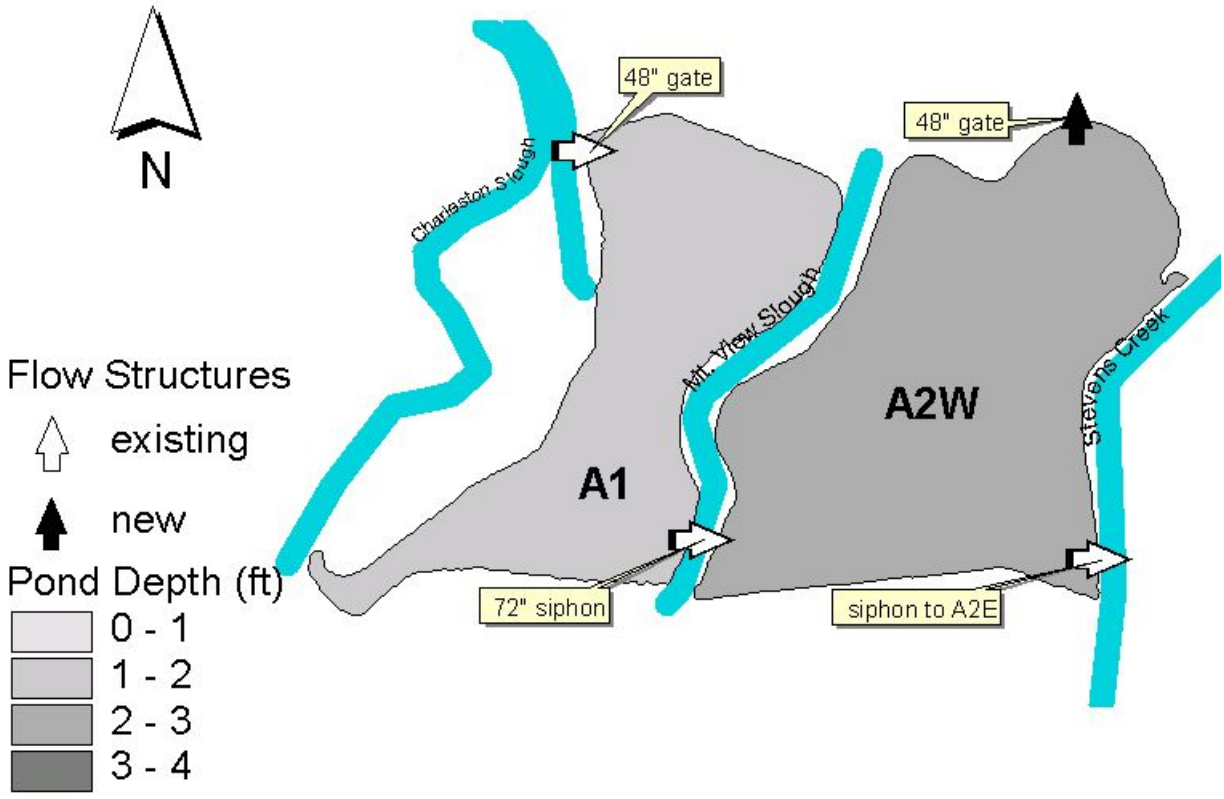
Operation Plan – Alviso System A2W (May 2005)



Objectives

Maintain full tidal circulation through ponds A1 and A2W while maintaining discharge salinities to the Bay at less than 40 ppt and meet the other water quality requirements in the Water Board's Waste Discharge Permit. This program will also include monitoring for pH, dissolved oxygen, temperature, avian botulism, mercury methylation, and potential for inorganic mobilization.

Structures

The A2W system includes the following structures needed for water circulation in the ponds:

- Existing 48" gate intake at A1from lower Charleston Slough
- Existing 72" siphon under Mountain View Slough between A1 and A2W
- Existing staff gage (no datum) at A1, plus a new NGVD gauge to be installed in 2005
- New 48" gate outlet structure with 24' weir box at A2W to the Bay
- New NGVD gage at A2W
- Note that existing siphon to A2E should be closed

System Description

The intake for the A2W system is located at the northwest end of pond A1 and includes one 48" gate from lower Charleston Slough near the Bay. The system outlet is located at the north end of pond A2W, with one 48" gate to the Bay. The flow through the system proceeds from the intake at A1 though the 72" siphon under Mountain View Slough to A2W. An existing siphon under Stevens Creek to Pond A2E was used for salt pond operations. It should remain closed for normal operations, though it is available for unforeseen circumstances.

Operations of the A2W system should require little active management of gate openings to maintain appropriate flows. Summer and winter operations are described below to indicate predicted operating levels during the dry and wet seasons. The system will discharge when the tide is below 4.5 ft. MLLW.

Summer Operation

The summer operation is intended to provide circulation flow to makeup for evaporation during the summer season. The average total circulation inflow is approximately 19 cfs, or 38 acre-feet/day, with an outlet flow of about 14 cfs (28 acre-feet/day). The summer operation would normally extend from May through October.

Summer Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A1	277	-1.8	-0.4	2.0
A2W	429	-2.4	-0.5	NA

Summer Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A1 intakes	50	19
A2W	100	48
Weir	-1.2 ft NGVD	6 boards

Water Level Control

The water level in A2W is the primary control for the pond system. The outlet at A2W includes both a control gate and control weir. Either may be used to limit flow through the system. The system flow is limited by the outlet capacity. Normal operation would have the outlet gates fully open, and the weir set at elevation -1.2 ft NGVD, approximately 0.7 feet below the normal water level. The normal water level in A2W should be at -0.5 ft NGVD in summer. The level may vary by 0.2 due to the influence of weak and strong tides.

The A1 intake gate can be adjusted to control the overall flow though the system. The maximum water level in either A1 or A2W should generally be less than 1.2 ft NGVD. This is to maintain freeboard on the internal levees and limit wind wave erosion.

Design Water Level Ranges

Pond	Design Water Level Elev. (ft, NGVD)	Maximum Water Elev. (ft, NGVD)	Maximum Water Level (ft, Staff Gage)	Minimum Water Elev. (ft, NGVD)	Minimum Water Level (ft, Staff Gage)
A1	-0.4	1.2	3.6	-0.6	1.8
A2W	-0.5	1.1	NA	-0.7	NA

The minimum and maximum water levels are based on our observations in the ponds for the period 2004.

There is no existing staff gage in pond A2W. Therefore, there is no record of existing minimums and maximums. Based on system hydraulics, pond A2W would typically be about 0.1 feet below pond A1.

100 Percent Coverage Water Level

Pond	Design Water Level Elev. (ft, NGVD)	100 % Coverage Water Elev. (ft, NGVD)	100 % Coverage Water Level (ft, Staff Gage)
A1	-0.4	-0.7	1.7
A2W	-0.5	NA	NA

The 100 percent coverage values represent the estimated water level which begins to expose part of the pond bottom area. Lower water levels would expose large areas of the pond bottom to drying and may cause odor problems.

Salinity Control

The summer salinity in the system will increase from the intake at A1 to the outlet at A2W, due to evaporation within the system. The design maximum salinity for the discharge at A2W is 40 ppt. The intake flow at A1 should be increased when the salinity in A2W is close to 35 ppt. If the gate at A1 is fully open, the flow can be increased by lowering the weir elevation at the A2W outlet structure. Increased flow will increase the water level in A2W. Water levels above elevation 1.1 ft NGVD should be avoided as they may increase wave erosion of the levees.

Dissolved Oxygen and pH Control

If summer monitoring shows that DO levels in discharges from the Pond A2W fall below a 10^{th} percentile of 3.3 mg/L (calculated on a calendar weekly basis), the FWS will accelerate receiving water monitoring to weekly, conduct within-pond monitoring and notify and consult with the Water Board as to which Best Management Practices described below for increasing dissolved oxygen levels in discharge water should be implemented:

1. Increase the flows in the system by opening the A1 inlet further. If increased flows are not possible, fully open both the A1 and A2W gates to allow the ponds to become muted tidal systems until pond DO levels revert to levels at or above conditions in the Creek.

2. Set in a series of flow diversion baffles at the pond discharge for directing the water from more suitable DO water levels to achieve maximum oxygen uptake.

3. Cease nighttime discharges due to diurnal pattern.

4. Close discharge gates completely until DO levels meet standards.

5. Close discharge gates completely for a period of time each month when low tides occur primarily at night.

6. Mechanically harvest dead algae.

7. Install solar aeration circulators.

The pH of the discharge is related to the DO of the discharge. If the pH of the discharge falls outside the range of 6.5 – 8.5, an analysis of the impact of discharging pH on the receiving waters will be performed. If it is determined that discharge is impacting receiving water pH, the above mitigations measures will be implemented.

To help minimize significant downtime on continuous monitoring devices used for DO and pH, the FWS will:

1. Have an extra monitor on hand, in case there is a break down.
2. Get a loaner unit through Hydrolab (within a week), if the extra monitor is being used.
3. Work with Hydrolab to insure a quick repair of monitors (within 2 weeks).

Avian botulism

Avian botulism outbreaks most typically occur in late summer/early fall when warm temperatures and an abundance of decaying organic matter (vegetation and invertebrates) combine to present ideal conditions for the anaerobic soil bacterium *Clostridium botulism* along water bodies. If summer monitoring shows that DO levels in the pond drop the BMPs listed under the section on Dissolved Oxygen and pH Control will be implemented to increase the DO. Monitoring of weather for long periods of hot, dry, windless days during late August and early September will trigger on the ground monitoring for any signs of botulism. FWS will be in contact with the adjacent landowners such as the San Jose and Sunnyvale Treatment plants to determine if botulism is occurring on their ponds. Additionally, if any bird carcasses in the ponds or nearby receiving waters are observed, they will be promptly collected and disposed of.

Winter Operation

The winter operation is intended to provide less circulation flow than the summer operation. Evaporation is normally minimal during the winter. The winter operation is intended to limit large inflows during storm tide periods and to allow rain water to drain from the system.

The average total circulation inflow is approximately 9 cfs, or 18 acre-feet/day, with an outlet flow of about 9 cfs (18 acre-feet/day). The winter operation period would normally extend from November through April. The proposed gate settings are intended to limit the intake flow, and flow within the system.

Winter Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A1	277	-1.8	-0.6	1.8
A2W	429	-2.4	-0.6	NA

Winter Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A1 intakes	30	12
A2W	100	48
Weir	-1.2 ft NGVD	6 boards

Water Level Control

The water level in A2W is the primary control for the pond system. The system flow is limited by the both the intake and outlet capacities. Normal winter operation would have the intake gate partially open to reduce inflow during extreme storm tides. Water levels in the ponds are controlled by the outlet weir setting. The normal winter water level in A2W should be at -0.6 ft NGVD, approximately 0.6 ft above the outlet weir. The pond water level may vary by 0.2 ft due to the influence of weak and strong tides, and over 0.5 ft due to storms

During winter operations, the water levels should not fall below the outlet weir elevation. If the elevation does decrease in April, it may be necessary to begin summer operation in April instead of May.

During winter operations, if the water levels exceed approximately 1.2 ft NGVD, the A1 intake should be closed to allow the excess water to drain. Note that without rainfall or inflow, it will take approximately 3 weeks to drain 1.0 ft from the ponds.

Salinity Control

The winter salinity in the system may decrease from the intake at A1 to the outlet at A2W, due to rainfall inflows within the system, which may exceed winter evaporation. During very wet winters, the intake salinities and system salinities may decrease to as low as 11 ppt.

Monitoring

The system monitoring will require weekly site visits to record pond and intake readings. The monitoring parameters are listed below.

Weekly Monitoring Program

Location	Parameter
A1 intakes	Salinity
A1	Depth, Salinity, Observations
A2W	Depth, Salinity, Observations

The weekly monitoring program will include visual pond observations to locate potential algae buildup or signs of avian botulism, as well as visual inspections of water control structures, siphons and levees. This program will also include supplementary DO monitoring when problems are identified in the formal monitoring listed below.

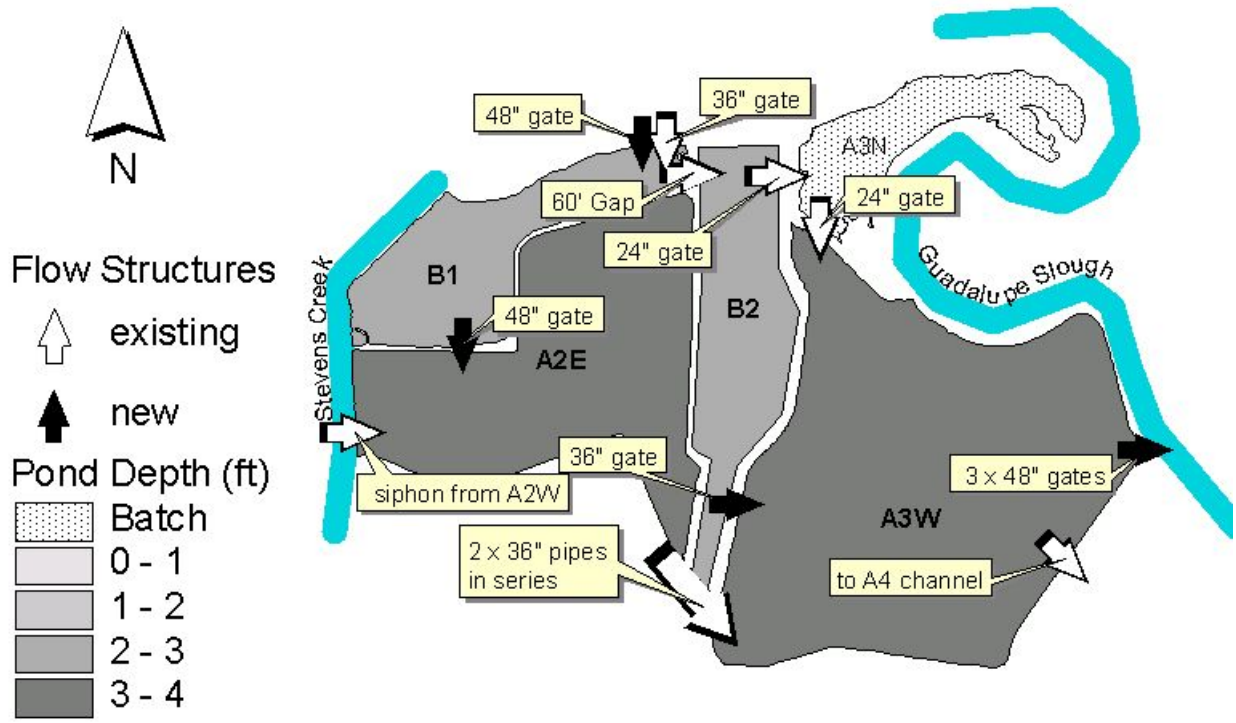
Mobilization of Inorganics and / or the Methylation of Mercury Control

Water column samples for total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury will be collected annually in August or September. If levels are found to rise, further analysis of the cause and mitigation measures will be developed.
If summer water levels in Ponds A1 and A2W are found to increase methyl mercury levels, FWS will notify the Regional Water Quality Board and consult to determine the best approach to addressing the issue.

Additional monitoring required by the RWQCB discharge permit includes the following:

Location	**Frequency**	**Parameters**
A2W(discharge)	Continuous (May-Oct)	DO, pH, Temp., Salinity
Bay	Monthly (May –Oct)	DO, pH, Temp., Salinity
Discharge point	Annually (Aug or Sept)	Metals in water column

Operation Plan – Alviso System A3W (May 2005)



Objectives

Maintain full tidal circulation through ponds B1, B2, A2E, and A3W while maintaining discharge salinities to Guadalupe Slough at less than 40 ppt and meet the other water quality requirements in the Water Board's Waste Discharge Permit. This program will also include monitoring for pH, dissolved oxygen, temperature, avian botulism, mercury methylation, and potential for inorganic mobilization.

Maintain pond A3N as a seasonal pond. If results of wildlife population monitoring indicate the need, operate pond A3N as a batch pond (i.e., at higher salinities).

Maintain water surface levels lower in winter to reduce potential overtopping of A3W levee adjacent to Moffett Field.

Structures

The A3W system includes the following structures needed for water circulation in the ponds:

- Existing 36" gate intake structure from the Bay at B1
- New 48" gate intake from the Bay at B1
- New 48" gate between B1 and A2E
- Existing 2x36" pipes in series between A2E and A3W (no gates).
- New 36" gate between B2 and A3W

- Existing gap between B1 and B2
- Existing 24" gate between B2 and A3N
- Existing 24" gate between A3N and A3W
- New 3x48" gate outlet at A3W to Guadalupe Slough. Two are outlet only, and one allows both inflow and outflow, no weir.
- Existing staff gages at all ponds and new NGVD gages at all ponds
- Existing siphon from A2W is closed, but available if needed

System Description

The intake for the A3W system is located at the northeast end of pond B1 and includes one 48" gate and one 36" gate from the bay. The system outlet is located at the eastern end of pond A3W, with three 48" gates into Guadalupe Slough. The normal flow through the system follows two parallel routes. One route is from B1 to A2E and then to A3W. The second route is from B1 to B2 and then to A3W. Flow through the two routes is controlled by gates from B1 to A2E, from A2E to A3W, and from B2 to A3W. There is an uncontrolled gap between ponds B1 and B2. Due to the size of pond A2E, the majority of the flow should be through A2E, with only minimal circulation flow through B2. Because of the flap gates and the relative elevation of the tides and pond levels, all gravity intake flow would occur at high tide, and all outflows would occur when the tide is below 3 ft. MLLW.

Pond A3N is a seasonal pond. Therefore, for the ISP period, the pond will be drained, and left to partially fill with rain water during the winter and to evaporate completely during the summer. However, if wildlife population monitoring during this period indicates the need for additional higher salinity habitats or if mercury monitoring indicates an increase in methylation due to reduction in water levels, Pond A3N could be operated as a batch pond.

Summer Operation

The summer operation is intended to provide circulation flow to makeup for evaporation during the summer season. The average total circulation inflow is approximately 35 cfs, or 70 acre-feet/day. The summer operation would normally extend from May through October.

Summer Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
B1	142	-0.8	0.4	1.3
B2	170	-0.6	0.4	1.3
A2E	310	-3.1	-0.5	3.0
A3W	560	-3.2	-1.4	2.1
A3N	163	-1.4	NA	NA

Summer Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
B1 west intake	100	36
B1 east intake	90	39
B1 – A2E	38	14
A2E – A3W	NA	NA
B2 – A3W	41	12
A3W outlets	100	48
A3W intake	0	0
B2 – A3N	0	0
A3N – A3W	0	0

Water Level Control

The water level in A3W is the primary control for the pond system. The system flow is limited by the outlet capacity. Normal operation would have the outlet gates fully open. Water levels are controlled by the intake gate settings. The normal water level in A3W should be at -1.4 ft NGVD (2.1 ft gage). The level may vary by 0.2 due to the influence of weak and strong tides.

The flow through B2 to A3W is only required to maintain circulation through B2. This circulation prevents local stagnant areas which may create areas of higher salinity or algal blooms. The gate can be set to a standard opening and would not require frequent adjustment.

The flow through A2E is controlled by the gates from B1 to A2E. The partial gate opening is to maintain the water level differences between A2E and B1. Again, the setting should not require frequent adjustment. There are no gates on the culverts between A2E and A3W, therefore the water levels in those two ponds should be similar.

The B1 intake gates should be adjusted to control the overall flow though the system. The water levels in B1 (and therefore B2) will change due to the change in inflow. The maximum water level should be less than 1.6 ft NGVD (2.5 ft gage). This is to maintain freeboard on the internal levees and limit wind wave erosion.

Design Water Level Ranges

Pond	Design Water Level Elev. (ft, NGVD)	Maximum Water Elev. (ft, NGVD)	Maximum Water Level (ft, Staff Gage)	Minimum Water Elev. (ft, NGVD)	Minimum Water Level (ft, Staff Gage)
B1	0.4	1.6	2.5	-0.2	0.7
B2	0.4	1.6	2.5	-0.2	0.7
A2E	-0.5	-0.2	3.3	-2.0	1.5
A3W	-1.4	-0.2	3.3	-2.0	1.5
A3N	NA	NA	2.6	NA	NA

The minimum and maximum water levels are based on our observations in the ponds for the period 2004.

100 Percent Coverage Water Level

Pond	Design Water Level Elev. (ft, NGVD)	100 % Coverage Water Elev. (ft, NGVD)	100 % Coverage Water Level (ft, Staff Gage)
B1	0.4	-0.8	0.1
B2	0.4	-0.8	0.1
A2E	-0.5	-2.2	1.3
A3W	-1.4	-2.7	0.8
A3N	NA	NA	NA

The 100 percent coverage values represent the estimated water level which begins to expose part of the pond bottom area. Lower water levels would expose large areas of the pond bottom to drying and may cause odor problems.

Salinity Control

The summer salinity in the system will increase from the intake at B1 to the outlet at A3W, due to evaporation within the system. The design maximum salinity for the discharge at A3W is 40 ppt. The intake flow at B1 should be increased when the salinity in A3W is close to 35 ppt. Increased flow will increase the water level in A3W. Water levels in pond A3W above elevation -0.2 ft NGVD (3.3 ft gage) should be avoided as they may increase wave erosion of the levees.

Dissolved Oxygen and pH Control

If summer monitoring shows that DO levels in discharges from the Pond A3W fall below a 10th percentile of 3.3 mg/L (calculated on a calendar weekly basis), the FWS will accelerate receiving water monitoring to weekly, conduct within-pond monitoring and notify and consult with the Water Board as to which Best Management Practices described below for increasing dissolved oxygen levels in discharge water should be implemented:

1. Increase the flows in the system by opening the A1 inlet further. If increased flows are not possible, fully open both the A1 and A2W gates to allow the ponds to become muted tidal systems until pond DO levels revert to levels at or above conditions in the Creek.

2. Set in a series of flow diversion baffles at the pond discharge for directing the water from more suitable DO water levels to achieve maximum oxygen uptake.

3. Cease nighttime discharges due to diurnal pattern.

4. Close discharge gates completely until DO levels meet standards.

5. Close discharge gates completely for a period of time each month when low tides occur primarily at night.

6. Mechanically harvest dead algae.

7. Install solar aeration circulators.

The pH of the discharge is related to the DO of the discharge. If the pH of the discharge falls outside the range of 6.5 – 8.5, an analysis of the impact of discharging pH on the receiving waters will be performed. If it is determined that discharge is impacting receiving water pH, the above mitigations measures will be implemented.

To help minimize significant downtime on continuous monitoring devices used for DO and pH, the FWS will:

1. Have an extra monitor on hand, in case there is a break down.
2. Get a loaner unit through Hydrolab (within a week), if the extra monitor is being used.
3. Work with Hydrolab to insure a quick repair of monitors (within 2 weeks).

Avian botulism

Avian botulism outbreaks most typically occur in late summer/early fall when warm temperatures and an abundance of decaying organic matter (vegetation and invertebrates) combine to present ideal conditions for the anaerobic soil bacterium *Clostridium botulism* along water bodies. If summer monitoring shows that DO levels in the pond drop the BMPs listed under the section on Dissolved Oxygen and pH Control will be implemented to increase the DO. Monitoring of weather for long periods of hot, dry, windless days during late August and early September will trigger on the ground monitoring for any signs of botulism. FWS will be in contact with the adjacent landowners such as the San Jose and Sunnyvale Treatment plants to

determine if botulism is occurring on their ponds. Additionally, if any bird carcasses in the ponds or nearby receiving waters are observed, they will be promptly collected and disposed of.

Winter Operation

The winter operation is intended to provide less circulation flow than the summer operation. Evaporation is normally minimal during the winter. The winter operation is intended to limit large inflows during storm tide periods and to allow rain water to drain from the system.

The average total circulation inflow is approximately 16 cfs, or 32 acre-feet/day, with an average outflow of approximately 18 cfs (36 acre-feet per day). The winter operation period would normally extend from November through April. The proposed gate settings are intended to limit the intake flow, and flow within the system.

Winter Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
B1	142	-0.8	0.9	1.8
B2	170	-0.6	0.9	1.8
A2E	310	-3.1	-1.8	1.7
A3W	560	-3.2	-1.8	1.7
A3N	163	-1.4	NA	NA

Winter Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
B1 west intake	34	10
B1 east intake	25	10
B1 – A2E	16	6
A2E – A3W	NA	NA
B2 – A3W	21	6
A3W outlets	100	48
A3W intake	0	0
B2 – A3N	0	0
A3N – A3W	0	0

Water Level Control

The water level in A3W is the primary control for the pond system. The system flow is limited by the outlet capacity. Normal winter operation would have the A3W outlet gates fully open. Water levels are controlled by the intake gate settings. The normal water level in A3W should be near -1.8 ft NGVD (1.7 ft gage). The level may vary by 0.2 due to the influence of weak and strong tides, storm tides, and rainfall inflows.

The water levels in A3W are important to prevent levee overtopping. The south levee separates the pond from the Moffit Field drainage ditch. The levee is low, and subject to erosion with high water levels. If the water level in A3W exceeds -0.6 ft NGVD (2.9 ft gage), the intake gate openings at B1 should be reduced or closed. The internal gates from B1 and B2 would also require adjustment. If the water level in A3W exceeds -0.2 ft NGVD (3.3 ft gage), the intake gates and all internal gates should be closed until the water level in A3W is back to normal. This may take one to two weeks depending on the weather. The water levels in the upper ponds (B1,

B2, and A2E) may increase due to rainfall during this period, but are less sensitive to higher water levels. The historic high elevation in pond A3W has been -0.2 ft NGVD (3.3 ft gage).

Whenever possible, the system intake at B1 should be closed in anticipation of heavy winter rains and high tides. When the system intake gates are closed, the internal gates from B1 to A2E and from B2 to A3W should also be closed to keep water in the upper ponds (B1 and B2).

There is no gate between A2E and A3W. During winter operations with reduced flows through the system, the A2E water level will be similar to the A3W water level. During the summer, the higher flows will establish approximately 0.9 ft difference due to the head loss through the two pipes in series which connect the ponds.

Salinity Control

The winter salinity in the system may decrease from the intake at B1 to the outlet at A3W, due to rainfall inflows within the system, which may exceed winter evaporation. During very wet winters, the intake salinities and system salinities may decrease to as low as 10 ppt.

Monitoring

The system monitoring will require weekly site visits to record pond and intake readings, as well as to inspect water control structures, siphons and levees. The monitoring parameters are listed below.

Weekly Monitoring Program

Location	Parameter
B1 intakes	Salinity
B1	Depth, Salinity, Observations
B2	Depth, Salinity, Observations
A2E	Depth, Salinity, Observations
A3W	Depth, Salinity, Observations
A3N	Depth, Salinity, Observations

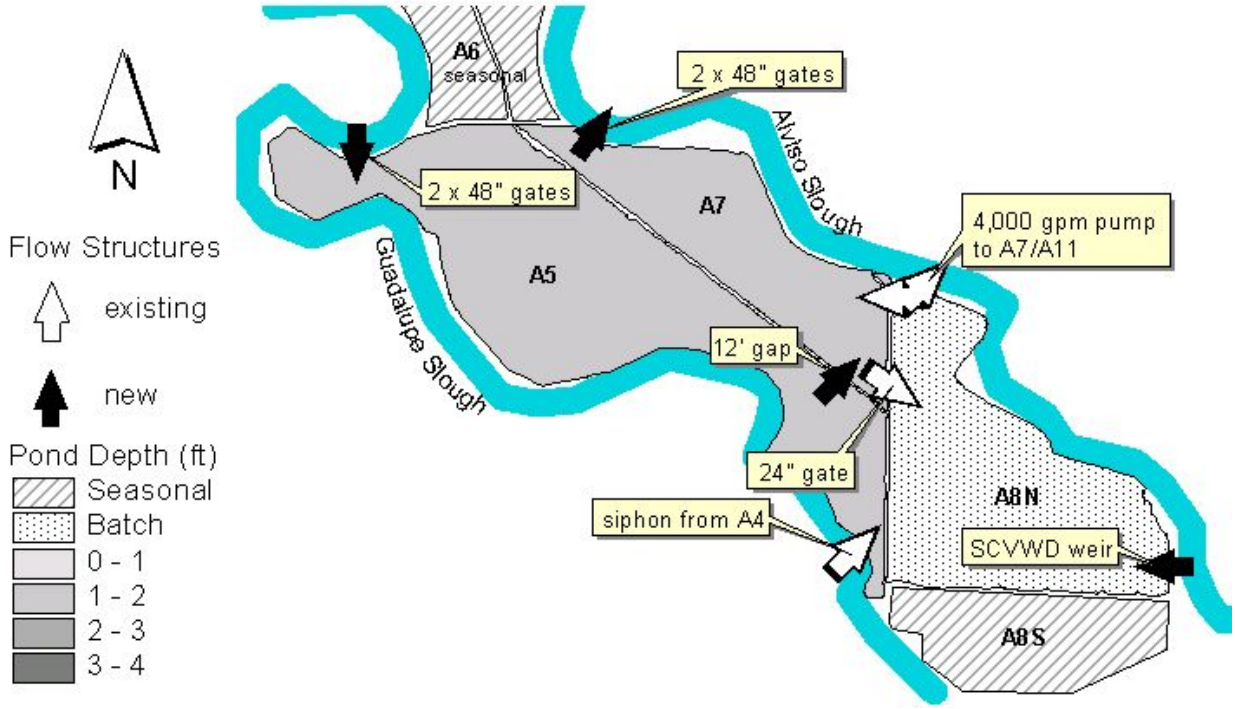
The weekly monitoring program will include visual pond observations to locate potential algae buildup or signs of avian botulism, as well as visual inspections of water control structures, siphons and levees. This program will also include supplementary DO monitoring when problems are identified in the formal monitoring listed below.

Mobilization of Inorganics and / or the Methylation of Mercury Control

Water column samples for total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury shall be collected annually at the Discharge point in August or September. If levels are found to rise, further analysis of the cause and mitigation measures will be developed.
If summer water levels in the A3W system are found to increase methyl mercury levels, FWS will notify the Regional Water Quality Board and consult to determine the best approach to addressing the issue.
Additional monitoring required by the RWQCB discharge permit includes the following:

Location	**Frequency**	**Parameters**
A3W(discharge)	Continuous (May-Oct)	DO, pH, Temp., Salinity
Guadalupe.Sl.	Monthly (May –Oct)	DO, pH, Temp., Salinity
Discharge Point	Annually (Aug or Sept)	Metals in water column

Operation Plan – Alviso System A7 (May 2005)



Objectives

Maintain full tidal circulation through ponds A5 and A7 while maintaining discharge salinities to the Bay at less than 40 ppt. and meet the other water quality requirements in the Water Board's Waste Discharge Permit. This program will also include monitoring for pH, dissolved oxygen, temperature, avian botulism, mercury methylation, and potential for inorganic mobilization.

Maintain pond A8 as a seasonal pond. If results of wildlife population monitoring indicate the need, operate pond A8 as a batch pond.

Maintain option to reverse flows if needed.

Structures

The A7 system includes the following structures needed for water circulation in the ponds:

- New 2x48" gate intake at A5 from Guadalupe Slough.
- New cut at the internal levee between A5 and A7.
- Existing 24" control gate from A7 to A8.
- Existing 4,000 gpm pump from A8 to A11. Outlet piping modified to allow discharge to A7 in addition to A11.
- New 2x48" gate outlet with two 24' weir boxes at A7 into Alviso Slough.
- Existing staff gages in both ponds; New NGVD gages at both new structures
- Existing siphon from A4 should generally be closed.

System Description

The intake for the A7 system is located at the northwest end of pond A5 and includes two 48-inch gates from lower Guadalupe Slough. The system outlet is located at the northeast end of pond A7, with two 48-inch gates to Alviso Slough. In normal operations, the flow through the system starts at the intake at A5 though a cut at the southern end of the levee between A5 and A7, and flows out to Alviso Slough through two 48-inch outlet gates. Both sections of Pond A8 (A8N and A8S) will be operated as seasonal ponds filling with winter rains and generally drying during the summer, though some makeup water can be added A8N through a 24-inch gate from pond A7. If necessary in the future, following bird monitoring studies, A8N may be operated as a batch pond with higher salinities. Because of the flap gates and the relative elevation of the tides and pond levels, all gravity intake flow would occur at high tide, and all outflows would occur when the tide is below 4.5 ft. MLLW.

The Santa Clara Valley Water District has built a weir at Pond A8 to allow flood overflow waters from Alviso Slough to enter the pond during 10-year storm events, or greater. Some flood waters may overtop the levees and enter Ponds A5 and A7 as well. When the ponds fill with floodwaters, the District is responsible for pumping the pond waters back to Alviso Slough or Guadalupe Slough and monitoring for increased mercury levels in sediments/pond waters.

The A7 system can be reversed by changing the control gate settings to intake water from Alviso Slough and release water to Guadalupe Slough. However, the reversed flow circulation does not have an outlet weir at the A5 structure. Therefore, the A5 gates must be set to maintain minimum water levels in the ponds. The reverse flow condition may conflict with the seasonal intake limitations from Alviso Slough for salmonid protection. The A7 structure should not be used as an intake during the winter (December to April) to avoid entrainment of migrating juvenile salmonids. The only reason to use the reversed flow circulation is to avoid potential poor water quality conditions in Guadalupe Slough, if necessary.

The A7 system would require very limited management, unless Pond A8 is operated as a batch pond. Note that for a period of time, the SCVWD may request to continue pumping waters from Pond A4 into Pond A5. At that time, they will provide data analyses and operations plans to assure that A7 discharges will remain below our RWQCB permit limits.

Summer Operation

The summer operation is intended to provide circulation flow to makeup for evaporation during the summer season. The average total circulation inflow is approximately 22 cfs, or 44 acre-feet/day, with an outlet flow of about 16 cfs (32 acre-feet/day). The summer operation would normally extend from May through October.

Summer Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A5	615	-0.6	0.4	1.9
A7	256	-0.5	0.4	1.8
A8N	406	-3.4	NA	NA

Summer Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A5 intakes	30	12
A7 outlet	100	48
A7/A8	0	0
Weir	0.0 ft NGVD	6 boards

Water Level Control

The bottom elevations in both Ponds A5 and A7 are similar and inlet/outlet capacities are the same. Due to the levee cut to connect the ponds, the water levels are similar in both ponds. Flows will occur in either direction based on inlet and outlet gate settings

The A5 intake gate should be adjusted to control the overall flow though the system. The maximum water level in either A5 or A7 should be less than 0.6 ft NGVD (2.1 ft gage). This is to maintain freeboard on the internal levees and limit wind wave erosion. The maximum water level is also intended to preserve the existing islands within the ponds used by nesting birds.

If a significant volume of water is to be diverted into Pond A8, the A5 inlet structure may need to be open further to bring in additional water. Diversions to A8 are controlled by the A7 to A8 gate. One foot of water in A8 (400 acre-feet) represents approximately 0.5 ft in A5/A7, or the net inflow to the system over approximately 10 days.

Design Water Level Ranges

Pond	Design Water Level Elev. (ft, NGVD)	Maximum Water Elev. (ft, NGVD)	Maximum Water Level (ft, Staff Gage)	Minimum Water Elev. (ft, NGVD)	Minimum Water Level (ft, Staff Gage)
A5	0.4	0.6	2.1	-0.3	1.2
A7	0.4	0.6	2.0	-0.3	1.1
A8N	NA	-1.0	0.5	-2.5	-1.0

The minimum and maximum water levels are based on our observations in the ponds for the period 2004.

100 Percent Coverage Water Level

Pond	Design Water Level Elev. (ft, NGVD)	100 % Coverage Water Elev. (ft, NGVD)	100 % Coverage Water Level (ft, Staff Gage)
A5	0.4	0.2	1.4
A7	0.4	0.2	1.4
A8N	NA	-2.5	-1.0

The 100 percent coverage values represent the estimated water level which begins to expose part of the pond bottom area. Lower water levels would expose large areas of the pond bottom to drying and may cause odor problems.

Salinity Control

The summer salinity in the system will increase from the intake at A5 to the outlet at A7 due to evaporation within the system. The design maximum salinity for the discharge at A7W is 40 ppt. The intake flow at A5 should be increased if the salinity in A7 is close to 35 ppt. Increased flow may increase the water level in A7. Water levels above elevation 0.6 ft NGVD (2.1 ft gage) should be avoided as they may increase wave erosion of the levees.

Dissolved Oxygen and pH Control

If summer monitoring shows that DO levels in discharges from the Pond A7 fall below a 10^{th} percentile of 3.3 mg/L (calculated on a calendar weekly basis), the FWS will accelerate receiving water monitoring to weekly, conduct within-pond monitoring and notify and consult with the Water Board as to which Best Management Practices described below for increasing dissolved oxygen levels in discharge water should be implemented:

1. Increase the flows in the system by opening the A1 inlet further. If increased flows are not possible, fully open both the A1 and A2W gates to allow the ponds to become muted tidal systems until pond DO levels revert to levels at or above conditions in the Creek.

2. Set in a series of flow diversion baffles at the pond discharge for directing the water from more suitable DO water levels to achieve maximum oxygen uptake.

3. Cease nighttime discharges due to diurnal pattern.

4. Close discharge gates completely until DO levels meet standards.

5. Close discharge gates completely for a period of time each month when low tides occur primarily at night.

6. Mechanically harvest dead algae.

7. Install solar aeration circulators.

The pH of the discharge is related to the DO of the discharge. If the pH of the discharge falls outside the range of 6.5 – 8.5, an analysis of the impact of discharging pH on the receiving waters will be performed. If it is determined that discharge is impacting receiving water pH, the above mitigations measures will be implemented.

To help minimize significant downtime on continuous monitoring devices used for DO and pH, the FWS will:

1. Have an extra monitor on hand, in case there is a break down.
2. Get a loaner unit through Hydrolab (within a week), if the extra monitor is being used.
3. Work with Hydrolab to insure a quick repair of monitors (within 2 weeks

Avian botulism

Avian botulism outbreaks most typically occur in late summer/early fall when warm temperatures and an abundance of decaying organic matter (vegetation and invertebrates) combine to present ideal conditions for the anaerobic soil bacterium *Clostridium botulism* along water bodies. If summer monitoring shows that DO levels in the pond drop the BMPs listed under the section on Dissolved Oxygen and pH Control will be implemented to increase the DO. Monitoring of weather for long periods of hot, dry, windless days during late August and early September will trigger on the ground monitoring for any signs of botulism. FWS will be in contact with the adjacent landowners such as the San Jose and Sunnyvale Treatment plants to determine if botulism is occurring on their ponds. Additionally, if any bird carcasses in the ponds or nearby receiving waters are observed, they will be promptly collected and disposed of.

Winter Operation

The winter operation is intended to provide circulation flow and to allow rain water to drain from the system. The proposed winter operation would be the same as the summer operation. The average total circulation inflow is approximately 22 cfs, or 44 acre-feet/day, with an outlet flow of about 23 cfs (46 acre-feet/day). The winter operation period would normally extend from November through April. The proposed gate settings are intended to limit the intake flow, and flow within the system.

Winter Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A5	615	-0.6	0.4	1.8
A7	256	-0.5	0.4	1.8
A8N	406	-3.4	NA	NA

Winter Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A5 intakes	30	12
A7 outlet	100	48
A7/A8	0	0
Weir	0.0 NGVD	6 boards

Water Level Control

Consideration may be made to reduce water levels in the ponds prior to winter storm events and high tides by closing or reducing the gate opening at the A5 inlet structure. Approximately three weeks would be needed to reduce pond levels by 0.5 feet. Water levels above elevation 0.6 ft NGVD (2.1 ft gage) should be avoided as they may increase wave erosion of the levees.

Salinity Control

The winter salinity in the system may decrease from the intake at A5 to the outlet at A7, due to rainfall inflows within the system, which may exceed winter evaporation. During very wet winters, the intake salinities and system salinities may decrease below 10 ppt.
If the SCVWD weir has a significant flood spill into pond A8N, the flood water may overflow into A5 and A7. The intake gates and outlet gates can be opened to the maximum after the flood event to aid in lowering the water level in the system. The volume in A8 below the elevation of the cross levee will not drain by gravity, and will need to be pumped from the ponds by the SCVWD.

Monitoring

The system monitoring will require weekly site visits to record pond and intake readings. The monitoring parameters are listed below.

Weekly Monitoring Program

Location	Parameter
A5 intake	Salinity
A5	Depth, Salinity, Observations
A7	Depth, Salinity, Observations
A8	Depth, salinity, observations

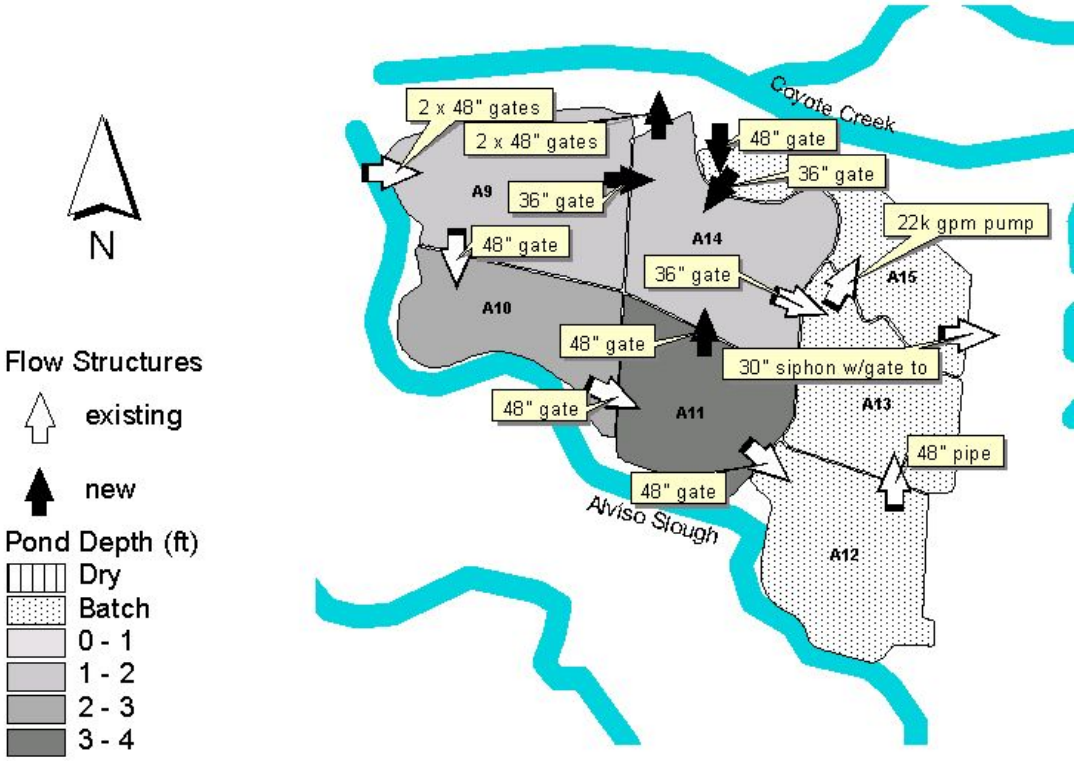
The weekly monitoring program will include visual pond observations to locate potential algae buildup or signs of avian botulism, as well as visual inspections of water control structures, siphons and levees. This program will also include supplementary DO monitoring when problems are identified in the formal monitoring listed below.

Mobilization of Inorganics and / or the Methylation of Mercury Control

Water column samples for total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury shall be collected annually at Discharge point in August or September. If levels are found to rise, further analysis of the cause and mitigation measures will be developed.
If summer water levels in the Discharge point are found to increase methyl mercury levels, FWS will notify the Regional Water Quality Board and consult to determine the best approach to addressing the issue.
Additional monitoring required by the RWQCB discharge permit includes the following:

Location	**Frequency**	**Parameters**
A7(discharge)	Continuous (May-Oct)	DO, pH, Temp., Salinity
Alviso Slough	Monthly (May –Oct)	DO, pH, Temp., Salinity
Discharge point	Annually (Aug or Sept)	Metals in water column

Operation Plan – Alviso System A14 (May 2005)



Objectives

Maintain full tidal circulation through pondsA9, A10, A11 and A14, while maintaining discharge salinities to Coyote Creek at less than 40 ppt. and meet the other water quality requirements in the Water Board's Waste Discharge Permit. This program will also include monitoring for pH, dissolved oxygen, temperature, avian botulism, mercury methylation, and potential for inorganic mobilization.

Maintain pond A12, A13 and A15 as batch ponds. Operate batch ponds at a higher salinity (80 – 120 ppt) during summer to favor brine shrimp.

Minimize entrainment of salmonids by limiting inflows during winter.

Maintain water surface levels lower in winter to reduce potential overtopping.

Structures

The A14 system includes the following structures needed for water circulation in the ponds:

- Existing 2 x 48" gate intake at A9 from Alviso Slough
- Existing 48" gate between A9 and A10
- New 48" gate between A9 and A14
- Existing 48" gate between A10 and A11
- New 48" gate between A11 and A14
- Existing 48" gate between A11 and A12
- Existing 48" gate between A12 and A13
- Existing 36" gate between A14 and A13
- Existing siphon from A15 to A16
- Existing 36" gate between A15 and A14
- Existing 22,000 gpm pump from A13 to A15
- New 48" gate intake at A15 from Coyote Creek
- New 2 x 48" gate outlet at A14 into Coyote Creek
- Existing staff gages at all ponds and new NGVD gages at all pond

System Description

The intake for the A14 system is located at the northwest end of pond A9 and includes two 48" gates from Alviso slough near the Bay. The system outlet is located at the northerly end of A14, with two 48" gates into Coyote Creek. The normal flow through the system proceeds from the intake at A9, then flow through A10 and A11 to the outlet at A14. Because of the flap gates and the relative elevation of the tides and pond levels, all gravity intake flow would occur at high tide, and all outflows would occur when the tide is below 4.0 ft. MLLW.

Ponds A12, A13, and A15 will be operated as batch ponds to control the individual pond volumes and salinities.

Operations of the A14 system should require little active management of gate openings to maintain appropriate circulation flows. Summer and winter operations are described below to indicate predicted operating levels during the dry and wet seasons.

Summer Operation

The summer operation is intended to provide circulation flow to makeup for evaporation during the summer season. The average total circulation inflow is approximately 38 cfs, or 17,000 gpm. The summer operation would normally extend from May through October.

Summer Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A9	385	-0.2	2.0	3.3
A10	249	-0.8	1.8	3.0
A11	263	-1.8	1.3	2.5
A14	341	-0.0	0.9	2.3
A12	309	-2.0	1.2	2.5
A13	269	-1.1	1.1	2.6
A15	249	0.7	2.8	4.1

Summer Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A9 north intake	100	48
A9 south intake	100	48
A9 – A10	100	48
A10 – A11	100	48
A11 – A14	100	48
A14 west outlet	100	48
A14 east outlet	100	48
A9 – A14	0	0
A11 – A12	0	0
A12 – A13	0	0
A13 – A15	0	0
A14 – A13	0	0
A15 – A14	0	0
A15 intake	0	0
A14 weir	0.0 ft NGVD	

Water Level Control

The water level in A14 is the primary control for the pond system. The system flow is limited by the inlet capacity at A9. Normal operation would have the outlet gates fully open. Water levels are controlled by the weir elevation at A14. The A14 weir should be at approximately 0.0 ft NGVD to maintain the summer water level in A14 at 0.9 ft NGVD (2.3ft gage). The level may vary by 0.2 due to the influence of weak and strong tides.

The route of flow through this system will be from A9 to A10 to A11 to A14. The partial gate opening is to maintain the water level differences between the ponds. Again, the setting should not require frequent adjustment.

The A9 intake gates should be adjusted to control the overall flow though the system. The water levels in A9 will change due to the change in inflow. The maximum water level should be less than 2.5 ft NGVD (3.8 ft gage). This is to maintain freeboard on the internal levees and limit wind wave erosion.

100 Percent Coverage Water Level

Pond	Design Water Level Elev. (ft, NGVD)	100 % Coverage Water Elev. (ft, NGVD)	100 % Coverage Water Level (ft, Staff Gage)
A9	2.0	1.6	3.0
A10	1.8	-0.2	1.0
A11	1.3	-0.2	1.0
A14	0.9	0.8	2.2
A12	NA	-0.3	1.0
A13	NA	-0.3	1.2
A15	NA	0.7	2.0

The 100 percent coverage values represent the estimated water level which begins to expose part of the pond bottom area. Lower water levels would expose large areas of the pond bottom to drying and may cause odor problems. The 100 percent coverage water levels are intended for information purposes only. Operating the ponds at or near minimum depths will interfere with circulation through the ponds and may cause significant increases in pond salinity during the summer evaporation season.

Pond A14 has an estimated average bottom elevation at 0.0 ft NGVD, but portions of the pond bottom are at 0.8 ft NGVD, very near the design water level. The proposed A14 water level may need to be adjusted to maintain circulation through the pond.

Salinity Control

The summer salinity in the system will increase from the intake at A9 to the outlet at A14, due to evaporation within the system. The design maximum salinity for the discharge at A14 is 40 ppt. The intake flow at A9 should be increased when the salinity in A14 is close to 35 ppt. Increased flow may increase the water level in A14. The inflow at A9 is constrained by the tide level in Alviso Slough since the intake gates would be fully open. The inflow can be increased by partially opening the gate from A9 to A14 to lower the water level in A9 and increase the gravity inflow. This would increase the flow through A9 and A14, but reduce the flow through A10 and A11. Water levels in pond A14 above elevation 2.0 ft NGVD (3.4 ft gage) should be avoided as they may increase wave erosion of the levees.

Batch Ponds A12, A13, and A15 summer salinity levels should be between 80 and 120 ppt, to provide habitat for brine shrimp and wildlife which feeds on brine shrimp. Salinity control for the batch ponds will require both inflows to replace evaporation losses, and outflows to reduce the salt mass in the ponds and create space for lower salinity inflows. Ponds A12 and A13 would operate as a single unit, with inflow from pond A11 and outflows to either A14 or A15. The water levels in A12 and A13 would generally be between the elevations in A11 (higher than A12) and A14 (lower than A13). Therefore inflows from A11 and outflows to A14 would be by gravity. Outflows from A13 can also be pumped to A15. Water can also be pumped from A13 to A14 if the water levels are low in A13. Pond A15 would operate as a separate batch pond at a higher elevation than A13 or A14. Inflows to A15 would be pumped from A13, or by gravity from Coyote Creek with the supplemental intake at A15. Outflows from A15 would be by gravity to either A14 or A16.

The batch pond operation will require the outflow of approximately 0.5 to 0.7 ft of water from the batch ponds each month. This represents approximately 25 percent of the pond volumes. Because the A14 and A17 system have no circulation inflows from Coyote Creek for dilution from December through April, the outflow would normally occur during the evaporation season. The preferred operation would be to maintain the pond salinities near 100 ppt as much as possible, with consistent small outflows during the month from A13 to A14 and from A15 to A16. These gates should only be open approximately 10 percent, depending on the pond water levels. The inflows would be on a batch basis to add approximately 0.5 ft to the batch ponds about every other week.

If the salinity levels are high in A14 or A16, it may be necessary to reduce or suspend outflows from the batch ponds and allow the batch pond salinity to increase until later in the season. The salinity in a batch pond will increase by approximately 10 ppt per month during the peak evaporation months. If the batch pond salinities are high at the end of the

circulation season, it may be necessary to continue to operate the A16 system with reverse flow during the winter continue to dilute the batch pond outflows until a reasonable salinity level is reached to start the next evaporation season.

Dissolved Oxygen and pH Control

If summer monitoring shows that DO levels in discharges from the Pond A14 fall below a 10^{th} percentile of 3.3 mg/L (calculated on a calendar weekly basis), the FWS will accelerate receiving water monitoring to weekly, conduct within-pond monitoring and notify and consult with the Water Board as to which Best Management Practices described below for increasing dissolved oxygen levels in discharge water should be implemented:

1. Increase the flows in the system by opening the A1 inlet further. If increased flows are not possible, fully open both the A1 and A2W gates to allow the ponds to become muted tidal systems until pond DO levels revert to levels at or above conditions in the Creek.

2. Set in a series of flow diversion baffles at the pond discharge for directing the water from more suitable DO water levels to achieve maximum oxygen uptake.

3. Cease nighttime discharges due to diurnal pattern.

4. Close discharge gates completely until DO levels meet standards.

5. Close discharge gates completely for a period of time each month when low tides occur primarily at night.

6. Mechanically harvest dead algae.

7. Install solar aeration circulators.

The pH of the discharge is related to the DO of the discharge. If the pH of the discharge falls outside the range of 6.5 – 8.5, an analysis of the impact of discharging pH on the receiving waters will be performed. If it is determined that discharge is impacting receiving water pH, the above mitigations measures will be implemented.

To help minimize significant downtime on continuous monitoring devices used for DO and pH, the FWS will:

1. Have an extra monitor on hand, in case there is a break down.
2. Get a loaner unit through Hydrolab (within a week), if the extra monitor is being used.
3. Work with Hydrolab to insure a quick repair of monitors (within 2 weeks).

Avian botulism

Avian botulism outbreaks most typically occur in late summer/early fall when warm temperatures and an abundance of decaying organic matter (vegetation and invertebrates) combine to present ideal conditions for the anaerobic soil bacterium *Clostridium botulism* along water bodies. If summer monitoring shows that DO levels in the pond drop the BMPs listed under the section on Dissolved Oxygen and pH Control will be implemented to increase the DO. Monitoring of weather for long periods of hot, dry, windless days during late August and early September will trigger on the ground monitoring for any signs of botulism. FWS will be in contact with the adjacent landowners such as the San Jose and Sunnyvale Treatment plants to determine if botulism is occurring on their ponds. Additionally, if any bird carcasses in the ponds or nearby receiving waters are observed, they will be promptly collected and disposed of.

Winter Operation

During the winter season, the A9 intake will be closed to prevent entrainment of migrating salmonids. The winter operation period would normally extend from December through May 31. 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. The gates from A9, A10, and A11 will be partially open to allow rainfall to drain to A14. Excess water from rainfall would be drained from the system after larger storms and will require additional active management to adjust the interior control gates.

Winter Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A9	385	-0.2	1.5	2.8
A10	249	-0.8	1.5	2.7
A11	263	-1.8	1.4	2.6
A14	341	-0.0	1.3	2.7
A12	309	-2.0	1.4	2.7
A13	269	-1.1	1.2	2.7
A15	249	0.7	2.8	4.1

Winter Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A9 north intake	0	0
A9 south intake	0	0
A9 – A10	100	48
A10 – A11	100	48
A11 – A14	100	48
A14 west outlet	0	0
A14 east outlet	100	48
A9 – A14	0	0
A11 – A12	0	0
A12 – A13	0	0
A13 – A15	0	0
A14 – A13	0	0
A15 – A14	0	0
A15 intake	0	0

Salinity Control

The winter salinity in the system may decrease from the intake at A9 to the outlet at A14, due to rainfall inflows within the system, which may exceed winter evaporation. During very wet winters, the intake salinities and system salinities may decrease to as low as 11 ppt.

Monitoring

The system monitoring will require weekly site visits to record pond and intake readings, as well as to inspect water control structures, siphons and levees. The monitoring parameters are listed below.

Weekly Monitoring Program

Location	Parameter
A9 intakes	Salinity
A10	Depth, Salinity, Observations
A11	Depth, Salinity, Observations
A14	Depth, Salinity, Observations
A12	Depth, Salinity, Observations
A13	Depth, Salinity, Observations
A15	Depth, Salinity, Observations

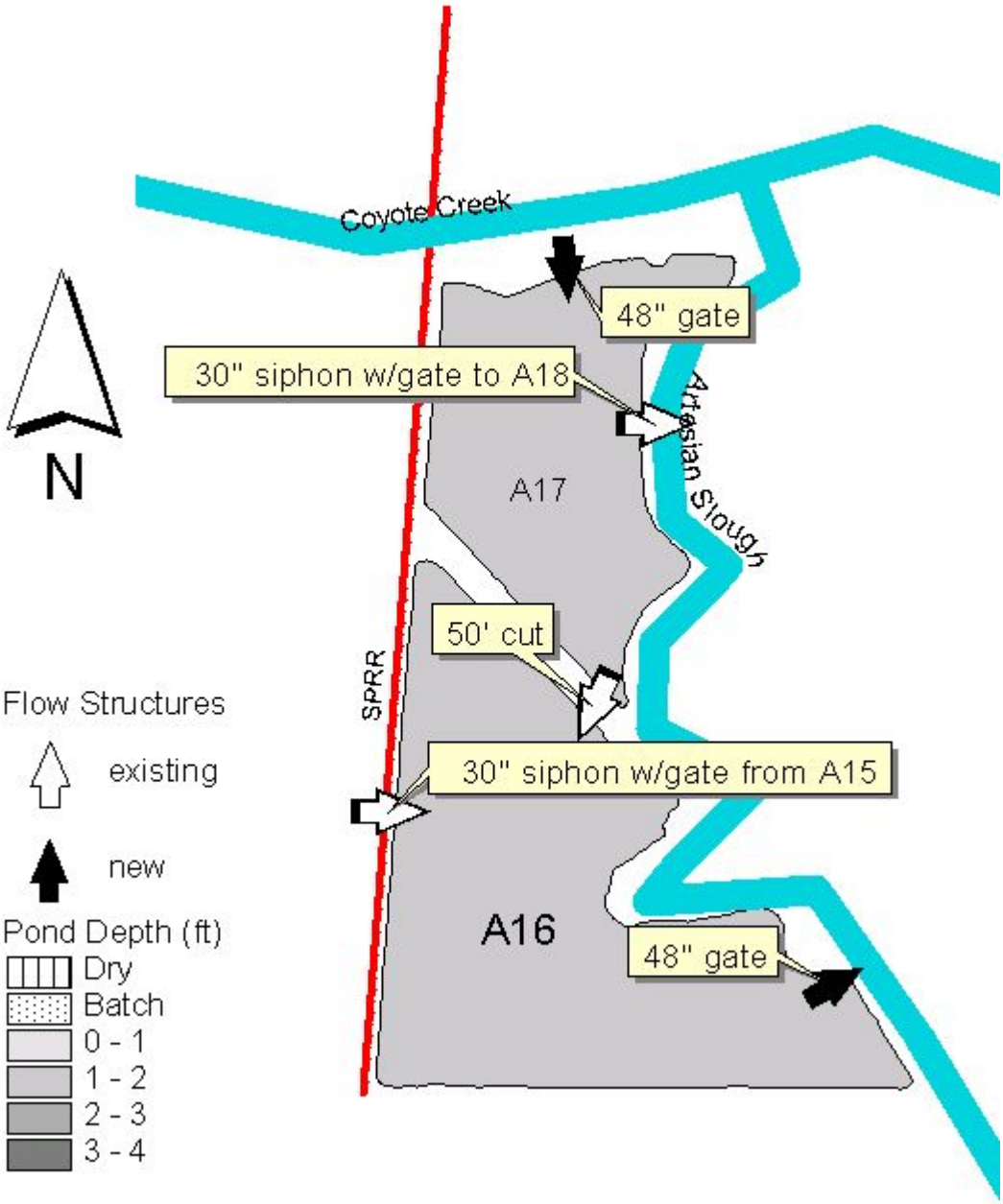
The weekly monitoring program will include visual pond observations to locate potential algae buildup or signs of avian botulism, as well as visual inspections of water control structures, siphons and levees. This program will also include supplementary DO monitoring when problems are identified in the formal monitoring listed below.

Mobilization of Inorganics and / or the Methylation of Mercury Control

Water column samples for total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury shall be collected annually at the Discharge point in August or September. If levels are found to rise, further analysis of the cause and mitigation measures will be developed.
If summer water levels in the A14 system are found to increase methyl mercury levels, FWS will notify the Regional Water Quality Board and consult to determine the best approach to addressing the issue.
Additional monitoring required by the RWQCB discharge permit includes the following:

Location	**Frequency**	**Parameters**
A14(discharge)	Continuous (May-Oct)	DO, pH, Temp., Salinity
Coyote Creek	Monthly (May –Oct)	DO, pH, Temp., Salinity
Discharge point	Annually (Aug or Sept)	Metals in water column

Operation Plan – Alviso System A16 (May 2005)



Objectives

Maintain full tidal circulation through ponds A17 and A16 while maintaining discharge salinities to the Artesian Slough lower than 40 ppt. and meet the other water quality requirements in the Water Board's Waste Discharge Permit. This program will also include monitoring for pH, dissolved oxygen, temperature, avian botulism, mercury methylation, and potential for inorganic mobilization.

Minimize entrainment of salmonids by:

Close A17 intake during winter, or
Reverse of intake and outlet flow during winter.

Structures

The A16 system includes the following structures needed for water circulation in the ponds:

- New 48" gate intake at A17 from Coyote Creek
- New 48" gate outlet structure at A16 into Artesian Slough
- Existing siphon between A15 (from system A14) to A16
- Existing gap between A17 and A16
- Existing siphon between A17 and A18
- Existing staff gauges (no datum) , plus new NGVD gauges to be installed

System Description

The intake for the A16 system is located at the northern end of pond A17 and includes one 48" gate from lower Coyote Creek. The system outlet is located at the southeast end of pond A16, with one 48" gate to the Artesian Slough. The flow through the system proceeds from the intake at A17 though a 50' cut in the levee between A17 and A16, then through the 48" gate at the outlet A16. An existing siphon from A15 to A16 will be used to release excess water from ponds A12, A13, and A15 on a batch basis. The existing siphon between A17 and A18 will not be used for system circulation, and may be sealed in the future. A18 will be owned and operated by the City of San Jose.

Operations of the A16 system should require limited active management of gate openings to maintain appropriate flows. Because of the flap gates and the relative elevation of the tides and pond levels, all gravity intake flow would occur at high tide, and all outflows would occur when the tide is below 5.5 ft. MLLW. Summer and winter operations are described below to indicate predicted operating levels during the dry and wet seasons.

Summer Operation

The summer operation is intended to provide circulation flow to makeup for evaporation during the summer season. The average total circulation inflow is approximately 15 cfs, or 6,800 gpm, with an outlet flow of about 12 cfs (5,400 gpm). The summer operation would normally extend from May through October.

Summer Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A17	131	1.1	2.3	1.3
A16	243	0.6	2.3	0.7

Summer Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A17 intake	100	48
A16 outlet	100	48
A16 weir	1.9 ft NGVD	

Water Level Control

The water level in A16 is the primary control for the pond system. The system flow is limited by the outlet capacity. Normal operation would have the outlet gates fully open, and the water level in A16 would be controlled by the elevation of the outlet weir at A16. The estimated weir elevation would be 1.9 ft NGVD to maintain the pond water level at 2.3 ft NGVD in summer. The level may vary by 0.2 feet during a month due to the influence of weak and strong tides.

The A17 intake gate can be adjusted to control the overall flow though the system. The maximum water level in either A17 or A16 should generally be less than 3.0 ft NGVD during the summer. This is to maintain freeboard on the internal levees and limit wind wave erosion. The maximum historic water level in A16 and A17 has been 3.8 ft NGVD during the winter.

100 Percent Coverage Water Level

Pond	Design Water Level Elev. (ft, NGVD)	100 % Coverage Water Elev. (ft, NGVD)	100 % Coverage Water Level (ft, Staff Gage)
A17	2.3	1.1	0.1
A16	2.3	1.6	0.1

The 100 percent coverage values represent the estimated water level which begins to expose part of the pond bottom area. Lower water levels would expose large areas of the pond bottom to drying and may cause odor problems. The 100 percent coverage water levels are intended for information purposes only. Operating the ponds at or near minimum depths will interfere with circulation through the ponds and may cause significant increases in pond salinity during the summer evaporation season.

Salinity Control

The summer salinity in the system will increase from the intake at A17 to the outlet at A16 due to evaporation within the system. The design maximum salinity for the discharge at A16 is 40 ppt. The discharge permit requires that the discharge salinity not exceed 44 ppt.

The system circulation flow should be increased when the salinity in A16 reaches approximately 35 ppt during the summer. There are two operational measures available to increase the circulation flow. First, the level of the outlet weir can be lowered to lower the pond water level and the gravity inflow to the system. The weir structure includes weir boards on three sides of the structure. In general, the overall weir elevation should not be lowered more than 0.5 ft, but it may be more practical to lower one side by 1.0 ft or less.

The second operational measure to increase the circulation flow would be to adjust the intake gate at the A16 outlet structure to allow inflow from Artesian Slough at high tide. With the A16 intake gate fully open, the overall circulation flow would be approximately double the flow with A17 alone. In addition, the salinity in Artesian Slough at high tide is lower than in Coyote Creek and would directly lower the salinity in A16. The weir level at A16 should be adjusted to increase the outflow from A16 to account for the increased inflow.

The A16 system is intended to be the discharge for flows from pond A15 in the A14 system. A15 is a batch pond with operating salinities in the range of 80 to 120 ppt. Water will be transferred from A15 to A16 to lower the water levels in A15 and provide capacity for lower salinity inflows control the batch pond salinity. The intention is to dilute the higher salinity water with the pond A16 circulation. The siphon from A15 should be approximately 10 to 25 percent open, and the 22,000 gpm pump from A13 to A15 should operate approximately two to 3 days per month. The pump can add approximately 0.4 ft of water to A15 in one day.

Dissolved Oxygen and pH Control
If summer monitoring shows that DO levels in discharges from the Pond A16 fall below a 10th percentile of 3.3 mg/L (calculated on a calendar weekly basis), the FWS will accelerate receiving water monitoring to weekly, conduct within-pond monitoring and notify and consult with the Water Board as to which Best Management Practices described below for increasing dissolved oxygen levels in discharge water should be implemented:

1. Increase the flows in the system by opening the A1 inlet further. If increased flows are not possible, fully open both the A1 and A2W gates to allow the ponds to become muted tidal systems until pond DO levels revert to levels at or above conditions in the Creek.

2. Set in a series of flow diversion baffles at the pond discharge for directing the water from more suitable DO water levels to achieve maximum oxygen uptake.

3. Cease nighttime discharges due to diurnal pattern.

4. Close discharge gates completely until DO levels meet standards.

5. Close discharge gates completely for a period of time each month when low tides occur primarily at night.

6. Mechanically harvest dead algae.

7. Install solar aeration circulators.

The pH of the discharge is related to the DO of the discharge. If the pH of the discharge falls outside the range of 6.5 – 8.5, an analysis of the impact of discharging pH on the receiving waters will be performed. If it is determined that discharge is impacting receiving water pH, the above mitigations measures will be implemented.

To help minimize significant downtime on continuous monitoring devices used for DO and pH, the FWS will:

1. Have an extra monitor on hand, in case there is a break down.
2. Get a loaner unit through Hydrolab (within a week), if the extra monitor is being used.
3. Work with Hydrolab to insure a quick repair of monitors (within 2 weeks).

Avian botulism

Avian botulism outbreaks most typically occur in late summer/early fall when warm temperatures and an abundance of decaying organic matter (vegetation and invertebrates) combine to present ideal conditions for the anaerobic soil bacterium *Clostridium botulism* along water bodies. If summer monitoring shows that DO levels in the pond drop the BMPs listed under the section on Dissolved Oxygen and pH Control will be implemented to increase the DO. Monitoring of weather for long periods of hot, dry, windless days during late August and early September will trigger on the ground monitoring for any signs of botulism. FWS will be in contact with the adjacent landowners such as the San Jose and Sunnyvale Treatment plants to determine if botulism is occurring on their ponds. Additionally, if any bird carcasses in the ponds or nearby receiving waters are observed, they will be promptly collected and disposed of.

Winter Operation

During the winter season, the A17 intake will be closed to prevent entrainment of migrating salmonids in Coyote Creek. The winter operation period would normally extend from November through April. During the winter, rainfall would tend to increase the water levels in the ponds. The inflow and outflow direction of the system will be reversed, where intake at A16 from Artesian Slough during the winter to minimize potential entrapment of migrating salmonids in Coyote Creek. The outlet at A17 includes both a control gate and control weir. Either may be used to limit flow through the system. The water levels in the ponds would be set by a weir at the outfall of A17 or adjustment of the control gates to avoid flooding of the existing internal levees or wave damage to the levees. The winter operation is intended to provide less circulation flow than the summer operation. Evaporation is normally minimal during the winter.

Winter Pond Water Levels

Pond	Area (Acres)	Bottom Elev. (ft, NGVD)	Water Level (ft, NGVD)	Water Level (ft, Staff Gage)
A17	131	1.1	2.2	1.2
A16	243	0.6	2.2	0.6

Winter Gate Settings

Gate	Setting (% open)	Setting (in, gate open)
A17 intake	0	0
A16	25	12
Weir	2.1 ft NGVD	

Water Level Control

The water level in A17 is the primary control for the pond system. The A17 water level is controlled by the outlet weir structure. Normal winter operation would have the A16 intake gate partially open to reduce inflow during extreme storm tides. Water levels in the ponds are controlled by the outlet weir setting. The normal winter water level in A17 should be at 2.2 ft NGVD, approximately 0.1 ft above the outlet weir. The pond water level may vary by 0.2 ft due to the influence of weak and strong tides, and over 0.5 ft due to storms.

During winter operations, the water levels should not fall below the outlet weir elevation. During winter operations, if the water levels exceed approximately 3.0ft NGVD, the A16 gate should be closed to allow the excess water to drain. Note that without rainfall or inflow, it will take approximately 3 weeks to drain 1.0 ft from the ponds.

Salinity Control

The winter salinity in the system may decrease from the intake at A16 to the outlet at A17, due to rainfall inflows within the system, which may exceed winter evaporation. During very wet winters, the intake salinities and system salinities may decrease to as low as 5 ppt.

Monitoring

The system monitoring will require weekly site visits to record pond and intake readings. The monitoring parameters are listed below.

Weekly Monitoring Program

Location	Parameter
A17 intake	Salinity
A17	Depth, Salinity, Observations
A16	Depth, Salinity, Observations

The weekly monitoring program will include visual pond observations to locate potential algae buildup or signs of avian botulism, as well as visual inspections of water control structures, siphons and levees. This program will also include supplementary DO monitoring when problems are identified in the formal monitoring listed below.

Mobilization of Inorganics and / or the Methylation of Mercury Control

Water column samples for total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury will be collected annually at the Discharge point in August or

September. If levels are found to rise, further analysis of the cause and mitigation measures will be developed.
If summer water levels in Ponds A17 and A16 are found to increase methyl mercury levels, FWS will notify the Regional Water Quality Board and consult to determine the best approach to addressing the issue.

Additional monitoring required by the RWQCB discharge permit includes the following:

Location	**Frequency**	**Parameters**
A16(discharge)	Continuous (May-Oct)	DO, pH, Temp., Salinity
Artesian Slough	Monthly (May –Oct)	DO, pH, Temp., Salinity
Discharge point	Annually (Aug or Sept)	Metals in water column