2010 Self-Monitoring Report
Baumberg Complex - Hayward, California
Eden Landing Ecological Reserve

Order Number: R2-2008-0078

Prepared for:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Prepared by:

Bay-Delta Region
California Department of Fish and Game
John Krause, Associate Wildlife Biologist
Eric Larson, Biological Programs Manager
7329 Silverado Trail
Napa, CA 94558

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Introduction

This annual self-monitoring report summarizes the water quality monitoring and pond management sampling conducted by the Department of Fish and Game (Department) from May through October 2010 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 were operated by the Department in 2010 and are described in the Initial Stewardship Plan (ISP), including Systems E10 (B11 in ISP), E2, E2C and E9 (B8A in ISP).

Data was collected by Department staff in accordance with the waste discharge requirements. Water quality monitoring was performed in 2010 using grab samples only. Continuous data recorder use was not required nor was it feasible due to modified operations required for construction activities as part of Phase One of the South Bay Salt Ponds Restoration Project (SBSPRP). In 2010, intake and discharge in Ponds E10 did not occur for the majority of the summer monitoring season. Additionally, E9 operations were substantially modified due to construction activities.

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 2010 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 2010, operation of all systems was within prescribed salinity parameters. Other water quality parameters were not regularly sampled, since construction activities restricted operations in many ponds. 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 conducted in 2010, due to on-site construction activities. 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.

For water quality monitoring, 2010 activities did not include continuous discharge monitoring and an applied study in Pond E10 was not conducted. Pond E10 was not operated during most of the summer, thus continuous monitoring and an Applied Study were not conducted for that pond. Similarly, E9 operations were modified during the monitoring period. Additional analysis and interpretation of monitoring data is not expected to be completed nor submitted for 2010.

2010 Annual Summary

Construction activities in support of SBSPRP Phase One actions began in ELER in the summer, 2010, and included work in Ponds E10, E8X, E8A, E9, E12, E13 and E14. The construction activities will be conducted over 2 years (i.e. in 2010, Stage 1 construction, followed by Stage 2 in 2011). Pond E10 was drained and intake was prevented by modifying the water control structure (WCS) located between Mt. Eden Creek (MEC) and Pond E10 to facilitate construction of a new levee segment within the pond. The

levee realignment is required to accommodate expected hydrological and geomorphological changes associated with SBSPRP Phase One actions to restore ponds to tidal salt marsh. Ponds E8X, E8A and E9 are expected to be restored to full tidal action in the fall, 2011. Full tidal restoration requires completion of levee construction bordering the area to be tidally restored using material obtained from levee lowering areas, followed by breaches at historic slough locations. Ponds E12 and E13 will be fully reconfigured as part of the SBSPRP Phase One actions. E12 and E13 will be subsequently 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. Current operations in E12 and E13 provide seasonal habitat, particularly for Western Snowy Plovers (WSP). The E12 and E13 project is to be completed in 2013.

The 2010 monitoring season required only periodic collection of monitoring data to inform pond management for ELER ponds. Such on-going monitoring continues to sufficiently inform pond management in the summer and winter seasons. Targeted monitoring efforts would be useful to continue to address areas of uncertainty. Pond management operations and intrinsic pond dynamics related to compliance with the RWQCB Final Order are discussed in greater detail below.

Water quality monitoring at the ELER ponds was modified but conformed to the Final Order. Only salinity and water levels were used for the 2010 season to monitor water quality due to modified operations associated with construction and because pond operations and monitoring did not indicate that the ponds were operating outside of expected ranges. No abnormal conditions, such as fish kills, were observed and salinity and water levels within the ponds and discharge locations were within target ranges. While no continuous data was collected for the pond systems that were operated, it is expected that there may have been brief periods of low DO again in 2010. 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. There appears to be some correlation with abiotic factors, such as spring and neap tide periods, weather conditions, and seasonal variations. It is likely that biotic factors affect DO levels, such as algal growth and growth and/or usage by pond invertebrates or larger animals, including fish. Observations of note include absent or reduced areas with large, green algal mats, while typical amounts of macroalgae were found in the water column and living and necrotic mats were observed on the pond bottom.

Pond management activities and the observed water quality conditions in 2010 appeared to be within ranges and conditions of a typical year. Pond operations were similar in 2010 to 2009 in systems that were operated "normally" (as compared to modified or operations that were ceased in association 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. 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 performed in 2010 for normally operated ponds.

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 conducted in all operating ponds and throughout the systems from May-October. The pond systems south of Old Alameda Creek were operated similar to 2009 and previous years, while north of Old Alameda Creek were regularly operated or managed as seasonal (dry) ponds to facilitate construction activities; modified operations were managed with information gathered typically on a weekly basis, rather than with continuous monitoring devices.

Under normal summer operations, water levels in the ponds are adjusted throughout the season depending on tide cycles, weather, habitat targets and response of species of interest. Management activity for the systems was relatively lower than in previous years, considering Ponds E10, E9, E8A and E8X, E14, E13 and E12 were affected by construction for much, if not all, of the monitoring season.

Ponds in System E6A (E8, E6B, E6A) were managed for WSP breeding, therefore, no discharge operations were conducted. Prior to the monitoring season, the System 6A ponds were drawn down by evaporation after pumping water out of the system using the Continental Pump and siphon under Old Alameda Creek into Pond E6. Ponds E6 and E5 within System E2, typically operated as "batch" ponds, which entails maintaining water levels and allowing salinity to increase to as high as 120-parts per thousand (ppt), were allowed to draw down and partially dry to provide additional WSP breeding habitat within ELER. Additional WSP habitat was provided to minimize any potential adverse affects that may have been caused by construction associated with SBSPRP Phase 1 actions.

For System E2 and E2C operations, adjustments to intake, discharge and pond-to-pond culvert gates were made less frequently than in the past. By 2009, DFG had determined optimum pond discharge settings based on field observations and review of previous years' data. Current or anticipated weather and predicted tidal conditions are also considered. While in previous years it was attempted to minimize discharge of pond waters not meeting water quality objectives (WQO's), including salinity and DO, a preliminary review of data indicates that more consistent, moderate volume discharges improved salinity conditions (lowered salinity). A summary of discharge events is shown on Table 1.

System E2C:

Pond E2C was operated in 2010 similarly to 2009 and previous years. As in 2009, 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 were monitored to determine operation parameters. This system presumably had periods of low DO levels, as observed in 2005-09, 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 2010 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 E2:

Pond E2 operations in 2010 were similar to previous years. A continuous water quality monitoring device was not used, as noted previously for System E2C. Management of this system was performed as described in the Operations Plan and was informed by grab samples collected on an approximately a weekly basis. Grab samples were collected for salinity analyses and water levels and waterbird use were monitored to determine operational impacts on these water quality parameters. It is assumed that this system had periods of low DO levels, as observed in 2005-9, but continued to provide habitat conditions sufficient to support waterbird use. Discharge was never greater than 25% of capacity, occurs directly to the Bay. No abnormal conditions were observed, and therefore, 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 water 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 E6A:

System E6A continued to be operated as a seasonal pond complex. These ponds were allowed to draw down by pumping into System E2 (Ponds E6 and E5) during the spring, followed by continued draw down via summer evaporation, to provide conditions that encourage nesting use by western snowy plovers (WSP), a federally threatened species. This system provided good habitat conditions for waterbirds, including WSP during the latter half of the 2010.

System E9:

Ponds E9, E8A and E8X in System E9 are proposed to for restoration to full tidal action in 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. 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 2010, compared to previous years. This operational modification was implemented to facilitate construction activities. Pond E9 was drained to the maximum extent feasible during extended periods to allow for construction of ditch blocks, levee lowering activities, and new levee construction along Pond E14 among other construction activity. Discharge from Pond E9 occurs to the Bay immediately adjacent to the mouth of Mt. Eden Creek (MEC). Pond E9 discharge was 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. Similarly, an Alameda County Flood Control District (ACFCD) project required modified E8A pond operations. The ACFCD project included beneficial reuse of sediment excavated by ACFCD in Old Alameda Creek (OAC) and placed within the borrow ditch along the E8A-E9 cross levee, to foster more rapid marsh restoration and to adequately mitigate ACFCD's impacts within OAC.

System E10:

Pond System E10 also had substantially modified operations in 2010, to facilitate construction activities. Pond E10 was drained to the maximum extent feasible and allowed to dry to allow for construction of a new levee segment along MEC. The new "set back" levee allows for MEC to widen, as is expected to occur when Ponds E9, E8A and E8X are restored to full tidal action. While the 630-acre area within those three ponds will have additional tidal connections to OAC and North Creek, existing topography and historic slough hydrology is expected to convey most of the tidal prism through the (former) pond E9 and MEC to the Bay. Discharge from Pond E10 normally occurs to the Bay immediately adjacent to the mouth of MEC. Pond E10 was generally operated as a seasonal pond in the 2010 monitoring season. Pond E11 was also operated as a seasonal pond in 2010, as is typical and described in the ISP and previous Operations Plans. Continuous monitoring devices (Datasondes) were not feasible or necessary in Pond E10 during the July-October monitoring period since that coincided with construction of the new levee segment and receiving water sampling was not required.

Due to construction activities and associated pond operations, it was not feasible to conduct an Applied Study (AS) to provide more spatial and temporal information,

particularly with respect to Dissolved Oxygen (DO), as was conducted by the Department in 2009 in addition to the continuous monitoring normally conducted in E10.

During the typical discharge monitoring season, the Department's contractor modified the WCS to preclude intake. Discharge was allowed to occur through one gate, manually opened 100% during low tides. Pond salinity, water levels and waterbird use were monitored weekly until the pond was dry. Fish within the pond were able to exit the pond when it was drawn down. Three 3 large leopard sharks, which were captured in the small remaining pool at the WCS and released into MEC.

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. Continuous meter data (Datasondes) in Pond E10 are summarized herein, 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; Datasonde files are available to others upon request.

NOTE: Table 1 salinity values displayed are generally from field deployed and maintained Datasondes, except occasionally when a hand-held refractometer was utilized; Datasonde values differ slightly from refractometer values collected simultaneously. Datasonde values should be considered more accurate and are generally used for all graphs listed as Figures in this SMR. In some figures, previous nomenclature for ponds are used, as has been the convention. "B" & "E" are interchangeable (Baumberg aka Eden Landing)

Pond	Location	Date	Salinity	Staff	Activity and notes
2C	E2c-14	4/12/2010	~20	3.30	1x48" discharge cont. at 20% during winter ops. Transition to summer ops.
2C	E2c-14	5/6/10	28	below	Red.1x48"Disch.to 5% to refill.pond 2/3 empty
2C	E2c-14	5/17/2010	27	3.55	Increased 1x48" Disch.to 10% to reduce water levels, neap tide.
2C	E2C-14	6/7/10	29	0.9	Red.1x48"Disch.to 5% to refill.pond 2/3 empty
2C	E2c-14	6/17/10	29	3.65	Increased 1x48" Disch.to 20% for spring tides, reduce water levels for shorebird foraging
2C	E2c-14	7/13/10	29	3.60	Increased 1x48" Disch.to 25% for spring tides
2C	E2c-14	7/26/10	31	3.15	Reduced 1x48"Disch.to 10% for neap tides, maintain water levels
2C	E2c-14	8/4/10	31	3.25	Increased 1x48" Disch.to 15% for spring tides
2C	E2c-14	8/13/10	35	2.45	Increased 1x48" Disch.to 25% for spring tides
2C	E2c-14	8/23/10	32	2.75	Reduced 1x48"Disch.to 10% to increase water levels, neap tides, high ambient temp.
2C	E2c-14	10/5/10	33	3.5	Increased 1x48" Disch.to 15% for spring tides.
2	E2-10	3/11/2010	29	2.90	Reduced 1x48"Disch. to 25% (from 50%), begin transition to summer ops.
2	E2-10	3/16/2010	28	3.0	Opened 2x48" intakes 100%.
2	E2-10	5/6/2010	32	3.20	Continue summer ops
9	E8a-1 (E9-1)	5/3/2010	30	4.65	1x48" Disch. at 5% to maintain water levels for winter ops, modified summer ops (construction operations)
9	E9-1	8/13/2010	39	3.10	2x48" Intake/Disch. 100%. Contractor drawing down pond for E9-E14levee construction.

Pond	Location	Date	Salinity	Staff	Activity and notes
9	E8a-1	8/17/2010	37	2.95	Contractor closed 2x48" Disch.
9	E8a-1	8/25/2010	34	2.95	Opened 1x48" Disch. to 10%.
9	E8a-1	9/14/2010	36	2.85	Contractor opened 1x48" Disch. 100%. Cont. draw down pond for levee construction and borrow operations.
9	E8a-1	10/25/2010	30	3.70	Intaking. Increased 1x48"Disch.to 100% for Contractor ops (temp. culvert for E9-E8A (E8A-9))
9	E8a-1	10/27/2010		2.90	2x48" Intake/Disch. 100%. Contractor drawing down pond for construction.
9	E8a-1	11/1/2010	29	~2.5	Contractor ops complete. Closed 2x48" gates, resume 1x48"Disch.at 10%.
9	E8a-1	11/15/2010	33	3.35	Opened 2x48" Supplemental Intakes 100%.Continue transition to WinterOps
8A	E8A-NC	4/7/2010	31	1.40	Pond fully flooded, winter ops; (1x48" Disch. At E8A-No.Crk at 5%)
8A	E8A-NC	5/25/2010	45	0.85	Closed 1x48" Disch.
8A	E8A-NC	7/9/2010		0.60	Reduced 1x48" Intake to 35% for spring tides, SNPL mgmt.
8A	E8A-NC	7/11/2010		0.70	Reduced 1x48" Intake to 5% for spring tides, SNPL mgmt.
8A	E8A-NC	7/14/2010		0.8	Opened 1x48" Disch. 25%, for SNPL mgmt (prevent nest flooding)
8A	E8A-NC	7/15/2010	50	0.65	Opened 1x48" Intake 50% to reduce salinity during SNPL mgmt drawdown
8A	E8A-NC	8/13/2010		below	1x48" Disch. 50%, Contractor gate ops for levee lowering, hauling activities
8A	E8A-NC	8/17/2010	38	below	1x48" Disch. 25%, Contractor gate ops continue for construction activities
8A	E8A-NC	8/25/2010	37	below	1x48" Intake closed. Contractor gate ops continue for construction activities. Pond maintained dry for duration of 2010 construction operations, including borrow ditch fill by Alameda County.
10	E11-1	3/11/2010	23	4.00	1x48"Disch. set at 10%, begin transition to summer ops.
10	E11-1	5/17/10	28	3.75	Increased 1x48" Disch. to 15%
10	E11-1	6/21/2010	29	3.55	Increased 1x48" Disch. to 25%
10	E11-1	8/16/2010	36	2.70	Contractor modified gates; no intake, pond being drained for new levee segment construction
10	E11-1	10/12/2010	34	2.95	Reduced 1x48"Disch.to 25% (from100%), Resumed Pond Ops Contractor work completed, gates restored to typical intake/discharge operation.

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, 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 2010 discharge monitoring season because pond management was changed due to construction activities which necessitated that ,the pond be drawn down and dried. During the typical discharge monitoring system, the contractor modified the WCS to preclude intake and was allowed to discharge by one gate, manually opened 100% during low tides. Pond salinity was monitored using grab samples, and water levels and waterbird use were also monitored weekly until the pond was dry.

Similarly, the Department and its contractor modified operations in Pond E9 and E8A to facilitate construction activities. Pond E9 was drawn down by discharge operations with gates opened 100% and supplemental intake gates 100% closed (2 culverts remained open). Pond salinity was monitored using grab samples, and water levels and waterbird use were also monitored weekly until the pond was dry.

Pond systems E2 and E2C were operated in 2010 in much the same as in 2009. The operation of these ponds conformed to previously submitted operations plans as no construction activity occurred in those systems. No Datasondes were utilized, rather grab samples were collected for salinity analyses approximately weekly in Ponds E2 and E2C as well as other 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 continues to be unable to secure funding to contract a similar effort with USGS, since there is no dedicated annual budget for ELER. The Department understands the usefulness of such a tool to provide discharge volume estimates and will continue to look for opportunities to acquire and use such tools. At this time, the Department does not anticipate funding will be available during the 2011 water quality monitoring period due to the ongoing State budget constraints.

Discharge time period information can be interpreted from continuous monitoring data and is available in the electronic data files, summarized in discussions herein. Table 1: Summary of Discharge Events, provides context for management operations; using discharge percentages, multiplied by discharge capacity described in ISP and Operations Plans, a generalized volume may be obtained. However. the 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.

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 contextualize management actions and BMP's implemented during ponds operations and provides information to complement the broader information contained in the Operations Plans. Discharge quantity estimates, as noted above, also complements this information.

Receiving Water Sampling:

Receiving water was not monitored in 2010, since operated ponds discharged to the Bay, except Pond E2C (which was operated below 25% discharge), as approved by RWQCB in the revised Final Order in 2005. Bay discharge locations include Ponds E2, E9 and

E10. Receiving water sampling to determine water quality measurements are required only for slough discharges, where a pond is discharged into a slough at a substantial distance from the main body of San Francisco Bay (otherwise, Bay discharge receiving water monitoring is not required nor is it practical).

Only one slough discharge (E2C) occurs for ELER, during the 2010 pond operations. 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 in discharge locations were not met should pond waters be discharged at volumes greater than 25% capacity of the E2C system.

Management operations for System E2C during 2010 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 pond E10 before pond water mixes with receiving water using a continuous monitoring device. The Discharger shall also continuously monitor discharges from Pond System E2C, between July 7 and October 10, if pond waters are 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 conducted during period when pond was dry (seasonal) for construction activities**

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:

As approved by RWQCB in 2005, the Department did not regularly conduct pond management sampling in 2010 in all ponds in each system. However, the Department did continue to collect data throughout the season for many circulation ponds where the data would be useful in determining 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 in 2010, 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, in Pond A8 and Alviso Slough.

Invertebrate Monitoring

Invertebrate monitoring was not conducted in 2010. Previous collections (2005-06) proved to be of limited use for analysis and had little applicability to pond operations.

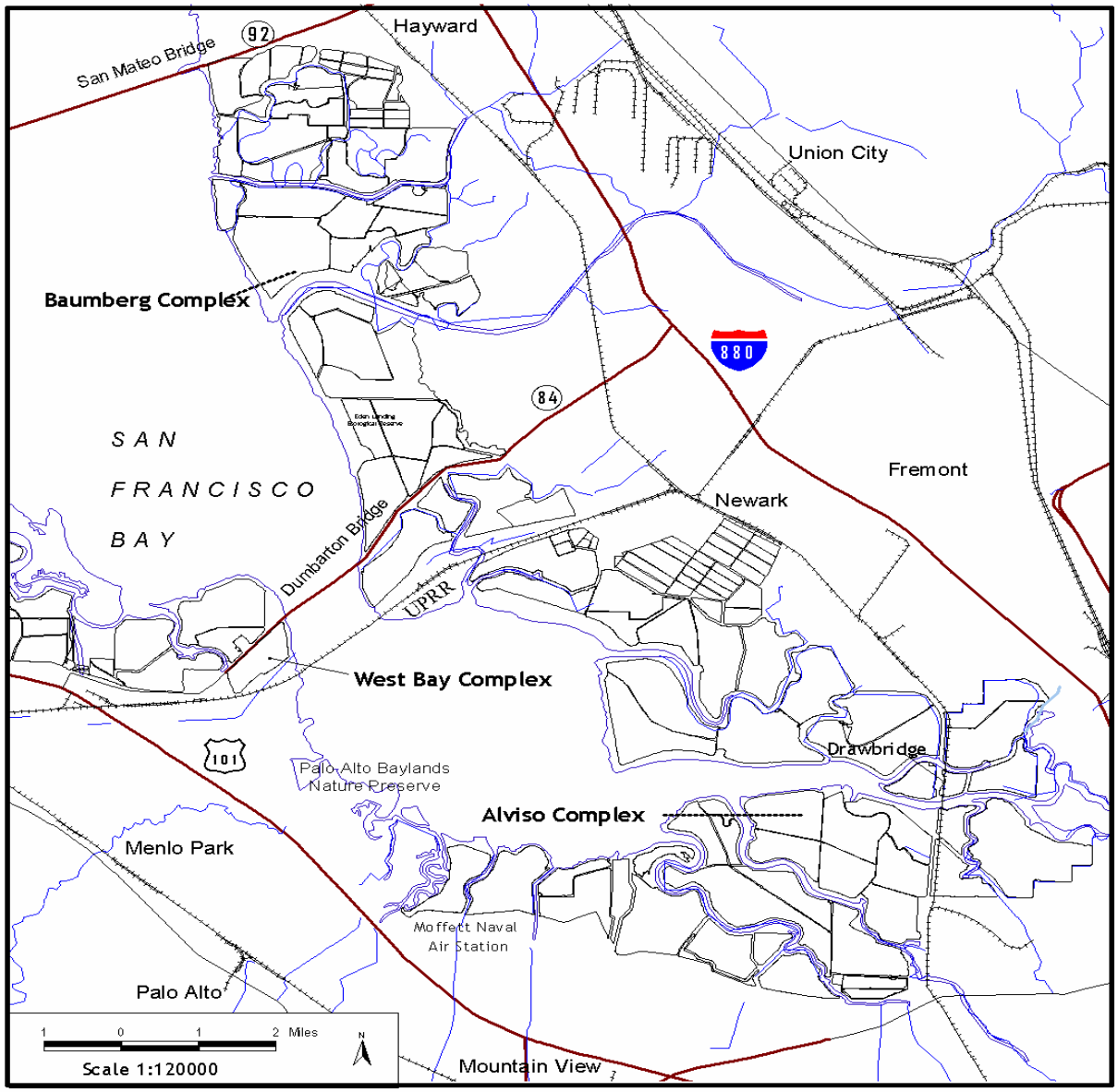

Figure 1. Vicinity Map of the Eden Landing Ecological Reserve (Baumberg Complex) Ponds

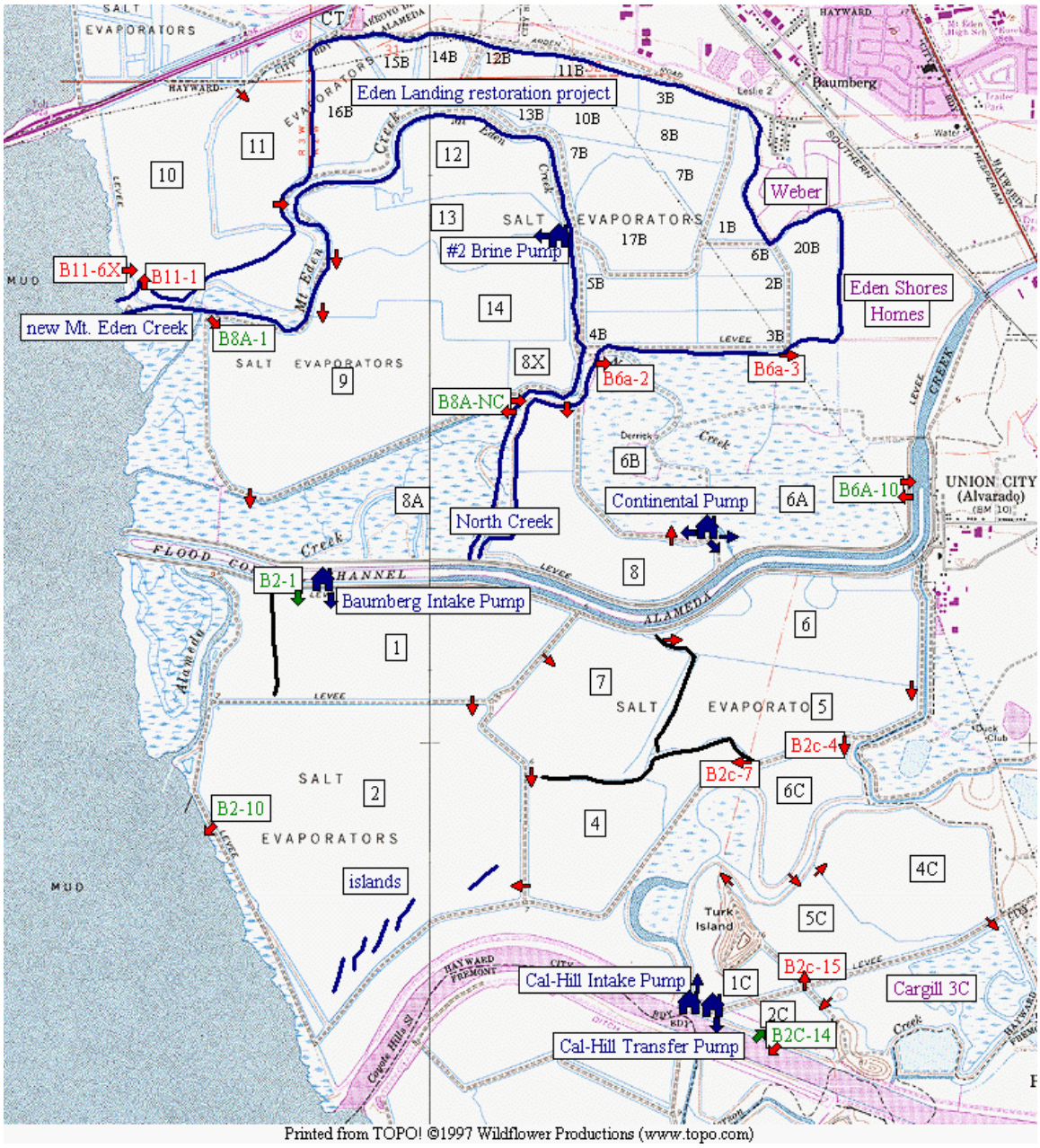

Figure 2. Eden Landing Ecological Reserve (Baumberg Complex) Ponds: Discharge and Intake Locations

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 2010 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 2010 as in previous years, based on visual observed conditions.

Salinity data from 2010 were generally consistent with data collected during previous years on comparative calendar dates. In Systems E9, E2, E2C, and E10, salinity during 2010 continued to be similar to those found during the 2009 monitoring but somewhat lower than in 2005-08. Salinity values in the past two years have been lower due increased precipitation, as compared to 2005-08 which had below average rainfall. Additionally, modified pond operations sustained more consistent and higher discharge gate settings and associated discharge volumes. System E6A salinity continued to be higher, which is attributable to seasonal management operations designed to provide WSP breeding habitat. Intake during the winter of 2010 in System E6A was precluded due to pond management and operations targeting WSP breeding conditions and because we expected salinity levels to remain above 44ppt. Deeper water conditions and corresponding higher salinity levels within this system preclude discharge. Operation of this system seasonally for WSP would require increased pumping to draw down water levels to provide for sufficient nesting habitat. However, funding for such pumping is limited.

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 2010 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 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**.**

As noted in previous annual reports, due to staff and funding constraints, discharge (flow) volume to measure inflow to the ponds and outflow from the ponds, as well as stage heights in the ponds were not measured during the 2010 monitoring period.

Salinity

Pond salinities in 2010 were similar to those found in 2009, reflecting current management operations which indicate that sustaining higher volume discharges more effectively maintains 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, subsequent higher salt content. In 2010, salinities were maintained below the 44 ppt limit by pond operations. Continuing pond operations with limited discharge and reduced intake volumes, as in 2005-08, appear to retard mixing and dilution and result in overall higher pond salinities, as compared to sustained higher volume discharges maintained in 2009-10. An elevated salinity period was observed in E8A, which may have been a result of WSP management activities to provide nesting habitat, as well as construction related water level management.. BMP's were implemented such that during this elevated salinity period, E8A discharge was minimal (5%) while pond salinity was approximately 55 ppt at the maximum. Discharge was ceased when a 55ppt value was observed in June, and pond salinity thereafter raised to a maximum value of 63ppt. Once E8A pond water elevations were no longer likely to risk flooding WSP nests, supplemental intake was resumed, and salinity was reduced to more typical values (approximately 34-43 ppt). 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 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 2010 showed values ranging from 17 to 29 ppt, (27 to 40 ppt in 2009, 16 to 37 ppt in 2008), and grab sample monitoring values during the 2010 monitoring season from May through October showed pond salinities from 23 to 40 ppt (30 to 44 ppt in

2009, 2008). 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. It is apparent that sufficient tidal mixing resulted in more typical salinity ranges. Observed E2C salinity was below 40 ppt throughout the season. In 2010 it was not necessary to conduct periodic implementation of the pond water transfer BMP, where Pond 2C water is allowed to drain into Pond 5C to increase intake at Pond 2C. 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 37 ppt (36 ppt in 2009, 39ppt in 2008).

E9:

System E9 is 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 E9, E8A and E8X in System E9 will be restored to full tidal action in 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. 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 2010, to facilitate construction activities. Pond E9 was drained to the maximum extent feasible during extended periods to allow for construction of ditch blocks, levee lowering activities and new levee construction along Pond E14 among other construction activity. Discharge from Pond E9 occurs 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, including SBSPRP Phase 1 Actions as well as for an Alameda County Flood Control District (ACFCD) project, which included beneficial reuse of sediment excavated by ACFCD in Old Alameda Creek (OAC) that was placed within the borrow ditch along the E8A-E9 cross levee to foster more rapid marsh restoration and to adequately mitigate ACFCD's impacts within OAC.

Secondary discharge via Pond 8A, while typically having higher salinity than Pond E9 would result in system pond water having lesser residence time. However, operation of the pond in this fashion facilitates a slightly increased residence time in the sloughs since there is a greater water transport distance before the sloughs discharge to the Bay. Minimal discharge operation of Pond 8A (5%) results in greater water volumes in the sloughs with associated rapid mixing. Subsequently, this discharge is indiscernible from

slough water immediately outside of the discharge location. Pond 9 discharge is assumed to mix with the open Bay in one ebb tide period.

At the start of the 2010 monitoring season, average observed discharge salinity from Pond 9 was approximately 28 ppt (32 ppt in 2009, 2008), and 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 mid-January, and thereafter operated typically until summer operations were modified for construction. Shallower water depths during modified operations allowed for higher than normal discharge in the latter half of the summer. The average salinity over the entire May-October monitoring season (obtained from grab samples) was 36 ppt (36 ppt in 2009, 37 ppt in 2008). Grab sample salinities in 2010 were not above 42 ppt. (44 ppt max in 2009, 42 ppt max in 2008).

The highest salinity value (obtained from grab samples) in 2010 was 44ppt on 7/8/09, (sampled in E9 at the E9-E8A water control structure), while the sample at the discharge WCS was 34ppt on the same day (at discharge location E8A-1, 44 ppt on 7/8/09, 42 ppt, 7/15/08). Grab sample salinity ranged from 30-41 ppt in 2010 (30-44ppt in 2009, 33-42 ppt in 2008). Discharge salinity was actively managed for construction in 2010, with operations reflecting grab sample data. Discharge operations were sustained at higher volumes in 2010 and it was not necessary to temporarily suspend discharge since lower salinity was maintained overall.. 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 was not utilized in 2008, 2009 or 2010.

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. When E9 dewatering occurred, approximately 2/3 of the pond bottom would be exposed for the duration of neap tide cycles. 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 again limited in 2010, by facilitating construction activities with intensive WSP nesting monitoring. Management for WSP is the primary use of the seasonal ponds.

E2:

System E2 is operated as a circulating system, rather than a primarily muted tidal system as is done with all other ponds. However, System E2 is augmented by muted tidal intake at the E2-10 discharge location to the Bay. Observed salinity at the E2-10 discharge at the beginning of May, 2010 was approximately 37ppt (42ppt in 2009, 39ppt in 2008) and ranged from 25 to 42ppt during the season (33-56ppt in 2009, 38-45ppt in 2008). Salinity for the majority of the 2010 season based on grab samples averaged 37ppt (average 40ppt in 2009, 42ppt in 2008) and were generally below 43ppt (below 44ppt in

2009, 2008) for the entire season**.** The 10/12 elevated salinity observation coincided with a neap tide period which may have resulted in circulation of a "pocket" of higher salinity water to the discharge location. It is apparent that sufficient tidal mixing thereafter resulted in more typical salinity values (33ppt). The system was operated as low salinity ponds since the E2-10 discharge is located directly to the Bay and operates as muted tidal intake/discharge.

E10:

System E10 was operated as a muted tidal system in Pond 10 until construction of the new levee segment began, with intake and discharge at the same location at the mouth of MEC. In August, 2010, Pond E10 was drained and dried. Pond E11 is operated as a seasonal pond and is allowed to drawn down and dry during the summer. Salinity in E10, while operated, ranged from 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 27ppt at the E11-1 discharge location (32ppt in 2009, 33ppt in 2008). Daily mean salinities were not above 44 ppt in 2010 (0 days in 2009, 2 days in 2008) and the system had typical low salinity conditions until it was drained and dried for construction.

Prior to construction necessitated modified 2010 pond management operations in E10, normal operational water levels were observed. Pond discharge operations in 2010 were less frequently adjusted compared to 2008 and were more similar to 2009.

System E10 provided good habitat conditions for numerous waterbirds in E10 until pond operations were modified for construction activities. Nesting island use by Caspian terns was successful, with all birds fledged prior to drying the pond for construction. E11 provided seasonal habitat for shorebirds.

pH

For 2010, 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 2010 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 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 2010. 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^{o}F in any case. In 2009, E2C, E9 and E2, season average grab sample temperature was 22^{o} F, 21^{o} F and 20^{o} F ($22.^{o}$ F, 20^{o} F and 21^{o} F in 2008), respectively. For E10, the 2009 season average of daily mean temperature was 20.8^{o} F (19.5^{o} 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 2010 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 2010, 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.

Continuous monitoring DO values for 2009, as well as the values observed during the August in-pond study, are discussed below for pond E10. Grab sample monitoring values for ponds E2C, E9 and E2 are also provided, but are less representative of variance over each day, week and season, since those values are only from samples taken during the day. However, if any periods of sustained, depressed DO conditions had occurred in those ponds, grab samples would have reflected those periods. Management

actions were implemented as appropriate. Evaluation of Pond E10 s is based on daily mean values recorded at the discharge location and on calendar-weekly 10^{th} percentiles. Values are referenced with the Basin Plan water quality objectives (compliance limit of 5.0 mg/L) and reporting "trigger" values established by RWQCB (below 3.3 mg/L), as discussed herein. Calendar-weekly tenth percentile "trigger" values were below 3.3 mg/L for most of the season for E10, and notification of these conditions was made to RWQCB staff. However, little change can be affected since managed ponds have high residence time and management changes require several days to several months to affectively implement and observe demonstrable changes in water quality conditions and aquatic habitat quality.

It should be noted that annual summary data does not necessarily indicate or reflect actual violations of the Final Order. Pond discharges did not occur continuously nor in all of these periods, and variations in pond operations, including BMPs, were implemented to attempt to increase DO values, or to limit potential adverse affects.

E10 Applied Study

An applied study was not conducted in Pond E10 during 2010, since the pond was dewatered and dried to facilitate a new levee segment to be constructed as part of the SBSPRP Phase One tidal marsh restoration in Ponds E9, E8A and E8X.
Of note during 2010, while no study was conducted, upon complete dewatering of E10, three, three-foot leopard sharks were captured and released to MEC (slough).

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 2010, the first stage of construction for Phase 1 of the South Bay Salt Ponds Restoration Project began, thus, modified pond operations were implemented, deviating from normal pond management operations. Ponds were drawn down and/or drained and allowed to dry. This change in operation management allowed the Department to set discharge gates in a manner that increased discharge volumes, rather than having reduced discharge settings, as was done more frequently in previous years. Gates were routinely set at approximately 15-25% open on average, with gates set 100% open for extended periods rather than more frequent adjustments (increases and reductions). 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 2010.

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 2010, except B2C, pond water is discharged to the open Bay and quickly dispersed. At lower tides the discharge is spread over extensive mudflats. In 2010, 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 2010, 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. Efforts were made to retrieve data and service devices whenever possible to prevent down-time of the continuous data recorders.

In 2010, the Department made data available to the RWQCB staff on an as needed basis. The Department conducted its own, limited monitoring in 2010, 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 expected completion in 2011 of levee breaching, 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 will be reconfigured, since the levees surrounding this pond abut the levees constructed for tidal restoration (E9/8A/8X) and the reconfigured managed ponds (E12/13), but E14 operations are expected to remain similar to the ISP and be managed as a seasonal for WSP management activities. Engineering plans at the 60% completion level are expected to be completed in 2011 and 100% completion level plans, specifications and estimates, and award of the project to the successful bidder are expected in 2012. Construction is anticipated to commence in 2012 and require two construction seasons in a 24-month period, to be completed in 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 SBSP 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 2010 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 2011 operations and monitoring results, and will make requests for alterations to the new Final Order as appropriate in future reports.

The Department proposes to discontinue conducting an Applied Study in Pond E10 for 2011 due to the modified pond operations expected to be required to complete SBSP Phase 1 construction operations. As in 2010, Pond E10 may need to be drained or otherwise have more substantially modified operations in 2011 to accommodate the second stage of construction of the new levee segment. The previous levee alignment segment will be lowered to an elevation suitable for marsh plant colonization and allow for tidal scour in Mt. Eden Creek. The realigned levee is necessary to allow expected channel scour to occur in MEC, associated with tidal marsh restoration actions in Pond System E9.

ATTACHMENT:

2011 Pond Operations Plans