2.0 ALTERNATIVES

2.1 Introduction

This chapter describes and compares the alternatives considered by the USFWS and DFG for interim management of the South Bay salt ponds acquired from Cargill Corporation. Section 2.2 discusses the process followed to develop a reasonable range of alternatives that meet the overall project objectives. It identifies the project objectives and project opportunities and constraints that were considered in formulating alternatives. Section 2.3 briefly describes those alternatives that were initially considered, but were eliminated from detailed study because they did not meet the project objectives or were infeasible. Section 2.4 describes in detail those alternatives, including the No Action alternative, a Seasonal Pond alternative,, and two alternatives for interim pond management, including the Preferred Alternative. Section 2.5 compares the major characteristics and effects of the alternatives in relation to the significant issues described in Chapter 1. This chapter meets the requirements of NEPA Regulations Section 1502.14 (Alternatives including the proposed action) and CEQA Regulations.

2.2 Development of Alternatives

NEPA Regulations (Section 1502.14) require that agencies “rigorously explore and objectively evaluate all reasonable alternatives….” NEPA Regulations (Section 1502.14) also require that agencies “devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.”

CEQA requires that an EIR “describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives” (CEQA Guidelines Section 15126.6(a), Consideration and Discussion of Alternatives to the Proposed Project). According to the Guidelines (Section 15126.6(a), “an EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation.” Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site (or the site is already owned by the proponent).

The general goal of the Initial Stewardship Plan (ISP) is to operate and maintain the South Bay Salt Ponds in an environmentally sound and cost-effective manner while long-term restoration plans are developed and implemented. See Appendix A. The ISP Team sought to develop a reasonable range of alternatives to be considered in this EIR/EIS that meet this general goal and a number of specific objectives of the ISP. The specific objectives of the ISP include:

A. Cease salt concentrating process.

B. Circulate bay water through the ponds and introduce tidal hydrology to Island Ponds, if feasible.
C. Maintain existing open water and wetland habitat for the benefit of wildlife, including habitat for migratory shorebirds and waterfowl and resident breeding species.
D. Maintain ponds in a restorable condition to facilitate future long-term restoration.
E. Meet all regulatory requirements, especially discharge requirements to maintain water quality standards in the South Bay.
F. Work within existing funding constraints.

In addition, in developing a reasonable range of alternatives to be considered in this EIR/EIS, the ISP Team sought to take advantage of various opportunities and to account for various constraints.

Opportunities include:

- Existing intakes. These conduits, gates, and channels have been in place for decades and are well understood by operational engineers.
- Existing connection infrastructure. Various structures between and among the ponds have been used for years to allow waters in various salinity conditions to flow between ponds in a controlled manner.
- Accessible bay water for circulation. Each of the complexes described in the ISP has multiple potential access points for waters from San Francisco Bay to be admitted to control the water features of the ponds.
- Multiple locations for outlets. Each complex also has multiple exit points for water to be let back into the Bay. The inputs and outputs from the Bay maintain the salt ponds at acceptable water levels, salinity levels, habitat values, and potential restoration conditions.

Constraints include:

- Direction of water flow. Ponds generally have a singular flow direction and sequence established by existing pond bottom elevations and operational infrastructure.
- Existing salt pond levees. These levees, unless modified, may limit pond water elevations.
- Existing pond connections. The maximum flow capacity of existing pond connections is limited by the structure size and the available water surface difference between ponds, although in some cases the connection may be replaced in order to establish greater flow potential.
- Flood protection. Although the salt production levees were not designed for flood control, they have provided incidental flood protection.
- Bottom elevations within ponds. High pond bottoms require high water surface elevations and reduce gravity inflow. In turn, low pond bottoms require low water surface elevations to minimize erosion from wave action and can limit gravity outflows.

- Infrastructure effects. Because of the generally passive nature of the infrastructure, pond water levels vary during weak or strong tidal cycles and after rainfall events.
- Seasonal conditions. The high summer evaporation increases the need for circulation to minimize salinity increases. The longer it takes for water to circulate through the pond systems, the more it evaporates and the more salinity concentrates. Conversely, the low evaporation and rainfall during winter decreases the need for circulation of bay water.
- Water Quality Objectives. WQOs may limit long-term pond discharge salinities. Implementation of the ISP must not degrade water quality to a degree that would have a long-term impact on existing beneficial uses in the receiving waters.
- Slough conditions. Because of the relative lack of water movement in sloughs, discharges to sloughs are more sensitive to water quality concerns and will have to be monitored closely.
- Migrating salmonids. Since water intakes have the potential to entrain juvenile fish or attract adult fish, placement and operation of structures needs to reduce the potential for such impacts.
- Tidal marsh habitat. The location of structures should avoid or minimize impacts to the existing tidal marsh habitat in the South Bay.

2.3 Alternatives Considered But Eliminated from Detailed Study

NEPA Regulations (Section 1502.14) require that agencies "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Likewise, CEQA Guidelines (Section 15126.6(c)) specify that an EIR should identify alternatives that were considered by the lead agency, but were rejected during the scoping process and should identify the reasons for eliminating the alternative from further consideration. Among the reasons that may be used to eliminate an alternative from detailed consideration in an EIR, CEQA Guidelines include the alternative's 1) failure to meet most of the basic project objectives, 2) infeasibility, and 3) inability to avoid significant environmental impacts.

During the project design phase that led to the ISP, a number of operational alternatives were considered. Some of these alternatives were limited from more detailed study because they failed to meet one or more of the project objectives, listed in Section 2.2, or because the constraints, also listed in Section 2.2, render them infeasible. These alternatives are described briefly below, along with a statement of why they were eliminated from further analysis in this EIR/EIS.

Note that the purpose of this project is to develop an interim management plan for lands recently acquired from Cargill. USFWS and DFG must determine how to best manage these specific lands over the period covered by this EIR/EIS. Therefore, no alternative locations are offered for this project.

The following alternatives have been eliminated from further study in this EIR/EIS:

2.3.1 Three-System Alternative

Under this alternative, the Alviso Ponds, Baumberg Ponds, and West Bay Ponds, would each be managed as a single system with continuous flow between all of the ponds within each of the three larger pond complexes. This would be similar to the existing process in which all three complexes are managed as a single system.

Although this alternative would involve relatively low costs and would maintain the existing infrastructures (Objectives F and D, respectively), it would not meet other project objectives (A, B, C, and E). Under this alternative, the single-point discharge from each of the systems would be highly saline because the residence time of salt water passing through these larger systems would be much longer than it would be through a system involving a smaller number of ponds (a two- to three-pond system, for example). The longer the salt water takes to move through the system, the more time there is for evaporation and salt concentration. The objective under Cargill operations was to concentrate the salt; the objective of the project is to dilute it (Objective A). The discharge of highly saline water into creeks and sloughs would not meet regulatory requirements, including water quality objectives for pond discharges (Objective E) and would have significant impacts on fish and wildlife. This alternative would also provide less fine-tuned control over individual pond surface elevations, flow rates, and salinity levels, and may make it difficult to control for habitat values within the ponds (Objective C).

2.3.2 Pump All the Baumberg Ponds Alternative

Most of the Baumberg ponds are above tidal elevation. Therefore, tidal water does not flow into these ponds by gravity alone and water must be pumped into the ponds instead. The existing Baumberg infrastructure includes pumps at most ponds, but use and maintenance of these pumps is a significant operational expense.

The continued operation of the Baumberg Pond pumps would have the advantage of maintaining existing open water and wetland habitats during the 5-year interim period (Objective C). This alternative would also meet Objectives A, B, D, and E (i.e., it would cease the salt concentration process, introduce bay water circulation, maintain ponds in a restorable condition, and make it possible to meet discharge WOQs and other regulatory requirements). However, this alternative would not meet financial objectives for the project (Objective F). It was therefore considered infeasible and was eliminated from further study in this EIR/EIS.

2.3.3 Culvert Structures for Island Ponds Alternative

This alternative for the Island Ponds (A19, A20, and A21) would involve constructing and managing a separate culvert inlet/outlet for each pond. The ponds would be managed to maintain water levels in the ponds approximately one foot above the average bottom elevation. The culverts would be constructed to connect to either Mud Slough or Coyote Creek. Since the barge access to A19 and A20 would be from Mud Slough, the preferred location would be along Mud Slough.

This alternative would also meet Objectives A, B, C, D, and E (i.e., it would cease the salt concentration process, introduce bay water circulation, maintain ponds in a restorable condition, maintain existing open water and wetlands habitat, and make it possible to meet discharge WOQs and other regulatory requirements). This alternative would have an advantage over the ISP proposal to breach the Island Ponds on the Coyote Creek side (see below) in that it would allow for a greater degree of control over the surface elevations, flow rates, and salinity levels of the ponds than the ISP proposal and would allow for greater control over habitat values. It would also not have the initial salinity impact that the full breach proposal would have on receiving waters and wildlife. However, the costs of this alternative would be considerably higher than the breach alternative. Due to the Island Ponds' location between Lower Coyote Creek and Mud Slough, they are fairly inaccessible. The culvert structures would be difficult and expensive to construct and to actively manage. Therefore, this alternative would not meet financial objectives for the project (Objective F). It was consequently considered infeasible and was eliminated from further study in this EIR/EIS.

2.3.4 Breach All Ponds Alternative

Under this alternative, all ponds in the Alviso, Baumberg, and West Bay systems would be breached to establish full tidal conditions throughout the systems. This alternative would meet Objectives A and B (i.e., it would cease the salt concentration process and introduce bay water circulation) and would probably be the least expensive alternative (Objective F). However, it would not meet the remaining Objectives C, D, and E (to maintain the ponds in a restorable condition, to maintain existing open water and wetlands habitat, and to make it possible to meet discharge WOQs and other regulatory requirements). At least in the short-term, impacts to receiving waters, wildlife, and wildlife habitat of a one-time introduction of highly saline water from the breached ponds would be significant. In addition, the long-term goal for the project area is to manage it for a diversity of habitat values, which would not be possible under this alternative. As with the Three-System Alternative, described above, the Breach All Ponds Alternative would provide less fine-tuned control over individual pond surface elevations, flow rates, and salinity levels, and may make it difficult to control for habitat values within the ponds. This alternative would represent a significant departure from the long-term habitat planning process. Finally, the breaching of levees which have served a flood control purpose in the past would introduce a potentially significant flood hazard to the project area. For these reasons, this alternative was eliminated from further consideration early in the alternative development process.

2.3.5 Individual System Alternatives

In addition to the alternatives above, a number of individual system alternatives were considered in the project design. However, these alternatives would require different infrastructure than that proposed in the ISP and some of the alternatives would result in significant impacts to receiving waters, habitat, and wildlife. Therefore, they were also ruled out early in the alternative development process for the EIR/EIS.

Alviso A3W System Alternative—In the Alviso A3W system, an alternative intake location was considered for Pond B1. The alternative location was close to the northern end of the pond near Stevens Creek. The alternative location would avoid existing marsh areas along the bay levee and was close to the deeper channel maintained by flows from Stevens Creek. The existing intake location has marsh elevations outside the intake which limit inflow to only high tide periods. After consultation with NMFS, Stevens Creek was identified as potential steelhead habitat. The alternative intake location was not included in the ISP to avoid potential conflicts with steelhead migration to and from Stevens Creek. For this reason, it was also eliminated from further study in this EIR/EIS.

Alviso A14 System Alternatives (2)—The Alviso A14 system included two separate alternatives which would include continuous circulation through all of the ponds. The ISP includes ponds A12, A13 and A15 as batch ponds.

The first alternative included four separate sub systems. A9 and A14 would be one sub system with flow from A9 to A14. A10 and A11 would be intake/outlet sub systems with tidal inflow and outflow to and from Alviso Slough into each pond. A15, A13 and A12 would be the last sub system with flow from A15 to A12. The alternative included potential issues with multiple discharges to Alviso Slough during initial release. The spring or summer freshwater flow in Alviso Slough may not be sufficient to carry the salinity from the pond discharges out to the Bay during the initial release. In addition, the flow from A15 to A12 would transfer Coyote Creek water to Alviso Slough and could represent a distracting trace flow to upstream migrating salmonids which may follow chemical clues from Coyote Creek. Due to this potential impact, the alternative was eliminated from further study in this EIR/EIS.

The second alternative would include all of the ponds in the Alviso A14 system, without sub systems. The inflow would be at A15, the highest pond in the system. The flow would be from A15, through ponds A14, A13, A12, A11, A10 and discharge at A9 to lower Alviso Slough. The alternative would allow gravity flow without the use of the existing pump from A13 up to A15. However, the alternative would reverse the flow of the entire system and would increase operating water levels in ponds A14, A13, and A12, and decrease operating water levels in ponds A9 and A10. The higher water levels in several ponds would require raising several internal levees and the levee along the railroad southeast of ponds A12 and A13. Consequently, the alternative was eliminated from further study in this EIR/EIS.

Alviso A16 System Alternatives —Two alternatives were considered for the Alviso A16 system. The first alternative would reverse the ISP direction of flow to intake from Artesian Slough and discharge to Coyote Creek. The intake from Artesian Slough would avoid potential entrainment of migrating salmonids in Coyote Creek. However, the intake from Artesian Slough would contain low salinity water from the San Jose Waste Water Treatment Plant (SJWWTP), and the entire system could operate at much lower salinities. The lower pond salinities could increase the risk of avian botulism in the ponds. Although not considered as a main system alternative, the option for changing the direction of flow will be considered as an adaptive management practice if needed to protect migrating fish during certain times of the year (see Section 2.4.3).

Another alternative operation was considered for the Alviso A16 system which would operate ponds A16 and A17 as batch ponds at higher salinities similar to ponds A12, A13 and A15 in the A14 system. This alternative would require a high salinity discharge to either Coyote Creek or Artesian Slough. Evaluation of the predicted pond discharge shows that the high salinity discharge may not meet receiving WQOs on a long-term basis. Due to this potential impact, the alternative was eliminated from further study in this EIR/EIS.

Baumberg 2 System Alternative—An alternative operation was considered for the Baumberg 2 system to maintain the water levels in all four ponds on a year around basis. This would require additional pumping at the pond 1 intake and construction of additional pumping capacity. Due to the high cost of pumping during the summer peak evaporation season, the alternative was eliminated from further study in this EIR/EIS.

Baumberg 2C System Alternative—An alternative flow operation was considered for the Baumberg 2C system to maintain the existing direction of flow from pond 4C to 5C to 1C. However, the existing Coyote intake pump would have to be used to supplement the flow from the pond 6 intake pump. Due to the high cost of pumping during the summer peak evaporation season, the alternative was eliminated from further study in this EIR/EIS.

Baumberg 8A System Alternative—An alternative operation was considered for the Baumberg 8A system to maintain the water levels in all four ponds on a year-round basis. This would require construction of an intake pump into the system. The intake pump was proposed at pond 8A to flow through to pond 9 and discharge at pond 9 to Mount Eden Creek. The flow from 8A to 9 was proposed to follow the existing pond bottom elevations to maintain similar pond depths in the two ponds. However, due to the high cost of pumping during the summer peak evaporation season, the alternative was eliminated from further study in this EIR/EIS.

2.4 Alternatives Considered in Detail

Alternatives considered in detail include:

- No Project/No Action Alternative
- Alternative 1 (Seasonal Ponds Alternative)
- Alternative 2 (Simultaneous March/April Initial Release)
- Alternative 3 (Phased Initial Release)

The No Project/No Action Alternative and Alternative 1 are similar, except that under No Project/No Action, existing levees and water control structures would not be maintained and would be allowed to deteriorate. Over time, the integrity of these structures would likely deteriorate. Under Alternative 1, by contrast, levees and water control structures would be maintained and repaired as needed. Under this alternative, the ponds would be managed as seasonal ponds until the final restoration plan has been completed.

Alternatives 2 and 3 closely follow the June 2003 Initial Stewardship Plan. The main difference between the two alternatives is in the timing of initial release from system ponds. Alternative 2 includes a March/April initial release, while Alternative 3 includes a phased initial release. Both alternatives incorporate plans to breach the Island Ponds (Ponds A19, A20, and A21 only) and a similar combination of individual pond management strategies, as proposed in the ISP. Alternatives 2 and 3 both incorporate flexibility for pond management by proposing a number of alternative management strategies for individual ponds and pond systems, including the Island Ponds. Alternative 3 represents the agencies' Preferred Alternative.

Alternatives 2 and 3 incorporate the following four management strategies, which are defined below:

- Batch ponds management
- High salinity batch ponds management
- Seasonal batch pond management
- Seasonal pond management

Batch ponds are ponds that do not have a direct hydrologic connection to the Bay or tidal sloughs and creeks and are not integrated into one of the continuous tidal circulation systems. They remain peripheral to these systems, but normally remain wet throughout the year. The volume and frequency of the intake and release from/to a neighboring pond can be used to control the batch pond salinity and water levels. Bottoms of batch ponds may be high, generally requiring pumping to fill the ponds (Baumberg 12, 13, and 14). For other batch ponds, the pond bottoms may be low, generally requiring pumping to remove water from the ponds (Alviso A8, A12, and A13). The batch pond management strategy allows for fine-tuned control over habitat values. Batch ponds can be managed for salinities in the range of 120-150 parts per thousand (ppt) to favor brine shrimp and brine fly production, an important food source to certain migratory birds. A **high salinity batch pond** is a batch pond that is specifically managed for high salinity levels throughout the year.

A **seasonal batch pond** is a pond that is peripheral, but remains connected, to one of the continuous tidal circulation system. In the winter, rainwater fills the seasonal batch pond and additional water may be brought in from a neighboring pond. The pond remains wet and is operated as a batch pond throughout the winter. That is, the volume and frequency of the intake and release from/to a neighboring pond can be used to control the batch pond salinity and water levels to achieve water quality or habitat objectives. In the summer, the seasonal batch pond is allowed to dry out (although, depending upon the amount of winter precipitation and the depth of the pond, some ponds may never completely dry in the summer). The seasonal batch pond strategy allows for some control over habitat values, but is less costly than the batch pond strategy because it does not involve year-round pumping and operation of water control structures.

A **fully seasonal pond** involves minimal management and operates basically independently from any tidal circulation systems. Seasonal ponds will fill from high groundwater or rain during winter and be allowed to dry-down through the summer. The pond salinity would not be controlled, but would fluctuate due to residual salt in the pond, rainwater inflows, and seasonal evaporation. In the summer, like the seasonal batch pond, the fully seasonal pond is allowed to evaporate. In the wintertime, depending upon bottom elevations across the pond, a seasonal pond may fill to only a few inches or may not fill completely. In the summer, the pond may dry out completely or may retain some water. The major benefits of a seasonal operation are the habitat provided for certain species and the elimination of costly pumping of water to maintain water levels.

2.4.1 No Project/No Action Alternative

Evaluation of the "No Action" or "No Project" Alternative is required under NEPA Regulations 1502.14 and CEQA Guidelines 15126.6(e), respectively. As stated in the CEQA Guidelines, "the purpose of describing and analyzing a no project alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project."

Under the No Project/No Action alternative, there would be no flow circulation through the pond systems. No additional water control structures would be installed, no release of pond contents or management of water and salinity levels would occur, and the existing infrastructure would not be maintained. During the interim period and until a long-term restoration plan is developed for the ponds, the existing levees and water control structures would be allowed to deteriorate.

Operation and management of the ponds will be transferred to DFG and FWS once the ponds meet the discharge requirements established by the Regional Water Quality Control Board. At transfer, the depth of water and salinity will vary among the ponds. Depending on climatic conditions and starting depth, ponds would evaporate at varying rates, leaving behind salt-crusted flats and, in deeper areas, residual pools of concentrated brine. The deepest portions of the ponds would be seasonally wet during winter, filling with water after rain events.

It is important to note that the No Project/No Action Alternative is not identical to the existing environmental setting, and therefore the No Action Alternative is not the baseline for determining whether the proposed project's environmental impacts may be significant. The existing environmental setting includes the pond infrastructure in its presently maintained condition. As noted above, under the No Project/No Action Alternative, the existing pond infrastructure would not be maintained.

Under the No Project/No Action Alternative, impacts to the existing environmental setting would occur. The advantage of this alternative is that it would be the lowest cost alternative. It would also minimize additional inputs of salinity and would not require a permit to discharge pond contents into the Bay. However, most of the existing open water habitats currently used by wildlife would be eliminated. Without maintenance, pond levees and control structures would be prone to failure, increasing risk of uncontrolled intake and release of flows from/to the Bay. This would present potentially significant impacts to water quality, fish, and wildlife habitat. It would also introduce a flood hazard to neighboring areas since some of the existing pond levees have come to serve a purpose of flood control for these areas. Long-term pond drying may cause some gypsum/salt-affected soils to be left on the sediment surface of some ponds. This may cause the chemistry of the soil to be affected in a manner that would likely increase the cost and level of effort of future restoration. However, results from other restoration efforts indicate that soil conditions return to normal once bay waters are returned. In addition, ponds would take 1 to 2 years to dry. During this time, there would be potentially significant impacts to nearby residents from nuisance odors.

The No Project/No Action Alternative would meet project Objectives A (cease salt production) and F (cost objectives), but would fail to meet several of the stated project objectives. Specifically, it would fail to meet Objective B (circulate bay water through the ponds), Objective D (maintain ponds in a restorable condition), and Objective E (meet all regulatory requirements). Although it would maintain some of the existing open water and wetland habitat, at least seasonally, it would not allow fine-tuned control of the ponds for habitat values (Objective C). Although the No Project/No Action Alternative would not meet most of the project objectives, in compliance with NEPA and CEQA, it is evaluated in detail in this EIR/EIS.

2.4.2 Alternative 1 (Seasonal Pond Alternative)

This alternative is the same as the No Action Alternative, except that the levees and water control structures would be maintained and repaired as needed. The ponds would be managed as seasonal ponds until the final restoration plan has been completed. Under this scenario, the pond contents would be allowed to evaporate during the summer and would be allowed to remain dry throughout the summer to minimize construction and management costs. During winter, they would fill during precipitation events, but contents would not be discharged.

This alternative minimizes additional inputs of salinity and does not require a permit to discharge pond contents into the Bay. Maintenance of the levees and water control structures would prevent their deterioration and prevent the accidental breaching of the ponds and release of pond contents to the Bay. Under this alternative, most of the existing open water habitats currently used by wildlife would be greatly reduced, significantly changing the character of the South Bay salt ponds. The duration and depth of water in the ponds would be reduced in most years, and the open water character of the salt ponds would be lost. The single intake pond for each pond complex would be closed. Intake ponds would no longer be present; the pond systems would not support fish and bay invertebrates, resulting in reduced foraging habitat for piscivorous (fish-eating) birds.

Alternative 1 would meet project Objectives A (cease salt production), E (meet all regulatory requirements), and F (cost objectives). By preventing deterioration of the existing infrastructure, it would partially meet Objective D (maintain ponds in a restorable condition). It would only partially meet this objective because, as with the No Project/No Action alternative, long-term pond drying may result in some gypsum/salt affected soil conditions in some ponds. This may cause the soil chemistry of those ponds to be affected, and increase the cost and level of effort of future restoration. However, results from other restoration efforts indicate that soil conditions return to normal once bay waters are returned. This alternative would also fail to meet Objective B (circulate bay water through the ponds) and Objective C (maintain existing open water and wetland habitat). Nevertheless, in order to evaluate the impacts of a complete range of reasonable and feasible alternatives, Alternative 1 is evaluated in detail in this EIR/EIS.

2.4.3 Pond Management Alternative 2: Simultaneous March/April Initial Discharge

This alternative includes an initial release period of March/April for project ponds and a variety of adaptive management strategies for individual ponds, including the option of breaching the Island Ponds (A19, A20, and A21) in the Alviso Complex. To accommodate the movement of brines out of the systems to the plant, implementation of all features described in the ISP may take up to 6 years. The operation of Alviso Ponds A22 and A23 will remain under current operations for years 1-2 of the ISP; during years

3-6, they will be operated as seasonal ponds with some intake of Bay waters to reduce salinity. Similarly, the West Bay Ponds will remain under current operations for years 1-3 of the ISP; during years 3-6, pond salinities will be reduced to meet discharge standards. Once the ponds can be discharged, they will transition to ISP circulation.

Initial Release Period. The initial release period is the startup period for the circulation of bay water through the pond systems. Using tidal water management techniques, the targeted ponds' salinity will be reduced to levels similar to the salinity of the Bay. Under the proposed ISP, structures would be installed when site constraints allow and initial discharge of the existing pond contents would begin the following March/April when salinities within the ponds and receiving waters are the lowest. March/April was considered a reasonable time for the initial release because bay salinities are generally low to maximize dilution of the higher initial release salinities within the ponds before discharge and in the receiving waters after discharge. Also, March/April is the beginning of the summer high evaporation season, before the salinity levels in the ponds start to increase. It is anticipated that initial releases from one or two ponds would occur in 2004 and releases from the remaining ponds would occur in 2005.

Individual Pond Management Strategies The description of individual pond management strategies contained in this section includes a brief summary of the proposed circulation hydraulics and management operations for each of the pond systems in the Alviso, Baumberg, and West Bay complexes. This information is summarized from the ISP. Table 2-1 provides a comparison of pond-specific existing conditions and proposed ISP conditions. The table also identifies options for flow direction, possible alternative operations, and management constraints. Alternative operations for adaptive management of individual ponds are also discussed in detail below.

Additional pond-specific information, including existing water surface elevations and seasonal salinity levels and modeled water surface elevations and seasonal salinity levels under the proposed interim management are described in detail for each of the ponds in the ISP (see Appendix A).

The proposed ISP is a pioneering project. The restoration of salt production ponds to a diversity of tidal habitats has not previously been undertaken on such a massive scale at any known location. The South Bay hydrology and habitats comprise a complex interrelated system. Partly due to a lack of existing data from related projects, it cannot be known what effect the project will have on fish and wildlife and their habitats. Impacts can only be inferred from a variety of vaguely related projects, such as from reported impacts to fish and wildlife from highly saline waters discharged from desalinization plants in Saudi Arabia and other remote locations.

Due to the complexity of the project and the abundance of unknown factors and potential for significant impacts, USFWS and CDFG prefer to have flexibility in the implementation of management strategies for specific ponds and pond systems. Alternative 2 incorporates a number of additional pond-specific or system-specific management alternatives, which are noted in Table 2-1 (below) and discussed further in the text that follows. These alternatives employ a combination of batch pond, high salinity batch pond, seasonal batch pond and seasonal pond management strategies. They introduce a considerable degree of flexibility into on-going habitat restoration planning and infrastructure management efforts at the project sites and allow project managers to make adjustments to respond to impacts as they are observed.

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
Alviso Ponds												
A2W*[2]	A1	277	System intake	11-42	1.8	System intake	<40	1.4-1.7	Close to existing			Minimize disturbance to tidal marsh and mudflat outboard of this pond
A2W*[2]	A2W	429	System pond	15-43	1.8	System outlet	<40	1.2-1.7	Close to existing			
A3W*[2]	B1	142	System intake	13-41 (low)	1.5	System intake	<40	1.2-1.7	Close to existing			Locate intake to avoid entrainment of Stevens Creek salmonids
A3W*[2]	A2E	310	System pond	18-43	1.9	System pond	<40*[3]	2.6-3.1	Deeper		Possible batch pond. Could be managed for high salinity, depending on dilution flow in A3W	
A3W*[2]	B2	170	System pond	13-43	1.3	System pond	<40	1.0-1.5	Close to existing			
A3W*[2]	A3W	560	System pond	23-44	1.9	System outlet	<40	1.8-2.1	Close to existing			Minimize disturbance to marsh along A3W slough levee
A3W*[2]	A3N	163	Batch	16-41	0.6	Seasonal	<40*[3]	NA	Close to existing		Could be managed as high salinity batch pond	

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Summary of Existing and Proposed Management for Individual Ponds

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System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
A7*[2]	A5	615	System pond	28-60	0.7	System intake	<40	1.0-1.2	Close to existing	Reversible		Locate intake to avoid entrainment of migrating steelhead using Alviso Slough
A7*[2]	A7	256	System pond	28-75	0.6	System outlet	<40	0.9-1.1	Deeper	Reversible		
A7*[2]	A8	406	System pond (partially seasonal, bermed southern portion)	31-110	1.6	Seasonal	<40*[3]	Variable	Variable		Northern portion could be operated as high salinity batch pond	
A14 (3 sub-systems)	A9	385	System intake	11-38	4.1	System intake	<40	2.2-1.7	Shallower			Avoid entrainment of salmonids by limiting winter inflow
A14	A10	249	System pond	17-45	3.3	System pond	<40	2.6-2.3	Shallower			Avoid entrainment of salmonids by limiting winter inflow
A14	A11	263	System pond	28-69	3.5	System pond	<40	3.1-3.2	Close to existing			Avoid entrainment of salmonids by limiting winter inflow
A14	A14	341	System pond	48-135	1.4	System outlet	<40	0.9-1.3	Close to existing			
A14	A12	309	System pond	35-66	3.4	High salinity batch (multiple intakes)	120-150	3.0-3.4	Close to existing			Avoid entrainment of salmonids by limiting winter inflow

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
A14	A13	269	System pond	38-77	2.3	High salinity batch (multiple intakes)	120-150	2.0-2.3	Close to existing			
A14	A15	249	System pond	40-111	2.2	High salinity batch (multiple intakes)	120-150	2.0-2.2	Close to existing			Avoid entrainment of salmonids by limiting winter inflow
A16	A17	131	System pond	45-137	1.6	System intake	<40	1.2-1.1	Close to existing	Reversible		Avoid entrainment of salmonids by reversing winter flow; Minimize Avian Botulism (AB) by controlling salinity (AB is a particular concern for Pond A16 intake)
A16	A16	243	System pond	43-122	2.1	System outlet	<40	1.7-1.6	Close to existing	Reversible		Avoid entrainment of salmonids by reversing winter flow; Minimize AB by controlling salinity
Island Ponds	A19	265	System pond	79-290	2.0	Tidal	Not managed	Not managed	Tidal	N/A	Operate as seasonal pond	Locate breaches to minimize disturbance to tidal marsh habitat
Island Ponds	A20	63	System pond	87-289	1.9	Tidal	Not managed	Not managed	Tidal	N/A	Operate as seasonal pond	Locate breaches to minimize disturbance to tidal marsh habitat

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
Island Ponds	A21	147	System pond	87-304	1.2	Tidal	Not managed	Not managed	Tidal	N/A	Operate as seasonal pond	Locate breaches to minimize disturbance to tidal marsh habitat
A22/A23	A22*[4]	270	Batch	66-296	1.0 Vari-able	Intake pond; Seasonal	NA	NA	NA			Primarily seasonal. Intake only to dissolve salt deposits when plant capacity is available.
A22/A23	A23*[4]	445	Batch	178-302	1.5 Vari-able	Intake pond; Seasonal	NA	NA	NA			Primarily seasonal. Intake only to dissolve salt deposits when plant capacity is available.
Baumberg Ponds												
2*[2]	1	337	System pond	18-46	2.6	System intake	<40	1.3-2.3	Lower than existing (different summer/ winter surface elevation)	Reversible flow at intake to drain system		
2*[2]	4	175	System pond	16-60	1.5	Winter - System pond; Summer-seasonal	<40[*3]	0.2-1.5	Lower than existing (different summer/ winter surface elevation)		Possible batch pond. Could be managed for high salinity, depending on dilution flow in pond 2	

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
2*[2]	7	209	System pond	23-59	2.3	Winter - system pond; Summer-seasonal	<40*[3]	0.6-1.9	Lower than existing (different summer/ winter surface elevation)		Possible batch pond. Could be managed for high salinity, depending on dilution flow in Pond 2	
2*[2]	2	673	System pond	20-49	2.7	System outlet	<40	1.0-2.3	Lower than existing (different summer/ winter surface elevation)	Reversible flow at outlet to fill system		
2C	6	176	System pond	25-148	2.3	System intake	<40	2.8-2.5	Similar to existing (different summer/ winter surface elevation)			
2C	5	159	System pond	23-149	2.2	System pond	<40	2.7-2.5	Similar to existing (different summer/ winter surface elevation)			

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
2C	6C	78	System pond	23-132	1.7	System pond	<40	2.2-2.1	Similar to existing (different summer/ winter surface elevation)			
2C	4C	175	System pond	23-143	1.0	System pond (intake from 5C)	<40	1.3-1.6	Similar to existing (different summer/ winter surface elevation)			
2C	3C	153	System pond	23-145	1.3	System pond	<40	1.1-1.7	Similar to existing (different summer/ winter surface elevation)			
2C	2C	24	System pond	20-178	1.3	System outlet	<40	1.3-1.7	Similar to existing (different summer/ winter surface elevation)			

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
2C	1C	66	System pond	22-147	0.6	System intake	<40*[3]	0.9-1.2	Similar to existing (different summer/ winter surface elevation)		Operate as high salinity batch pond	
2C	5C	111	System pond	20-136	0.8	Outlet to 4C	<40*[3]	1.1-1.4	Similar to existing (different summer/ winter surface elevation)		Operate as high salinity batch pond	
6A	8	180	System pond	48-296	2.5	Winter – intake/ Summer-seasonal	<40	Winter – 0.6	Lower than existing (different summer/ winter surface elevation)			
6A	6B	284	System pond	35-231	0.9	Winter – system pond/ Summer-seasonal	<40	Winter – 0.9	Lower than existing (different summer/ winter surface elevation)			

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
6A	6A	340	System pond	32-184	2.2	Winter – outlet/ Summer-seasonal	<40	Winter – 2.1	Lower than existing (different summer/ winter surface elevation)		Summer – may include a limited muted tidal area	
8A*[2]	9	366	System pond	62-241	2.1	System intake	<40	0.8-2.0	Lower than existing (different summer/ winter surface elevation)	Reversible intake to drain pond		
8A*[2]	8A	256	System pond	69-265	0.7	Winter – system outlet/ Summer-seasonal, tidally muted in borrow ditch	<40	2.0-0.6	Lower than existing (different summer/ winter surface elevation)	Intake and outlet		
8A*[2]	8X					Open tidal culvert to ditch-Pond is seasonal	<40		Lower than existing (different summer/ winter surface elevation)			

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
8A*[2]	12	99	System pond	27-328	1.7	Winter intake; Summer-seasonal	<40*[3]	Winter - 1.1	Lower than existing (different summer/ winter surface elevation)		Possible batch pond. Could be managed for high salinity, depending on dilution flow in Pond 9	
8A*[2]	13	132	System pond	27-334	1.5	Winter - intake; Summer-seasonal	<40*[3]	Winter - 0.9	Lower than existing (different summer/ winter surface elevation)		Possible batch pond. Could be managed for high salinity, depending on dilution flow in Pond 9	
8A*[2]	14	156	System pond	32-304	1.2	Winter batch; Summer seasonal	<40*[3]	Winter – 0.5	Lower than existing (different summer/ winter surface elevation)		Possible batch pond. Could be managed for high salinity, depending on dilution flow in Pond 9	
11*[2]	10	214	Muted tidal (Open culvert)	16-74	1.3	Winter system intake; Summer intake and outlet	<40		Lower than existing (different summer/ winter surface elevation)	Reversible	Alternative 3 (phased release): Pond 10 intake operates as combined intake/ outlet	

Table 2-1
Summary of Existing and Proposed Management for Individual Ponds

			Existing Management			Alternatives 2 and 3 Proposed Management						
System	**Pond**	**Pond Area (Acres)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (year-round)**	**Type of Pond**	**Salinity Range (ppt)**	**Average depth (summer - winter)**	**Proposed water level compared to existing**	**Flow direction options**	**Possible alternative operations *[1]**	**Management constraints**
11*[2]	11	118	System pond	16-81	1.4	Winter system outlet; Summer seasonal	<40	Winter – 1.1	Lower than existing (different summer/ winter surface elevation)	Reversible	Alternative 3 (phased release): operate as fully seasonal (year-round)	
						West Bay Ponds						
	1*[5]	445	System intake	35-326	0.5	System outlet	<40	0.9	Deeper than existing			
	2*[5]	145	System pond	64-306	1.6	System intake	<40	0.8	Lower than existing			Locate intake to minimize disturbance to tidal marsh habitat.
	3*[5]	273	System pond	145-320	1.2	System intake	<40	0.8	Lower than existing			Locate intake to minimize disturbance to tidal marsh habitat.
	4*[5]	297	System pond	88-341	0.4	System outlet	<40	0.7	Close to existing			.
	5*[5]	31	System pond	96-340	0.6	System pond	<40	1.0	Deeper than existing			
	S5*[5]	29	System pond			System intake	<40	1.2				Locate intake to minimize disturbance to tidal marsh habitat.
	SF2*[5]	242	System pond	76-316	1.0	System outlet	<40	0.7	Lower than existing			

Notes for Table 2-1:

1 Proposed management under Alternative 3 is identical to proposed conditions under Alternative 2, except where noted here.
2 Systems with July/August 2004 initial discharge under phased release scenario (Alternative 3).
3 Salinity levels could be higher than those proposed under Alternative 2 if pond is managed as a high salinity batch pond (Adaptive management strategy).
4 In years 1-3 the operation will remain similar to existing conditions; in years 3-6 the ponds will be operated as seasonal ponds to reduce salinity.
5 In years 1-3 the operation will remain similar to existing conditions; in years 3-6 the pond salinities will be reduced to transfer standards. After year 6, the ponds will transition to ISP circulation

Alviso System A2W— System A2W will consist of two ponds, A1 (intake) and A2W (outlet). See Figure 4-1 in the ISP (Appendix A). The proposed system would make use of an existing gate intake at A1 from lower Charleston Slough, an existing siphon under Mountain View Slough between A1 and A2W, and an existing staff gauge at A1. It would involve constructing a new gate outlet structure at A2W to the Bay and a new staff gage at A2W.

The intake location at the northwesterly end of A1 was selected to utilize the existing intake, as well as to allow inflow from lower Charleston Slough. The high tide salinities near the Bay would be closer to normal bay salinity than farther upstream. The bay salinity would be closer to existing conditions in the ponds. The outlet location at the northerly end of A2W was selected to allow outflow directly into the Bay. The specific location of the outlet was selected because the mudflat and tidal marsh communities outside the levee are narrowest at the proposed location. However, the rate of discharge from A2W into the Bay may be limited by the elevations of mudflat/marsh area in the vicinity.

Ponds A1 and A2W will require limited active management. This would include on-going monitoring and inspections. The system may require adjustment of the control gates monthly or seasonally. System A2W could be operated with reduced inflow and circulation during the winter season when evaporation is low. The proposed system includes an outlet weir to maintain minimum water levels with low flow rates. The system can be operated without an outlet weir, but may require more frequent adjustment of the control gates to control both water levels and salinities.

Alviso System A3W— Alviso System A3W consists of 5 ponds: B1 (intake), B2, A2E, A3N, and A3W (outlet). See Figure 4-2 in the ISP (Appendix A). The proposed system would make use of three existing gate structures, existing pipes between A2E and A3W, and existing staff gages at all ponds. It would require construction of four new gate structures.

The intake location at the northeasterly end of B1 was selected to be near the existing intake and avoid inflow from the Bay near the mouth of Stevens Creek. Stevens Creek has been identified as a potential salmonids fishery and migrating salmonids could be entrained in the intake flow if the intake were at Stevens Creek. The outlet location at the easterly end of A3W was selected to allow outflow into Guadalupe Slough in close proximity to the existing dock structure near the Sunnyvale WWTP discharge. At that location, the new outfall would have the least impact on existing marsh along the slough levee.

The proposed control gates will allow intake at the outlet structure. It may be useful to intake at A3W to dilute the pond contents if the pond salinity exceeds the discharge goals. Because of the flapgates and the relative elevations of the tide and pond water levels, all intake flow would occur at high tide, and all outflows would occur at low tide. The long term discharge salinity levels at A3W would be at or above bay salinity, and would generally be higher than low tide salinity in Guadalupe Slough. Due to freshwater inflow from San Thomas Aquino Creek, Calabazas Creek, and the Sunnyvale WWTP, the salinity in Guadalupe Slough is typically lower than bay salinity, particularly at low tide water levels.

Ponds B1, B2, and A3W will require limited active management. The intake, internal connections, and outlet structures generally have sufficient capacity and gravitational head for salinity control in winter and spring.

Pond A3N would be operated as a seasonal pond. For seasonal operations, the pond would be drained initially and no further operation would be required. The pond would fill with 1 to 2 feet of rainwater during the winter, which would evaporate during the summer. Because the bottom of pond A3N is 1½ feet below sea level, some groundwater seepage may occur to keep portions of the pond bottom wet during the summer.
The discharge flow from the gravity outlet from pond A3W to Guadalupe Slough may be affected by high flood tides during periods of high rainfall. There is a low levee on the south side of the pond which can be eroded by wave action if the water levels are high. It may be preferable to limit or stop inflow to the system during the winter to control the maximum water level. This is similar to the existing commercial salt operation. The outlet gates would need to be adjusted after large storms to drain excess volume from the system. Based on system model estimates, the outlet culverts would have capacity to allow circulation during the winter.

Alviso System A3W Adaptive Management Alternatives

Alviso Complex Pond A2E—Pond A2E, in the Alviso A3W System, is currently operated as a system pond and Alternative 2 proposes to operate it as a low salinity system pond. As an additional alternative, Pond A2E could be managed as a high salinity batch pond, depending on the dilution flow in A3W.

Alviso Complex Pond A3N—Pond A3N, in the Alviso A3W System, is currently operated as a batch pond and Alternative 2 proposes to operate it as a seasonal pond. As an additional alternative, Pond A3N could be managed as a high salinity batch pond. Pond A3N has existing gates to operate as a batch pond. Water would be released from B2 to A3N to manage the volume in the pond and thus manage the amount of salt in the pond. This may affect the circulation in B1, B2, and A3W and may require additional analysis of flow rates and mixing in A3W. If the salinities in A3N become significantly higher than the salinity in A3W, there may be constraints on the discharge flow to A3W and the Guadalupe Slough. The flows through B1 and B2 to A3W would need to dilute the higher salinity inflow from A3N to a level that could be discharged from A3W. This may be limited during the summer high evaporation season due to the hydraulics of the system. The availability of the batch operation alternative also depends upon potential levels of methyl mercury that exist in pond sediments and the potential need to maintain higher water levels to reduce bioavailability of sediment contaminants to wading and shorebirds. Additional sediment sampling to determine levels is planned for fall and winter (2003-2004).

Alviso System A7— System A7 consists of 3 ponds: A5 (intake) and A7 (outlet) and seasonal pond A8. See Figure 4-5 in the ISP (Appendix A). The system would make use of the existing control gate from A7 to A8, the existing pump from A8 to A11 and existing staff gages in all ponds. The system would involve construction of new intake and outlet gates. A new cut would be made at the internal levee between A5 and A7 and the existing cut between these ponds would be filled.

The intake location at the northwesterly end of A5 was selected to allow inflow from Guadalupe Slough as close to the Bay as possible. The high tide salinities near the Bay would be closer to normal bay salinity than farther upstream. Due to freshwater inflows from Calabazas and San Tomas Aquino Creeks, other drainage channels, and the Sunnyvale WWTP, the salinity upstream in Guadalupe Slough generally is lower than bay salinity. The bay salinity would be closer to existing conditions in the ponds.

The outlet location at the northerly end of A7 was selected to allow outflow into Alviso Slough as close to the Bay as possible. The outlet salinity levels would be at or above bay salinity, but would generally be higher than low tide salinity in Alviso Slough. Due to freshwater inflow form Guadalupe River the salinity in Alviso Slough generally is lower than bay salinity, particularly at low tide levels.

Ponds A5 and A7 will require limited active management. Pond A8 would be operated as a fully seasonal pond. The pond would be drained initially and no further operation would be required. It would fill with 10 to 20 inches of rainwater during the winter, which would evaporate during the summer. Because the bottom of pond A8 is over 3 feet below sea level, some groundwater seepage may occur to keep portions of the pond bottom wet during the summer.

If the salinity in A8 is significantly higher than the salinity in A11 or A7, there may be constraints on the flow to A11 or A7. The flow through the A14 system, which includes A11, or the A7 system, would need to dilute the higher salinity inflow from A8 to a level that could be discharged from A14 or A7. This may be limited during the summer high evaporation season due to the hydraulics of the system. The flow to A11 would also be limited during the winter when the flow through the A14 system would be reduced or closed to limit potential entrainment of salmonids.

Pond A5 includes an existing siphon under Guadalupe Slough from pond A4. Pond A4 has been acquired by the Santa Clara Valley Water District (SCVWD) for a proposed restoration project. Based on the proposed schedule for the long-term restoration of pond A4 there may be a requirement for interim management of the pond during the initial stewardship period for the DFG and FWS ponds. One or more alternatives being considered by the SCVWD for interim management may include operation of pond A4 as a batch pond with periodic outflows through the siphon to pond A5. If SCVWD and USFWS agree that flows from A4 are appropriate, the flows would be restricted to time periods and salinity levels which would not have a significant effect on flow rates or discharge salinities from pond A7. SCVWD would be responsible for preparation of a suitable operation plan for interim management of pond A4 in coordination with the operation of System A7.

The Santa Clara Valley Water District is in the process of obtaining permits to implement the Lower Guadalupe River Flood Protection Project, which will accommodate the 17,000 cfs 100-year flood capacity of the Guadalupe River Flood Control Project currently under construction. The Guadalupe River Project is located upstream of the

Lower Guadalupe River Flood Protection Project and is scheduled to go on line in spring 2004.

As currently designed, the Lower Guadalupe River Flood Protection Project would affect the magnitude and duration of flooding downstream of the project at the Cargill Salt Ponds, and in Alviso. Currently, when flood flows in the lower Guadalupe River exceed 6,800 cfs, Alviso Slough downstream of the Union Pacific Railroad crossing will over-top its west bank at Pond A8W. The flood control project would increase lower Guadalupe River channel capacity at the railroad crossing 17,000 cfs and therefore increase the potential for flooding conditions in the downstream salt ponds. During flood conditions, estimated depths in ponds A5, A7, A8D and A8W would increase by up to 1 foot compared to current conditions. Flood volumes would increase from 15 to 21% and duration of flooding would increase by 12 to 30%. Without pumping or other evacuation methods, it would take months, even years for the floodwaters to evaporate under current conditions.

To reduce the potential for flooding and duration of flooding in the ponds, additional mitigation measures to be implemented include constructing an Alviso Slough Overflow Weir at pond A8W and hardening of the pond A6 levee. Continuing flood flows into ponds A5, A6, A7, A8, and A8D via the Alviso Weir would allow adequate storage of flood waters to minimize overbanking in Alviso Slough.

Note that, although the proposed interim batch management of the SCVWD's Pond A4 and potential projects at Ponds A6 and A8 in conjunction with the SCVWD's Lower Guadalupe River Flood Protection Project would directly and indirectly impact ponds included in the ISP project, these SCVWD are not part of the ISP project. These projects are being developed separately and their environmental impacts are being evaluated separately. Implementation of the ISP is not dependent upon implementation of these projects. Nor is implementation of these projects dependent upon implementation of the ISP.

Alviso System A7 Adaptive Management Alternatives

Alviso Complex Pond A8—At the present, the only pond in the project area that is truly seasonal is a portion of A8 (referred to a A8 South in the Alviso A7 System. The depth of this pond is sufficiently shallow that the south portion of the pond, which has been separated from the remainder of the pond by a berm, dries out during the summer and provides seasonal habitat for snowy plovers. Alternative 2 proposes to operate the remainder of Pond A8 as a fully seasonal pond.

As an alternative strategy, A8 could be operated as a seasonal batch pond and the northern portion of the pond could be managed as a high salinity batch pond to favor brine shrimp and brine fly production, an important food source to certain migratory birds. As a seasonal batch pond, A8 would not have continuous flow operation similar to A5 or A7. All outflows from A8 must be pumped to A11 or A7. The seasonal batch pond operation would minimize the amount of pumping required. Water would be diverted from A7 to maintain the volume in the pond. Water would be pumped from A8 to A11 or A7 to decrease the volume in the pond and reduce the amount of salt in A8. If the salinity in A8 is maintained at a level similar to the A11 or A7 levels, there would be no constraint on the timing and flow from A8 to A11 or A7.

If the salinity in A8 is significantly higher than the salinity in A11 or A7, there may be constraints on the flow to A11 or A7. The flow through the A14 system, which includes A11, or the A7 system, would need to dilute the higher salinity inflow from A8 to a level that could be discharged from A14 or A7. This may be limited during the summer high evaporation season due to the hydraulics of the system. The flow to A11 would also be limited during the winter when the flow through the A14 system would be reduced or closed to limit potential entrainment of salmonids.

The availability of this alternative for Pond A8 depends on the extent to which this pond will be flooded with fresh waters under the Lower Guadalupe River Flood Control Project.

Alviso System A14— System A14 consists of 7 ponds: A9 (intake), A10, A11 and A14 (outlet) and batch ponds A12, A13, and A15. See Figure 4-7 in the ISP (Appendix A).

The existing intake at A9 allows intake only, and would not be modified. The new outlet structures would include operable gates and flapgates, to allow inflow at the outlet when necessary. For instance, it may be necessary to use A14 as a mixing chamber for higher salinity flows from A15, which may require inflows from Coyote Creek to A14. In addition, the control gates would allow partial culvert openings to control water levels. Because of the flapgates and the relative elevation of the tides and pond water levels, all intake flow would occur at high tide, and all outflows would occur at low tide.

The outlet location at the northerly end of A14 was selected to allow outflow into Coyote Creek at a location near an existing channel within the marsh area along the levee. The existing channel drains part of the marsh area to the existing dredge lock cut at the north end of A15. This would minimize the potential disturbance in the marsh.

Ponds A12, A13, and A15 are proposed for batch operations that will allow higher salinities in those ponds. The goal for these higher salinity ponds would be to reach summer salinity levels between 120 and 150 ppt to provide habitat for brine shrimp and wildlife which feeds on the brine shrimp. Lower salinity water would be diverted from ponds A11 and A14 in A12 and A13 and evaporation would increase the salinity over time. Higher salinity water would be pumped up to A15 as needed to maintain the pond volume. Additional low salinity water would be added to make up lost volume and lower salinity if needed. Excess volume in the batch system would be released to the A16 system for dilution and discharge to Artesian Slough and Coyote Creek.

Ponds A12, A13, and A15 are called a batch system because it is anticipated that the ponds will be operated in a series of batch operations to control the individual pond volumes and salinities. For example, a typical operation may be to add 3 inches of low salinity water from A11 to A12 to make up lost volume and reduce the pond salinity, or release 6 inches of water from A15 to A16 to lower the pond volume to make room for inflows from A12 and A13. Using individual transfers of volume from one pond to another simplifies the planning necessary for control of the pond salinities.

Ponds A9, A10, A11, and A14 will require limited active management. During the winter season, the A9 intake would be closed to prevent entrainment of migrating salmonids. For planning purposes, this was assumed to extend from December through April. During the winter, rainfall would tend to increase the water levels in the ponds. The water levels in the ponds would be set by a weir at the outfall or adjustment of the control gates to avoid flooding of the existing internal levees or wave damage to the levees.

Ponds A12, A13 and A15 would be operated as batch ponds to maintain summer salinity levels in the range of 120 to 150 ppt for brine shrimp habitat. Water would be diverted from A11 or A14 into ponds A12 and A13 for makeup water as necessary to control salinity. Water would be pumped from A13 to A15 for makeup water in A15. Excess volume in A12 and A13 would be pumped up to A15. Excess water in A15 would be discharged to A16.

The proposed intake to A15 from Coyote Creek would also allow flow from the creek into A15 during the summer. Inflows from the creek would have lower salinity than makeup water from A13. This would lower the salinity in A15, if necessary. In addition, control gates would be available from A9 to A14 and from A15 to A14. These gates could be used to increase the flow through A14 from A9 and allow A14 to be used as a mixing pond for releases from A15. Flow could also be released from A13 to A14 by adjusting the water level in A13.

For winter operation, the gates from A9, A10, and A11 were assumed to be open to allow rainfall to drain to A14. This would minimize the need for water level management during the winter. However, the water levels in A9 and A10 would be lower than existing conditions. The winter water level in A9 would be approximately 2.3 feet below the average winter water levels for the existing commercial salt operations. The winter water levels in each individual pond could be maintained at different water levels by closing the internal pond connection gates at the start of the winter season. Excess water from rainfall would need to be drained from the system after larger storms and would require additional active management to adjust the interior control gates.

The summer water level for pond A9 for the ISP condition is approximately 1.9 feet below the existing condition average summer water level. The lower water level was required to increase the intake flow through the existing intake gates and provide sufficient circulation flows to maintain salinities within the system. The gravity intake flows are dependent on the size of the intake structure and the pond water level in comparison to the slough water levels. More active management of water levels in the system may allow summer operation of ponds A9 and A10 at higher levels depending on the discharge salinities, flows to the batch ponds, and the intake salinities. The modeled discharge salinities at pond A14 were near 35 ppt during the summer with higher than normal intake salinities.

Alviso System A16— System A16 consists of 2 ponds: A17 (intake) and A16 (outlet). See Figure 4-9 in the ISP (Appendix A).

The inlet and outlet structures would include operable gates and flapgates to close off all flow, allow inflow only, or allow outflow only. Therefore, the inflow and outflow direction for the system could be reversed if necessary. For instance, a summer operation with an intake from Coyote Creek was preferred to avoid inflows from Artesian Slough at the City of San Jose wastewater treatment plant outfall. However, it may be necessary to intake at A16 from Artesian Slough during the winter to minimize potential entrainment of migrating salmonids in Coyote Creek. The control gates would allow partial culvert openings to control water levels. Because of the flapgates and the relative elevations of the tides and pond levels, all intake flow would occur at high tide, and all outflows would occur at low tide.

Ponds A16 and A17 will require limited active management. During the winter season, December through April, the A17 intake would be closed to prevent entrainment of migrating salmonids. The control gates would need to be adjusted weekly or monthly during the summer circulation period.

Pond A16 includes a siphon from pond A15 in the A14 system. Pond A15 would contain higher salinity water between 120 and 150 ppt to provide brine shrimp habitat. Excess water from ponds A12, A13, and A15 would be released to A16 on a batch basis. Because the proposed salinity in A15 would be significantly higher than the salinity in A16, there may be constraints on the flow to A16. The flow through the A16 system would need to dilute the higher salinity inflow from A15 to a level that could be discharged from A16. This may be limited during the summer high evaporation season due to the hydraulics of the system. It would also be limited during the winter when the flow through the A16 system would be reduced or closed to limit potential entrainment of salmonids from Coyote Creek at A17. An operational alternative would be to reverse the flow in the A16 system during the winter and intake from Artesian Slough instead of Coyote Creek. Salinities in Artesian Slough are lower than in Coyote Creek due to the San Jose WWTP discharge, and may be more effective to dilute higher salinity inflows from A15. In addition, Artesian Slough does not have a salmonid fishery.

Based on the average salinity of the inflows from Coyote Creek and the average summer inflows to the A16 system, in an average year the release from the batch ponds through A15 to A16 would need to extend for approximately 4 months to prevent the salinity in A16 from exceeding 40 ppt.

Island Ponds (A19, A20, and A21) — The Island Pond group in the Alviso Complex contains three separate ponds. Under this alternative, there would be one or more levee breaches to Coyote Creek at each pond, allowing full tidal circulation within the ponds. The ponds would operate independently. The proposed breach locations were selected to avoid locations near the existing railroad bridge at Coyote Creek and to minimize impacts within the existing marsh areas along Coyote Creek (see Figure 4-11 in the ISP, Appendix A). The existing Coyote siphon pump and Mud Slough pump would be removed. The existing control gate from pond A21 to the Mud Slough pump would also be removed. Existing water surface elevations and seasonal salinity levels and modeled water surface elevations and seasonal salinity levels under the proposed interim management are described in detail in the ISP (Appendix A, Sections 4.2.6.2 and 4.2.6.3).

Following the breaching of the Island Ponds, these ponds will require no active management or maintenance. It is anticipated that the existing levees will degrade over time due to erosion from rainfall, tidal flows, and flood flows. The existing pond bottoms are relatively high in elevation and would become vegetated with middle level salt to brackish marsh vegetation relatively quickly. The estimated maximum breach velocities for certain breach locations may be higher than 4 feet per second (fps). The initial breach size and configuration would be expected to erode over time to a more stable configuration. The size and shape of breaches would depend on long-term circulation through the individual breach, elevation of the Coyote Creek marsh at the breach location, and durability of soils within the levee. Depending on site conditions, individual breaches may become deeper and wider.

Adaptive Management Alternative - Island Ponds (A19, A20, and A21) —This alternative would include the potential for operating the island ponds as seasonal ponds for the Initial Stewardship period. The existing brines in the ponds would be transferred to the Cargill Plant 2 to the maximum extent possible. The residual brines in the borrow ditches and low areas would evaporate in place. As seasonal ponds, the Island Ponds would partially fill with winter rainfall. The rainwater would evaporate during the spring and summer, and the ponds would be dry until the following winter. The seasonal pond alternative would not require construction of any intake or outlet structures at the Island Ponds. There would be no discharges to the Bay or sloughs. The ponds could be breached in the future as part of the long-term restoration plan.

Alviso System A22/A23— This system includes ponds A22 and A23, both of which are presently operated as batch ponds. The operation of Alviso Ponds A22 and A23 will remain under current operations for years 1-2 of the ISP. During years 3-6, they will be operated as seasonal ponds to reduce salinity. See Figure 4-16 in the ISP (Appendix A). They would, however, each be able to intake water from Mud Slough as needed to dissolve salt deposits when plant capacity is available.

Baumberg System 2—The Baumberg System 2 consists of 4 ponds: ponds 1 (intake), 2 (outlet), 4 and 7. See Figure 4-17 in the ISP (Appendix A).

The circulation pattern for the system would be to intake at pond 1, then flow through ponds 7 and 4 to the outlet at pond 2. All four intake culverts would include operable gates and flapgates to allow inflow. Two culverts would include gates to allow outflow, if necessary. Controls to allow outflow at the intake structure are included to maintain management flexibility and allow discharge from pond 1 in the event of flooding or a gate failure within the system. Because of the flapgates and the relative elevation of the tides and pond levels, all gravity intake flow would occur at high tide, and all outflows would occur at low tide.

The existing intake pump station at pond 1 will remain to supplement gravity inflows into the system during the summer high evaporation period. Because the pond bottom elevations and water elevations are relatively high, the gravity flow intakes are effective only during short periods at high tides. During periods of weak tides, little gravity inflow would occur and the pump would be needed to supplement the inflow. The intake pump station also operates only at high tide.

The outlet structure at pond 2 to the Bay would include operable gates and flapgates to close off all flow or allow outflow only. The control gates at the intake and outlet culverts would allow partial culvert openings to control water levels.

The initial stewardship conditions would include different operation plans for the winter and summer. The operating water levels in the ponds would be lower during the summer to increase the gravity inflow into the system during the higher evaporation season. The water level in pond 2 would be approximately 3.1 feet (ft) NGVD during the summer, and 3.4 ft NGVD during the winter. Because of the high bottom elevations in ponds 7 and 4, they would be only partially wet during the summer.

Baumberg System 2 will require active management during the summer, as well as during the transitions to and from the summer operation. The intake culverts do not have sufficient capacity to allow adequate flow for salinity control during the summer. The inflow may need to be supplemented using the intake pump to control the summer salinity. It is anticipated that the supplemental pump would be controlled manually based on the measured salinity in pond 2 on approximately a weekly basis. The intake pump includes an automatic level switch to turn the pump on at high tide and off at low tide.

For the winter operation, the gate from Pond 1 to Pond 7 would be open and the gate from Pond 1 to Pond 2 would be closed. Water from the Bay would circulate from Pond 1 to 7, to 4, and to Pond 2. Because of rainfall and low evaporation during the winter, no supplemental pumping would be required in normal years. The water level in the system would be controlled by the outlet gate settings.

In the spring the system would be changed to the summer operation condition. This was assumed to occur in early May, but could vary depending on habitat conditions in the ponds. For example, the transition could be delayed or advanced based on use of the pond by migratory birds, or salinity levels in the ponds.

For the summer operation, the planned water levels would be lower by approximately 1 foot. The water levels in the system would be controlled by the outlet gate settings. The lower operating levels throughout the system would provide a significant increase in the gravity inflow from the intake culverts in pond 1. In addition, the gate from pond 1 to pond 2 would be at least partially opened to reduce the headloss for flow from pond 1 to pond 2. The gate from pond 1 to pond 7 would be partially open to provide limited circulation through ponds 7 and 4.

Based on modeling of the system for historic tide and evaporation conditions in 1994, the gravity intake system would not be sufficient to maintain the maximum salinity goals during periods of weak tides. Gravity inflows would only occur at high tide levels in the Bay. During periods of weak tides, with lower high tides, the inflow would be reduced. Weak tide periods may extend for a week to 10 days. With low inflows from the Bay and high evaporation, the salinity levels in the ponds would increase, and may exceed the design goal of 40 ppt. Therefore, supplemental pumping would be provided from the existing intake pump from Old Alameda Creek to pond 1. A proposed operation scheme was developed in which pumping would start if the discharge salinity exceeds 37 ppt, and stop if the discharge salinity is below 36 ppt. Because the discharge salinity responds slowly to the increased inflow, the pumps generally would operate for several days or weeks at a time. The pumping criteria could be modified to conform to other discharge goals. A higher allowable discharge goal would reduce the need for pumping. Based on the pond modeling for 1994 and 1995, the supplemental pumping would be necessary during summer periods with higher bay intake salinity, but may not be required during wet years with lower ambient salinity in the Bay.

Baumberg System 2 Adaptive Management Alternatives

Baumberg Complex Pond 4—This pond is presently managed as a low salinity system pond within the Baumberg 2 system. Alternative 2 proposes to operate this pond as a low salinity seasonal batch pond (see Section 2.4.3). As an alternative, Pond 4 could be operated as a high salinity batch pond (120-150 ppt salinity), depending upon the dilution flow in Pond 2 of the Baumberg 2 system.

Baumberg Complex Pond 7—This pond is presently managed as a low salinity system pond within the Baumberg 2 system. Alternative 2 proposes to operate this pond as a low salinity seasonal batch pond (see Section 2.4.3). As an alternative, Pond 7 could be operated as a high salinity batch pond (120-150 ppt salinity), depending upon the dilution flow in Pond 2 of the B2 system.

Baumberg System 2C—The Baumberg System 2C consists of eight ponds: ponds 6 (intake), 5, 6C, 4C, 3C, 2C (outlet), 1C (intake) and 5C. See Figure 4-19 in the ISP (Appendix A).

The proposed intake pump would provide continuous circulation through ponds 6, 5, 6C, 4C, 3C, and 2C during the summer months. Water would be pumped primarily during high tide into pond 6 and then be conveyed by gravity into ponds 5, 6C, 4C, 3C and 2C. A new gravity outlet at pond 2C consisting of two 48” gates would discharge flows into the Alameda FCC.

The existing intake pump at pond 1C would operate to provide inflows to a smaller sub-system consisting of pond 1C and 5C. This pond sub-system would operate on a continuous basis or could be operated seasonally as a batch system to allow higher salinity in ponds 1C and 5C. Pond 5C would discharge to pond 4C.

Flows through both these two sub-systems would be primarily unidirectional to pond 2C. The outlet structure from pond 2C would discharge to Alameda FCC through two 48” flapgates at low tide. The new outlet in pond 2C would be constructed as close to San Francisco Bay as possible. The outlet structure would also include a weir to control the minimum water level in pond 2C. The weir would include weir boards to adjust the weir elevation.

The control gates at the intake and outlet culverts would allow partial culvert openings to control water levels. Because of the flapgates, all gravity outflows would occur during low tide in the channel. Because of the shallow depths in Old Alameda Creek, all pumped inflows would occur at high tide.

The initial stewardship conditions would include different operation plans for the winter and summer. The operating water levels in the lower ponds (4C, 3C, and 2C) would be slightly lower during the summer to increase the gravity flow through the system from the upper ponds (6, 5, and 6C) during the higher evaporation season. The water level would vary approximately 1 foot in elevation NGVD during the summer between the upper and lower ponds.

Baumberg System 2C will require active year round management because the intake pumping would be controlled by the discharge salinities at pond 2C. Active management will also be important in the transition period entering and exiting the summer management regime. The water surface elevations would be controlled primarily by the intake pump operations at ponds 6 and 1C and the discharge weir elevation at pond 2C.

Because of rainfall and low evaporation during the winter, winter pumping would typically not be required. However, limited pumping may be required during extreme drought winters with low rainfall. For winter operation, the discharge weir elevation at the 2C outlet structure would be set high enough (4.3 NGVD) to provide open water throughout the system. Winter operation pumping may be required to maintain water levels.

In the spring the system would be changed to the summer operation condition. The outlet weir would be lowered by approximately 1 foot (3.6 NGVD). This was assumed to occur in early May, but could vary depending on habitat conditions in the ponds. For example, the transition could be delayed or advanced based on use of the pond by migratory birds, or salinity levels in the ponds.

Lowering the discharge weir would lower the operating levels throughout the system and provide a significant increase in the gravity flow between ponds. The summer operation elevations would be similar to the existing operating elevations for downstream ponds. The new intake pump at pond 6 and the existing pump at pond 1C should have sufficient capacity to provide flow for salinity control during the spring, summer, and fall as needed. A proposed operation scheme was developed in which pumping would start if the discharge salinity exceeds 37 ppt, and stop if the discharge salinity is below 36 ppt. Because the discharge salinity responds slowly to the increased inflow, the pumps generally would operate for several days or weeks at a time. The pumping criteria could be modified to conform to other discharge goals such as a reduction in odors associated with pond drying.

A higher allowable salinity discharge goal would reduce the need for pumping. Based on the pond modeling for 1994 and 1995, the supplemental pumping would be necessary during summer periods with higher bay intake salinity, but may be significantly reduced during wet years with lower ambient salinity in the Bay.

Ponds 1C and 5C would be a separate sub system within the overall system. Inflows from Alameda Flood Control Channel would be pumped as necessary to control salinity in the sub system. The sub system would discharge to pond 4C. This sub system may also be operated as a batch system with higher salinity to provide habitat for brine shrimp and related species. This may require additional analysis of pond salinities in pond 2C.

There are no salmonid migration concerns in Old Alameda Creek to limit pumped intake at pond 6, however there is the potential for future restoration of anadromous fish in Alameda Flood Control Channel. Steelhead go up Alameda Creek, but are blocked from migration to spawning areas by several barriers. Local anglers transport some fish above the barriers. Until fish movement past the barriers is addressed, there is not a viable steelhead fishery in Alameda Creek.

Baumberg System 2C Adaptive Management Alternatives

Baumberg Complex Pond 1C—This pond is presently managed as a low salinity system pond within the Baumberg 2C system. Alternative 2 proposes to operate this pond as a low salinity intake pond. As an alternative, Pond 1C could be operated as a high salinity batch pond (120-150 ppt salinity).

Baumberg Complex Pond 5C—This pond is presently managed as a low salinity system pond within the Baumberg 2C system. Alternative 2 proposes to operate this pond as a low salinity outlet to Pond 4C. As an alternative, Pond 5C could be operated as a high salinity batch pond (120-150 ppt salinity).

Baumberg System 6A—The Baumberg System 6A consists of 3 ponds: ponds 8 (intake), 6B and 6A (outlet). See Figure 4-21 in the ISP (Appendix A).

As a seasonal or muted tidal pond system, the system would not be subject to continuous circulation through ponds during the summer high evaporation season. The seasonal ponds would be filled during the fall to provide open water during the winter and early spring. The seasonal ponds would be drained in the spring. Due to the hydraulic limitations of the intake to pond 8 and the limited capacity of Old Alameda Creek, it was not considered practical to maintain continuous circulation in the 6A system during the summer.

Pond 6A may be operated as a muted tidal pond during the summer. With muted tidal operation, the outlet culvert would be opened to allow both inflow and outflow on each tidal cycle. The pond would then have a daily cycle of wetting and drying for part of the pond. Because of the limitation of the culvert and the creek channel, the daily tidal cycle within the pond would be relatively small, generally less than one foot. The tidal cycle in the Bay is generally over six feet.

The intake and outlet structures and internal connections were designed to provide circulation for filling the pond system in the fall and to empty the ponds in the spring. The proposed intake structure into pond 8 at North Creek would include one 48” gravity culvert. All gravity intake flows would occur at high tide. The proposed intake structure would be constructed as part of the North Creek levee improvements to be completed as part of the Eden Landing restoration project.

In addition, the existing control structures include two control ponds located between the three ponds near Old Alameda Creek. The control ponds are shown in Figure 4-19, but not to scale. The actual ponds are each less than 1 acre. As shown in the plan, the south control pond (also called a donut) is connected by gated culverts to ponds 8 and 6A, to the north control pond and the siphon to pond 6 across Old Alameda Creek. The north control pond is connected to Pond 6B. The north control pond was the source for water for the Continental pump, which pumped up into pond 8. For the salt making operations, the control ponds and pump were used to transfer water to and from pond 6. For the initial stewardship conditions, the pump and siphon would not be required. The system would be separate from the pond system south of Old Alameda Creek.

The system outlet structure would be located on the eastern end of pond 6A, and would discharge to Old Alameda Creek. All outflows would occur at low tide.

The initial stewardship conditions would include different operation plans for the ponds during the winter and summer seasons. The ponds would be seasonal and would have open water through the system during the winter. During the summer, the ponds would be dry or include a limited area of muted tidal area in pond 6A.

Baumberg System 6A will require limited active management, primarily during the transitions to and from the winter operation conditions. Pond water surface elevations would be controlled primarily by adjusting the control gates at the intake and outlet, between ponds. Intake salinities would be the similar to the bay salinity and pond salinities would be similar to existing bay salinities.

For the winter operation, the gates from pond 6B to pond 6A would be open to equalize the water surface elevations within the ponds. Water from the Bay would circulate from pond 8 to 6B and 6A. Pond 8 would operate at a higher elevation because the pond bottom is higher. The water level in pond 8 may be controlled by a weir at the discharge, or by adjustment of the pond 8 control gates.

In the spring the system would be drained for the summer condition. This was assumed to occur in early May, but could vary depending on habitat conditions in the ponds. For example, the transition could be delayed or advanced based on use of the pond by migratory birds, or salinity levels in the ponds.

Because ponds would be operated as seasonal ponds, the ponds would slowly drain and dry during the late spring, and no further management would be required until winter. The ponds would then become part of the continuous flow operation in winter.

If pond 6A is to be operated as a muted tidal pond during the summer, the outlet culvert would be opened to allow inflow and outflow and the water level would be controlled by the outlet weir. Without the outlet weir the pond would only contain minimal water at extreme high tides.

Baumberg System 6A Adaptive Management Alternatives

Baumberg Complex Pond 6A—This pond is presently managed as a system pond with widely ranging seasonal salinities within the Baumberg 6A system. Alternative 2 proposes to operate this pond as a low salinity outlet pond in the winter and as a seasonal pond in the summer. As an alternative, Pond 6A could include a limited muted tidal area in the summertime.

Baumberg System 8A—The Baumberg System 8A consists of 6 ponds: ponds 9 (intake), 8x and 8A (outlet) and seasonal ponds 12, 13 and 14. See Figure 4-23 in the ISP (Appendix A).

All four culverts of the pond 9 intake structure at Mount Eden Creek would include operable gates and flapgates to allow inflow. However two culverts would include gates to allow outflow, if necessary. Controls to allow outflow at the intake structure are included to maintain management flexibility and allow discharge from pond 9 in the event of flooding or a gate failure within the system. A 48” intake gate has been constructed at the northeasterly end of pond 8A as part of the Eden Landing restoration project. The pond 8A intake would increase circulation within pond 8A.

The outlet structure from pond 8A would include operable gates and flapgates to close off all flow or allow outflow only or allow inflow and outflow. The control gates at the intake and outlet culverts would allow partial culvert openings to control water levels. All gravity intake flow would occur at high tide, and all outflows would occur at low tide.

The operating water levels in the ponds would be lower during the summer to increase the gravity inflow into the system during the higher evaporation season. The water level in pond 9 would be approximately 3.4 ft NGVD during the summer, and 4.6 ft NGVD during the winter. The minimum water level in pond 9 would be controlled by fixed weirs at the connections to pond 8A. The fixed weirs would not be adjustable using weir boards. Because of the high bottom elevations in pond 8A, it would be only partially wet during the summer.

The existing brine pump at pond 13 will remain to provide inflows to the seasonal ponds 12, 13, and 14. The pump will intake from pond 8x. Inflows to pond 8x will use the existing intake from North Creek. Because of the high bottom elevation in pond 8x, only the borrow ditches will be wet for normal tidal conditions. The ditches will be used to transport inflow from North Creek to the pump at pond 13.

Baumberg System 8A will require limited active management, primarily during the transitions to and from the summer operation conditions, as well as winter management of ponds 12, 13, and 14 if they are operated as batch ponds.

For the winter operation, the gates from pond 9 to pond 8A would be open. Water from the Bay would circulate from pond 9 to 8A. The outlet control gates from pond 8A would be set to control the water levels in ponds 8A and 9.

In the spring the system would be changed to the summer operation condition. This was assumed to occur in early May, but could vary depending on habitat conditions in the ponds. For example, the transition could be delayed or advanced based on use of the pond by migratory birds, or salinity levels in the ponds.

For the summer operation, the inlet and outlet structures at pond 8A should be open for muted tidal inflow and outflow. The water level in pond 9 would be controlled by fixed weirs between pond 9 and pond 8A.

Based on modeling of the system for historic tide and evaporation conditions in 1994, the gravity intake system would be sufficient to maintain the maximum salinity goals during periods of weak tides. Weak tide periods are the portion of the lunar cycle with higher low tides and lower high tides. Gravity inflows would only occur at high tide levels in the Bay. During periods of weak tides, with lower high tides, the inflow may be reduced. Weak tide periods may extend for a week to 10 days. A sensitivity analysis was prepared to evaluate the potential effects of extreme high evaporation combined with weak tides. The 1994 weak tide summer period was rerun using evaporation values 20 percent higher than normal. This corresponds to an evaporation condition with approximately a 25-year recurrence interval. This means that on average, it would be exceeded once in a 25-year period.

Ponds 12, 13, and 14 would be operated as seasonal or winter batch ponds. For seasonal pond operations, the pond would be drained initially and no further operation would be required. The pond would fill with 10 to 20 inches of rainwater during the winter that would evaporate during the summer.

As batch ponds, ponds 12, 13, and 14 would not have continuous flow operation similar to 9 and 8A. All inflows to 12, 13, and 14 must be pumped from pond 8x and North Creek. Water would be pumped from 8x in the fall to establish an operational water level in the ponds. Supplemental water may be added during the winter to maintain water levels in dry years. In wet years, surplus water may be released from pond 14 to pond 9 to limit the maximum water level in the ponds. Depending on weather conditions, the batch operation may require gate adjustment weekly or more frequently. If the salinity in ponds 12, 13 and 14 begins to increase in the spring the ponds may require additional inflows to control the salinity. In general, the batch ponds would be drained to pond 9 in the spring to minimize the pumping required for salinity control in the seasonal ponds during the summer high evaporation season.

Baumberg System 8A Adaptive Management Alternatives

Baumberg Complex Pond 12—This pond is presently managed as a system pond with widely ranging seasonal salinities within the Baumberg 8A system. Alternative 2 proposes to operate this pond as a low salinity intake pond in the winter and as a seasonal pond in the summer. As an alternative, Pond 12 could be operated as a batch pond, and possibly as a high salinity batch pond (120-150 ppt salinity), depending upon the dilution flow in Pond 9.

Baumberg Complex Pond 13—This pond is presently managed as a system pond with widely ranging seasonal salinities within the Baumberg 8A system. Alternative 2 proposes to operate this pond as a low salinity batch pond in the winter and as a seasonal pond in the summer. As an alternative, Pond 13 could be operated as a batch pond, and possibly as a high salinity batch pond (120-150 ppt salinity), depending upon the dilution flow in Pond 9.

Baumberg Complex Pond 14—This pond is presently managed as a system pond with widely ranging seasonal salinities within the Baumberg 8A system. Alternative 2 proposes to operate this pond as a low salinity batch pond in the winter and as a seasonal pond in the summer. As an alternative, Pond 14 could be operated as a batch pond, and possibly as a high salinity batch pond (120-150 ppt salinity), depending upon the dilution flow in Pond 9.

Baumberg System 11—The Baumberg System 11 consists of ponds 10 (intake and outlet) and pond 11 (outlet). See Figure 4-25 in the ISP (Appendix A).

This pond group would contain two continuous circulation ponds: 10 & 11. The system has different operation plans for winter and summer seasons to meet summer evaporation conditions. The intake and outlet structures and internal connections were designed to provide circulation for water quality control during the summer evaporation season and allow seasonal flow through pond 11. All four intake gates would allow tidal inflow to pond 10. Two of the culverts would include control gates to allow outflow at the intake structure. All gravity intake flows would occur at high tide. The proposed intake structure would replace an existing intake structure from San Francisco Bay into pond 10. The replacement has been proposed due to the age and condition of the existing intake. The new location has been proposed to improve flow conditions at the intake. The existing intake is located in a large marsh area with tidal action only at high tide. The proposed location would be in an area of lower Mount Eden Creek with less marsh area.

A new 48" gate would be installed between ponds 10 & 11 at the southern end of pond 11. This additional internal connection would supplement existing inflows to pond 11 from pond 10 via two 43" wood gates located in the northern half of the ponds.

There are existing wooden gates from ponds 10 and 11 to a brine ditch on the west side of Mount Eden Creek that would be removed. The brine ditch has been used to transfer water for the commercial salt operation. The ditch connected ponds 10 and 11 with the existing brine pump at pond 13. The brine ditch and the existing gates to the brine ditch will be removed as part of Mount Eden Creek improvements for the Eden Landing Restoration project.

Two outlet structures, one on the eastern end of pond 10 and the other on the southeastern end of pond 11, would discharge to Mount Eden Creek. The outlet structures would both consist of a single 48" culvert. All outflows would occur at low tide. The outlet culverts would be constructed as part of the Mount Eden Creek improvements for the Eden Landing restoration project to replace the existing wooden gates and the existing brine ditch.

The initial stewardship conditions would include different operation plans for each pond during the winter and summer seasons. The operating water levels in the ponds would be lower during the summer to increase the gravity inflow into the system during the higher evaporation season. The water level would be approximately 3.1 ft NGVD during the summer, and 4.0 ft NGVD during the winter. Because of the high bottom elevations in pond 11, it would be only partially wet during the summer. Therefore, pond 11 would be closed off from pond 10 and pond 11 would be operated as a muted tidal or seasonal pond during the summer. Pond 10 would discharge directly to Mt. Eden Creek during the summer.

During the winter, the circulation pattern would be from pond 10 to pond 11, then to Mount Eden Creek. The control gates would be adjusted to maintain higher water levels and create open water habitat in both ponds. Pond 11 would discharge into Mt. Eden Creek during the winter.

Baumberg System 11 will require active management, primarily during the transitions to and from the summer operation conditions. Water surface elevations would be primarily controlled by adjusting the outlet control gates. Intake salinities would be the same as bay salinities and pond salinities would be similar to existing bay salinities.

For the winter operation, the gates from pond 10 to pond 11 would be open. Water from the Bay would circulate from pond 10 to 11. The control gates at the outlet structures from ponds 10 and 11 would be set to provide open water throughout the system.

In the spring the system would be changed to the summer operation condition. This was assumed to occur in early May, but could vary depending on habitat conditions in the ponds. For example, the transition could be delayed or advanced based on use of the pond by migratory birds, or salinity levels in the ponds.

For the summer operation, the pond 10 outlet gate would be adjusted to lower the pond water level by approximately 1.0 feet. This would provide a significant increase in the gravity inflow from the intake culverts in pond 10. The internal connections between ponds 10 and 11 would be closed so that pond 11 would be operated as a seasonal pond or muted tidal pond.

Based on modeling of the system for historic tide and evaporation conditions in 1994, the gravity intake system would be sufficient to maintain the maximum salinity goals during periods of weak tides. Gravity inflows would only occur at high tide levels in theBbay. During periods of weak tides, with lower high tides, the inflow may be reduced. Weak tide periods may extend for a week to 10 days. A sensitivity analysis was prepared to evaluate the potential effects of extreme high evaporation combined with weak tides. The 1994 weak tide summer period was rerun using evaporation values 20 percent higher than normal. This corresponds to an evaporation condition with approximately a 25-year recurrence interval. This means that on average, it would be exceeded once in a 25-year period. The estimated inflow from the gravity intake culverts would maintain the discharge salinity below approximately 40 ppt.

Because pond 11 would be operated as muted tidal or seasonal pond, the pond would slowly drain and dry up over summer and no further management would be required until winter. The pond would then become part of the continuous flow operation in winter. If pond 11 is to be operated as a muted tidal pond during the summer, the outlet culvert would be opened to allow inflow and outflow and the water level would be controlled by the outlet weir. Without the outlet weir the pond would only contain minimal water at extreme high tides.

West Bay Ponds— The West Bay pond group consists of five pond systems. The complex includes seven ponds: 1, 2, 3, 4, 5, S5 and SF2. See Figure 4-27 in the ISP (Appendix A).

As noted above, the West Bay Ponds will remain under current operations for years 1-3 of the ISP. During years 3-6, pond salinities will be reduced to meet discharge standards. Once the ponds can be discharged, they will transition to ISP circulation, under which they would contain five separate sub systems. Ponds 1, 2, 3, and SF2 would each be an independent single pond system with inlet/outlet structures. The inlet/outlet structures would allow tidal inflow at high tide and outflow at low tide. The intake/outlet structures were designed to provide circulation for water quality control during the summer evaporation. All gravity intake flows would occur at high tide, and all outflows would occur at low tide. The proposed intake/outlet structures were located minimize construction within the existing marsh areas along the Bay and slough levees.

The other West Bay pond group would include S5 (inlet), 5, and 4 (inlet/outlet). The major flow to the system would be from the pond 4 intake. There would be a supplemental intake structure to provide circulation from the Flood Slough Restoration Area west of pond S5. The supplemental intake would provide circulation through both ponds S5 and 5.

The West Bay ponds will require limited active management. Once the muted tidal and tidal circulation operation has been established the operation would only require active management to adjust the operating water surface elevations. With outlet weirs, this may be necessary for an unusual event or maintenance, or to improve the habitat conditions within the ponds. Without the outlet weirs, the water levels would be controlled by the outlet control gate settings. The gate settings may require adjustment on weekly or monthly periods.

The five separate sub systems in the West Bay complex include intake/outlet structures. Since the inflows and outflows would occur at the same location, there may be limited mixing within the individual ponds. Shallow areas within the ponds may not be well mixed by wind and wave action. For ponds 1, 2, 3, and 4, the Ravenswood pump station and existing connection structures between the ponds may be used to increase mixing by providing circulation to other locations within the individual ponds.

Alternative 2 would meet all of the stated project objectives, including Objectives A (cease salt production), B (circulate bay water through the ponds), C (maintain existing open water and wetland habitat), e D (maintain ponds in a restorable condition), E (meet all regulatory requirements), and F (cost objectives). Alternative 2 is evaluated in detail in this EIR/EIS.

2.4.4 Pond Management Alternative 3: Phased Initial Discharge

With the exception of a difference in the timing of initial discharge from project ponds and a change in the proposed management of ponds in Baumberg System 11, Alternative 3 is identical to Alternative 2.

Alternative 2 would meet all of the stated project objectives, including Objectives A (cease salt production), B (circulate bay water through the ponds), C (maintain existing open water and wetland habitat), e D (maintain ponds in a restorable condition), E (meet all regulatory requirements), and F (cost objectives). Alternative 2 is evaluated in detail in this EIR/EIS.

Initial Release Period. Under this alternative, the initial release from a limited number of ponds would occur in July/August 2004, with release from other pond systems to follow in subsequent years as salinity levels are sufficiently reduced to meet WQOs. Most of the proposed water control structures are not accessible for construction during the winter. Phased release would allow early July releases from some ponds that can be accessed earlier and that can achieve WQOs for discharge more rapidly, while structures are installed and salinities reduced at the remaining ponds as site constraints allow. Initial discharge of existing pond contents at these remaining ponds would begin the following March/April when salinities within the ponds and receiving waters are the lowest.

Based on construction and operational constraints, ponds that could be included in the first release phase (July release) include Alviso Systems A2W, A3W, A7 and Baumberg Systems 2, 8A and 11. Initial releases from Alviso Systems A14 and A16, and Baumberg System 2C, would likely take place in the subsequent year. Initial releases from the Island Ponds (A19, A20, A21) would not occur for 3 years, and from the West Bay Ponds for six years due to the time needed for Cargill to move the salts from these high salinity ponds back to its plant site in Newark.

The advantages of this alternative are that it allows for early initial releases from some priority ponds and it allows room for adjustments in proposed releases, depending upon observed impacts from first phase releases. However, there remain some concerns regarding this alternative, relative to the ability to meet regulatory requirements for the initial discharge of pond contents and effects of elevated salinity at discharge locations to salmonids and bay shrimp for March/April releases.

Individual Pond Management Strategies The phased release scenario includes modification of the operation for Baumberg System 11 from the operation proposed under Alternative 2 and described in Section 2.4.3, above. Pond 10 is presently managed as a muted tidal pond with an open culvert in the Baumberg 11 ystem and Pond 11 is presently managed as a low to medium salinity system pond within the Baumberg 11 system. Alternative 2 proposes to operate Pond 10 as a low salinity intake pond in the winter and as an intake and outlet pond in the summer. Alternative 2 proposes to operate Pond 11 as a low salinity outlet pond in the winter and as a seasonal pond in the summer.

Because the phased release would occur prior to completion of the Mount Eden Creek channel construction project, the proposed outlets to the new channel from Ponds 10 and 11 would not be available for the phased release scenario. An alternative initial operation scheme would use the existing Pond 10 intake as an intake/outlet. The initial release would be from the intake and would release the volume of Ponds 10 and 11. After the initial release, Pond 11 would be operated as a seasonal pond with no intake or discharge. Pond 11 would partially fill with rainwater during the winter and dry out during the summer.

Pond management would be identical to Alternative 2 for all other systems.

Preferred Alternative. NEPA does not specifically require that agencies identify a preferred alternative. However, under NEPA Regulations 1502.14, agencies shall "identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference." Under CEQA, a typical EIR identifies a "proposed Project" studied in considerable detail, and then identifies a "reasonable range of alternatives" considered in much less detail. Like NEPA, CEQA does not specifically require that agencies identify a preferred alternative. However, CEQA's statutory and regulatory scheme presupposes a single proposed Project as the starting point against which environmental effects are studied and alternatives are measured.

As discussed in Section 2.4.3 above, due to the pioneering nature of the project and lack of existing data from related projects, the impacts of the project are difficult to predict. Therefore, the responsible agencies (USFWS and CDFG) prefer to have flexibility in the implementation of management strategies for specific ponds and pond systems. Alternative 3 incorporates the phased initial release scenario, which offers the maximum flexibility in the timing of initial release, as well as the individual pond management strategies included in Alternatives 2 (including the proposal to breach the Island Ponds and various adaptive management alternatives for individual ponds). Selection of this alternative would allow the agencies a high degree of flexibility to adjust management strategies in response to water quality, habitat, and wildlife impacts that are observed as various components of the project are implemented. The complexity of this project and its pioneering nature call out for such an iterative process. Therefore, the agencies (CDFG and USFWS) have identified this alternative as the Preferred Alternative.

2.5 Comparison of Alternatives

NEPA Regulations (Section 1502.14) require that an EIS present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker(s) and the public. While CEQA requires a greater level of analysis for the Proposed Project, NEPA requires that all project alternatives be given an equivalent level of analysis. Since this project must comply with both CEQA and NEPA standards, all alternatives were considered equally.

Table S-3 in the preceding summary presents the anticipated impacts for each of the alternatives described in Section 2.4 that were analyzed in detail in this EIR/EIS. The standard for information contained in Table S-3 is information without which the public and responsible agencies cannot make a fully informed decision regarding the project.