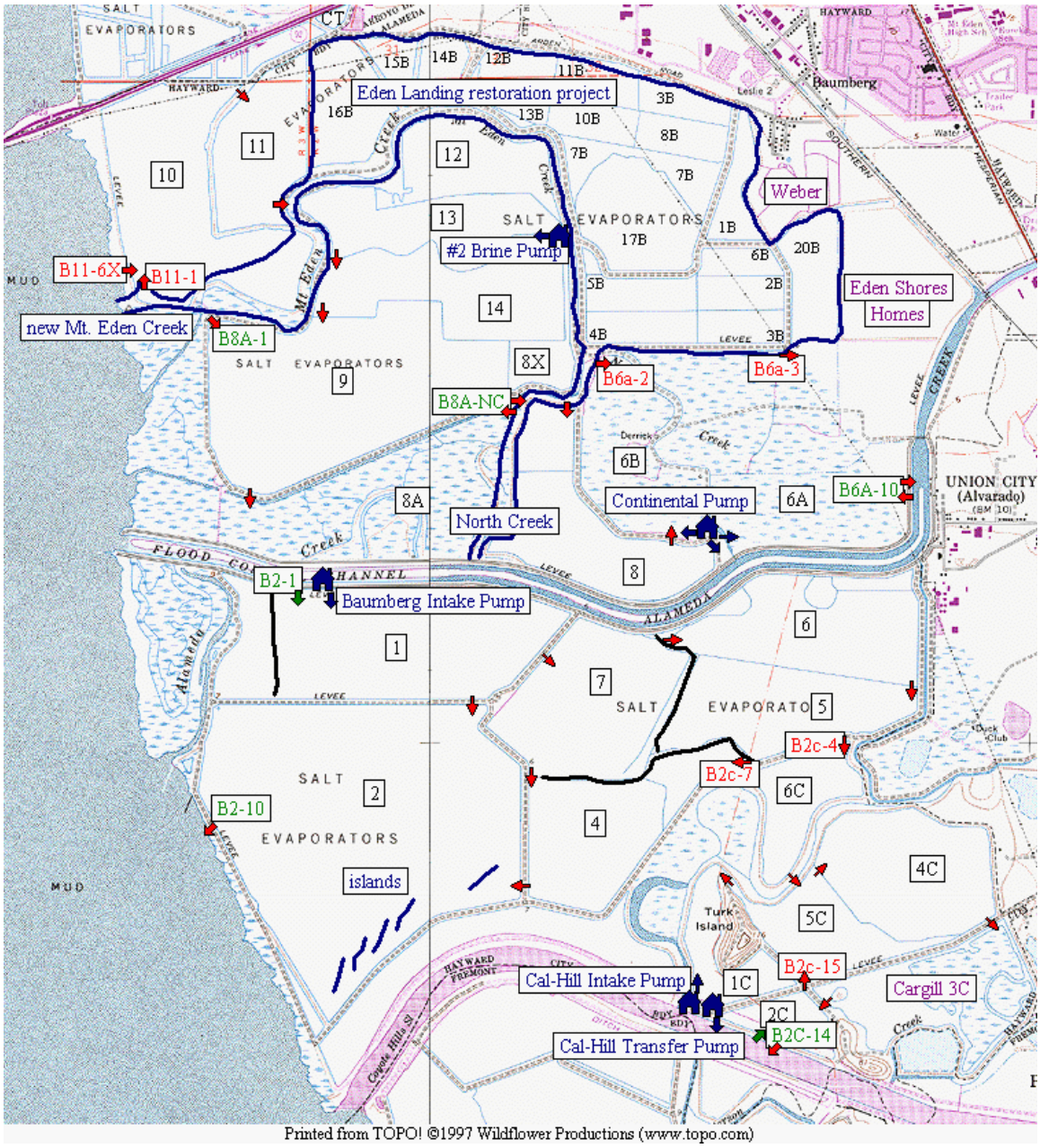

Figure 2. Eden Landing Ecological Reserve (Baumberg Complex) Ponds: Discharge and Intake Locations

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 and "E" nomenclature from SBSP dropped on pond labels)

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 2011 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 2011 as in previous years, based on visual observed conditions.

Salinity data from 2011 were generally consistent with data collected during previous years on comparative calendar dates. In Systems E9, E2, E2C, and E10, salinity during 2011 continued to be similar to those found during the 2010-09 monitoring seasons and somewhat lower than in 2005-08. Typical pond operations in 2011 sustained more consistent and higher discharge gate settings and associated discharge volumes. System E6A salinity is expected to be somewhat higher than other systems with continuous circulation operations, which maintain deeper open water, as seasonal management operations designed to provide WSP breeding habitat result in shallow water with less circulation flow. However, limited pond operations were sufficient to maintain water quality and WSP habitat conditions.

Temperature has generally been consistent across years since monitoring at the ELER began. Dissolved oxygen has been more difficult to interpret and has been highly variable across the years. Similarly, pH has also been variable and difficult to interpret in regards to how management activities may have affected pH as compared to ambient conditions.

The 2011 pond water monitoring results (grab samples) and field observations file is maintained in a large spreadsheet file and is 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 reviewing 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**.**

Salinity

Pond salinities in 2011 were similar to those observed in previous years. Current management operations that sustain higher volume discharges more effectively maintain salinity below the discharge limit of 44ppt. Conversely, in 2005-08, the low rainfall during the winter seasons and periodic reduction or suspension of pond discharges resulted in reduced circulation within the ponds and resulted in subsequent higher salt

content. Conducting pond operations with limited discharge and reduced intake volumes, as in 2005-08, appeared to retard mixing and dilution and resulted in overall higher pond salinities, as compared to sustained higher volume discharges maintained in 2009-11. Any brief period of elevated pond salinity may have been a result of WSP management activities to provide nesting habitat, as well as construction-related water level management. BMP's are implemented such that elevated salinity periods are quickly moderated in spring tide cycles, which provide for greater intake volumes and mixing. Maximizing intake to reduce salinity must be balanced against the risk of flooding WSP nests. 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 normal rainfall years, with increased management activity during low and high rainfall years to maintain low to medium salinity managed ponds, reflecting only moderately higher salinities compared to ambient water conditions in 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 salinity in seasonal or batch pond operations. Batch and seasonal ponds are allowed to reach moderately high salinities, but are generally not discharged when salinity is higher than 40ppt. Batch ponds are sufficiently mixed with system ponds before discharge. Batch and seasonal ponds are periodically reflooded to reduce salinity to levels below 40ppt and then discharge may resume. Batch and seasonal pond operations do not prevent continued management of primarily low salinity ponds.

E9:

System E9 was operated as a muted tidal system, primarily via Pond 9, with intake and discharge at the same location (E8A-1) adjacent to the historic mouth of MEC. Supplemental intake and secondary discharge occurred in Pond 8A, via North Creek. Ponds E8A, E8X and E9 were restored to full tidal action in September and October, 2011. The seasonal ponds, E14, E13 and E12 are expected to be fully reconfigured in 2012-13 for intensive pond management as part of the SBSPRP Phase 1 Actions. These actions require multiple years for construction to be completed. Pond operations are described below and more fully in the updated Operations Plan. Further background information is described within the environmental compliance documents for the SBSPRP.

Pond System E9 had substantially modified operations in 2011, to facilitate construction activities and full tidal restoration. Pond E9 was drained to the maximum extent feasible to allow for construction of actions, including levee lowering activities and new water control structures to be constructed along the southern Pond E14 levee. Discharge from Pond E9 occurred to the bay immediately adjacent to the mouth of Mt. Eden Creek. Pond E9 discharge was monitored using grab samples for salinity, water levels and waterbirds use. A continuous monitoring device was not used. Management of this system was

maintained to provide habitat for waterbirds to the extent feasible while allowing construction activities to implement full tidal restoration in 2011. Intake to and discharge from Pond E8A via North Creek was also similarly modified for construction activities and full tidal restoration actions. Discharge operations were sustained at higher volumes again in 2011 to facilitate construction. It was not necessary to temporarily suspend discharge during normal operations since lower salinity was maintained overall. Discharge was only suspended during short periods to allow reflooding after draw down occurred. Review of 2007-09 data did not show an appreciable increase in water quality across all parameters using the temporary suspension of discharge BMP; therefore, suspension of discharge did not occur for normal operations since 2008.

In May, 2011 at the start of the monitoring season, average observed discharge salinity from Pond 9 was approximately 23 ppt (28 ppt in 2010, 32 ppt in 2009, 2008), which is considered a normal value at the start of summer operations. Salinity at this level indicates that the system was maintained as a low salinity system with normal rainfall the previous winter. This system reached winter water depth targets in early January, and was drawn down for construction operations until the end of February. Thereafter, E9 was reflooded to winter water depth until summer operations began in May. Operations were modified periodically from May through September for construction. Shallower water depths were observed during modified operations achieved by periodic draw down, with higher than normal discharge and reduced intake in the summer. The average salinity over the entire May-October monitoring season (obtained from grab samples) was 27 ppt (36 ppt in 2009-10, 37 ppt in 2008). Grab sample salinities in 2011 were not above 33 ppt. (42 ppt in 2010, 44 ppt max in 2009, 42 ppt max in 2008). Grab sample salinity ranged from 19-33 ppt in May-September, 2011 (30-41 ppt in 2010, 30-44ppt in 2009, 33-42 ppt in 2008). Intake and discharge was actively managed for construction in 2011, with operations reflecting grab sample data.

Periodic draining of Pond 9 waters for construction effectively normalized pond salinity to ambient slough and Bay water conditions at the mouth of MEC. After periods of near complete dewatering discharges to MEC, especially for periods of more than one day, during spring tide cycles and construction required operations, system salinities remained normalized to ambient slough and Bay salinities.

E10:

System E10 was operated with typical management activities, with intake and discharge at the same location (muted tidal operations) at the mouth of MEC. It was not necessary to drain and dry Pond E10 to facilitate construction in 2011, therefore E10 was operated as open water for the summer. Pond E11 is operated as a seasonal pond and is allowed to drawn down and dry during the summer. Average salinity during the summer monitoring season in E10 was 26 ppt. Salinity in E10 ranged from 20-33 ppt in 2011 (28-36 ppt in 2010, 30-41ppt in 2009, 32-44ppt in 2008). At the start of the monitoring season in early-May 2010, salinity in E10 was approximately 20 ppt at the E11-1 discharge location (27ppt in 2010, 32ppt in 2009, 33ppt in 2008). Observed salinities were not above 44 ppt in 2011 (0 days in 2009-10, 2 days in 2008) and the system had typical low salinity conditions.

E2:

System E2 is operated as a flow-through circulating system, with primary intake in Pond E1 and discharge at Pond E2. This differs from all other pond systems, which are operated as muted tidal systems where primary intake and discharge as is done at the same location. However, System E2 operations included supplemental intake at the E2-10 discharge location at the bayfront. Salinity values were well below discharge limits, as compared to being near discharge limits in previous years, reflecting higher winter rainfall (43ppt in 2010, below 44ppt in 2009, 2008) for the entire season**.** Observed salinity at the E2-10 discharge at the beginning of May, 2011 was approximately 25ppt (37ppt in 2010, 42ppt in 2009, 39ppt in 2008) and ranged from 22 to 37ppt during the season (25 to 42ppt in 2010, 33-56ppt in 2009, 38-45ppt in 2008). Salinity for the majority of the 2011 season based on grab samples averaged 29ppt (37ppt in 2010, 40ppt in 2009, 42ppt in 2008).

E2C:

System E2C is operated as a muted tidal system, by intake and discharge at the same location. Salinity, therefore, varied depending on duration of intake periods resulting from spring and neap tide cycles. Grab samples obtained during routine pond operations prior to May 2011 showed values ranging from 9 to 23 ppt, (17 to 29 ppt in 2010, 27 to 40 ppt in 2009, 16 to 37 ppt in 2008), and grab sample monitoring values during the 2011 monitoring season from May through October showed pond salinities from 9 to 38 ppt (23 to 40 ppt in 2010, 30 to 44 ppt in 2009, 2008). Higher salinity values are typically observed during neap tide periods when there is less pond intake and circulation at the discharge location. During spring tide periods, sufficient tidal mixing results in more moderate salinity observations. Salinity in E2C was well below 40 ppt throughout the season. In 2011, the pond water transfer BMP, where Pond 2C water is allowed to drain into Pond 5C and intake is increased at Pond 2C, was only performed as necessary to provide suitable pond foraging and roosting habitat for migratory shorebirds. Intake of circulation pond water into seasonal ponds generally occurs in the fall, whereas simple pond draw down occurs in the spring. Generally, BMP's such as weekly discharge timing and minimizing discharge volumes adequately protected receiving waters. The system was operated assuming typical low salinity conditions, and average salinity over the entire monitoring season (May through October) was 27 ppt (37 ppt in 2010, 36 ppt in 2009, 39ppt in 2008).

E6A:

System E6A was operated as a seasonal pond complex, with capability for flow-through circulation or independent, muted tidal operations. Salinity values at discharge locations were below discharge limits during active intake and discharge periods**.** From May to August, pond operations were seasonal with the primary habitat management targeting WSP, providing periodic intake to make up water evaporated and allowing no discharge operations. After WSP broods were fledged in late August, muted tidal operations began Water levels were allowed to fluctuate for the remainder of the summer monitoring season and muted tidal operations began to improve circulation. Observed salinity at the E6A-10 discharge (E6A to Old Alameda Creek) at the beginning of September, 2011 was

approximately 25ppt. Salinity observed during muted tidal operations in September ranged from 20 to 28 ppt. Observed salinity at the E6A-2 discharge (E6B to North Creek) at the beginning of September, 2011 was approximately 40ppt. Salinity observed during muted tidal operations in E6B in September averaged 33 ppt and ranged from 26 to 40 ppt. Pond E8 was operated as a seasonal pond with no active intake and discharge operations.

pH

For 2011, no Datasondes were utilized to collect instantaneous or continuous pH values, rather ponds were managed based on construction, biological resource management and sensitive species requirements. Based on salinities, pond depth, observed conditions and waterbird use, typical pond water quality conditions were assumed to be similar during the 2011 monitoring period as in previous years. In 2009, sampled pH values at the discharge ranged from a minimum of pH 7.6 to a maximum of 8.6, although higher values were found in more distant areas of E10 associated with poor circulation (8.2-9.6 pH during August, 2009 transects). In 2008, values ranged from 7.74 to 10.02 at all locations, including mid-pond and more distant, poor circulation areas. Receiving water sampling in 2007 showed that a discharge "signal" was not discernable except in the immediate vicinity of the discharge. Compliance for pH levels was allowed in the Final Order to be measured in either the pond or receiving waters, as determined by the discharger. There was no apparent pattern in pH values as related to discharge operations. In E10, during the 2009 monitoring period, pH varied less extensively at the discharge (pH = 7.5-8.5 at E10-1) than in previous years, with instantaneous values ranging within one pH point over the season, compared to two pH points in 2008. During pond transect sampling in August, 2009, pH values ranged from 8.2 in areas with adequate circulation to 9.7 in areas with poor circulation. In other ELER pond systems in 2009, pH similarly ranged approximately one pH point over the season. In Pond E2C, grab sample pH values ranged from approximately 8.0 to 8.6 during the 2009 season (7.7 - 8.6 in 2008) and pH averaged 8.2 (8.2 in 2008) throughout the season.

In Pond E9 during 2009, grab sample pH values ranged from approximately 8.1 to 8.6 (7.8 to 8.6 in 2008) and pH averaged 8.1 (8.2 in 2008).

In Pond E2, grab sample pH values ranged from approximately 8.0 to 8.6 during the 2009 season (8.2 to 8.6 in 2008) and averaged 8.2 pH (8.2 in 2008).

In pond E10 during 2009 continuous data collection, daily mean and grab sample pH ranged from approximately 7.9 to 8.5 throughout the monitoring season, including in-pond transects (7.9 to 10.0 in 2008). 2009 instantaneous values ranged from 7.4 to 8.7 pH, and averaged 8.0 pH, throughout the season (7.76 to 10.29, average 8.4 in 2008).

Temperature

Water temperature data were not collected in 2011. However, since the Department began operations and management of the ponds at the ELER for waterbirds, pond water temperatures were generally similar to ambient Bay and slough temperatures and were

only slightly warmer during hot weather periods, primarily in shallower ponds. The ponds easily met the temperature discharge limits, not exceeding ambient temperatures of the receiving waters by 20°F in any case. In 2009, E2C, E9 and E2, season average grab sample temperature was 22° F, 21° F and 20° F (22.° F, 20° F and 21° F in 2008), respectively. For E10, the 2009 season average of daily mean temperature was 20.8° F (19.5 ° F in 2008).

Dissolved Oxygen (DO)

Since grab sample values are highly variable, considering the diurnal pattern observed in previous years, no pond dissolved oxygen values were collected for the 2011 monitoring season. In past years the ponds showed a pattern of periods of low or sustained depressed DO, demonstrating that achieving compliance with the Final Order is problematic. Monitoring efforts showed that DO levels in the ponds generally continued to exhibit 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 the cause of diurnal fluctuations of DO levels throughout the ELER Ponds during the summer. In 2011, large algal blooms were notably less prevalent and persistent, due to annual variation patterns that are not well understood as to relationships or correlations with annual weather, pond conditions and pond management operations.

Applied Studies

An applied study was not conducted in Pond E10 during 2011, as approved by RWQCB, since previous studies did not contribute new information and it is understood that substantial improvement in water quality would only be feasible by reconfiguring ponds. It is expected that reducing residence time by constructing infrastructure improvements (new levee segments, water control structures, etc) would improve pond operations, however such actions are not applicable to on-going operations. A reconfigured pond system will be constructed during 2012-13 as part of the SBSPRP Phase One Actions in Ponds E12 and E13.

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

It is recognized that it will not be feasible for a well-operated lagoon/pond system to continuously meet an instantaneous DO limitation of 5.0 mg/L as specified in the Basin Plan (based on the national criteria published by the U.S. Environmental Protection Agency [USEPA]). It is also understood that a stringent interpretation of this limit is not necessary to protect water quality, based on review of monitoring data in the Bay, site-specific standards work in recent years in the Everglades and Virginian Province (Cape Cod, MA to Cape Hatteras, NC), and data collected by USGS in Newark Slough in 2005, 2006 and 2007. The Department maintains that DO levels lower than 5.0 mg/l naturally occur in estuaries and lower values, therefore, do no necessarily implicate pond discharges.

For most of 2011, the second stage of construction for Phase 1 of the South Bay Salt Ponds Restoration Project was completed. Modified pond operations were implemented

as appropriate, but should be considered within the range of normal pond management operations. Discharge gates were routinely set at approximately 15-25% open on average, with gates set as high as 100% open for brief periods. The increased pond discharge gate settings minimize pond water levels, required for construction activities, and also allow some ponds to be operated as seasonal ponds.

To address normal pond seasonal depressed DO levels, as observed in previous years, several operational strategies or BMPs were routinely implemented, as described herein and in the individual system operations plans. The Department evaluated BMPs such as closure of discharge gates during periods of time when the data indicates that DO would be below the 3.3 mg/L trigger. An example of this BPM would be the cessation of pond discharges during the low diurnal DO time period of approximately 10 pm to 10 am. The intent of this BPM would be to avoid the daily period of time when low DO within the ponds occur, with subsequent pond discharge occurring after DO had increased to sufficient levels, achieving standards described the Final Order. However, 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, however, use a weekly discharge timed BMP to minimize discharge of low DO waters during "trigger" value periods. Weekly discharge timing entailed setting pond discharges at greater volumes when DO conditions are low in association with corresponding periods when daytime tides are also low. The result of this BMP is that the majority of pond discharges occur during the daytime when photosynthesis increases the pond DO levels.

During particularly weak (neap) tide periods, intake is limited and pond water has the least turnover. This management operation substantially reducing the discharge volume for an extended duration minimizes potential affects on receiving waters. However, under this practice, improvements to pond water quality do not occur because of the lower turnover and higher residence time (less circulation and less mixing). In reviewing 2005-08 data, it appears that ceasing discharge for prolong 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, even at reduced 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 the ponds during modified pond operations were similar to ambient conditions in sloughs and the Bay, since most daily intake waters were fully or nearly fully discharged at low tide.

Refer to Table 1 for a full summary of discharge events and gate settings in 2011.

Compliance Evaluation Summary

Maintaining dissolved oxygen levels in the ponds within water quality objectives and Final Order requirements has been the most notable management challenge discovered during operation of the ponds as part of the Initial Stewardship Plan and subsequent

SBSPRP Phase One actions. A number of BMPs were developed and evaluated to determine if they are sufficient as corrective actions that can be effectively implemented, beginning in 2005 and continuing through 2009, in an attempt to raise dissolved oxygen levels in the ponds. Some of the BMPs appear to be more effective than others, but it is still uncertain if the BMPs consistently 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 results of monitoring and data evaluation, management operations in subsequent years will continue to be modified as appropriate to attempt to determine which methods of operation most improves water quality objective and Final Order compliance.

Previously, RWQCB suggested using some of the BMPs implemented by USFWS which appear to be successful in the Alviso Pond Complex, including installation of baffles, which direct water from portions of ponds expected to have higher DO values and block off lower DO waters caused by substantial algal mats, to help improve DO values at the discharge. The Department no longer considers the use of baffles as practical or effective pond operational measures since they were not expected to improve DO levels at discharge ponds. As discussed previously, deep borrow ditches do not generally surround ELER ponds, and the ponds are more consistently shallow than the Alviso Ponds due to operations and maintenance and land-use practices. Improvements that would be more appropriate than baffles may be implemented as part of future actions, such as changes in pond topography or geometry that could address deficiencies in achieving water quality objectives.

Strong diurnal patterns to DO levels are known to occur at the ELER complex. However, ceasing discharge on a daily basis is not a practicable means to avoid discharge of low DO waters, nor is such pond management/operation likely to improve water quality. Conversely, cessation of daily pond discharges may, in fact, decrease water quality. BMPs such as weekly discharge timing, reduced discharge gate settings and draining system waters to seasonal ponds to increase intake were implemented by the Department at ELER to address low DO values and appear to be sufficiently protective of receiving waters. For all systems operated in 2011, pond water discharges were not observed to result in adverse affects in receiving waters, as discharge to sloughs and the open Bay is quickly dispersed. At lower tides the discharge is spread over extensive mudflats. In 2011, discharge gates were generally set to allow increased discharge volumes compared to previous years. This was done 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 BMP in which large volumes of system pond waters are drained into adjacent seasonal ponds (for systems which have dry ponds to efficiently receive system water) may successfully improve water quality in discharge ponds and within the overall systems. Similarly, muted tidal ponds with modified pond operations for construction would be expected to have similar water quality values to the sloughs and Bay.

Data Collection, Evaluation and Communication

In 2011, sufficient data were collected for monitoring purposes using salinity grab samples and collection of pond water level data, as well as waterbird use number ranges and patterns. It should be noted that pond operations were monitored as often as possible, given staff limitations.

In 2011, the Department provided data to the RWQCB staff on an as needed basis. The Department conducted its own, limited monitoring in 2011, considering the substantial modified pond operations throughout the ELER complex to implement SBSPRP Phase One construction activities. With the same Department staff conducting monitoring, reviewing, and interpreting data, the Department has generally been able to consider and implement operational and management decisions effectively. Pond operations and management data is provided to the RWQCB by FTP site posting and retrieval, rather than by means of this report.

Final Order requirements regarding communication of compliance to the RWQCB was considered to be satisfactorily completed by email, telephone and face-to-face communication of observed conditions. Additionally, the Department has supported providing data to RWQCB by posting files to its FTP site. This continued dialogue is helpful in addressing concerns conveyed by means of conversations and written communications between the Department and RWQCB staff and are useful in determining appropriate pond management operations.

Summary and Implementation Schedule for Phase 1 Actions and Requests for Revisions to SMP:

The Phase One actions of the SBSPRP at ELER include tidal salt marsh habitat restoration, managed pond reconfiguration, and recreation/public access actions, as well as monitoring activities and applied studies. SBSPRP Phase One actions will restore a mosaic of habitats, including tidal salt marsh, tidal mudflat, salt panne, subtidal flats and channels, sloughs, ponds, marsh ecotones/upland transition zones, and open water habitats (managed ponds), to support populations of fish and wildlife, special-status species, migratory waterfowl, shorebirds, and anadromous and resident fishes. Phase One tidal salt marsh habitat in Ponds E8A/E9/E8X and are expected to begin developing within two to five years, with more complex habitat developing thereafter, following the completion in 2011 of levee breaches, proceeded by excavation of pilot channels through the fringe marsh outboard of certain levee breaches, levee lowering, and the installation of borrow ditch blocks. The E8A/E9/E8X tidal marsh habitat is expected to develop over the 50 year project planning period and encompass the entire 630 acres of restored ponds.

Also included in Phase One at ELER is reconfiguration of Ponds E12 and 13, which is expected to commence after completion of the tidal marsh restoration actions. Reconfiguration and management of Ponds E12 and E13 as a small-scale salt pond

system to create 230 acres of high quality shallow water foraging areas at varying salinities and 6 constructed nesting islands. This action will include the replacement of an existing pump, installation of three new water control structures for intake and discharge, development of an internal water circulation system using a series of berms and flashboard weirs, and the construction of nesting islands. Reconfiguration of Ponds E12 and E13 will create shallow water foraging habitat for resident and migratory shorebirds, with a range of salinities, and a limited number of islands for nesting bird habitat. Activities at Ponds E12 and E13 will test the extent to which focused management of shallow water habitats can increase migratory shorebird densities and the importance of salinity on the density of foraging shorebirds and their prey. Activities at these ponds will also evaluate techniques for water and salinity management. Ostensibly, Pond E14 has been reconfigured, since the levees surrounding this pond abut the levees constructed for tidal restoration (E9/8A/8X) and the reconfigured managed ponds (E12/13). E14 operations are expected to remain similar to the ISP and be managed as a seasonal for WSP management activities. Engineering plans, specifications and estimates for E12-E13 are expected to be 100% complete in Summer, 2012, and award of the project to the successful bidder and subsequent construction activities are expected to begin by Fall, 2012. Construction is anticipated to require two construction seasons, to be completed by the end of 2013.

Evaluation of anticipated pond management and operations requirements, along with monitoring data collected since 2004 continues to inform the design of Ponds E12, E13 and E14 such that minor modifications to the geometry of the reconfigured managed ponds, along with sufficient capacity of new water control structures is intended to improve water quality, particularly dissolved oxygen levels.

Planning for SBSPRP Phase Two actions has begun, and the Department is formulating potential restoration actions along with other partner agencies on the SBSPRP Project Management Team. Until Ponds E12 and E13 are reconfigured and operational, no new data collection is proposed to provide a framework for developing a site-specific objective for dissolved oxygen in managed ponds.

Operations and Maintenance activities in 2011 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 2012 operations and monitoring results, and will make requests for alterations to the new Final Order as appropriate in future reports.

ATTACHMENT:

2012 Pond Operations Plans