August 16, 2005

As mentioned above, Refuge managers have been working with the Regional Quality Control Board on a variety of techniques to address the seasonal reduction of dissolved oxygen in some of the ponds. On August 1, 2005, managers temporarily closed the levee gates on pond A16.

On August 10, 2005, staff at the Refuge's Environmental Education Center in Alviso reported a large number of California Gulls on the pond with small dead fish on the shore. Other Refuge staff responded immediately and surveyed the pond. They found many gulls and fewer than 100 dead fish washed up along the downwind levees of the pond. Considering the large number of gulls on the pond it is probable that more fish were killed than found on the levees because gulls eat dead fish. A fish was collected and is being identified at this time. However it is thought that the fish were either topsmelt or juacksmelt.

Monitoring data for pond A16 revealed that there was an overall decline in dissolved oxygen (DO) levels starting on August 9th. It is possible that the low DO for such a long time caused the fish kill that was seen on this pond. After consultation with the staff at the Regional Water Quality Control Board, we opened the pond intake gates 100% to allow higher oxygenated slough water to flow into the pond.

This is the first time that such low DO levels have been recorded over such a long period of time on Pond A16. Since we have re-opened the outlet structure for Pond A16 to tidal inflow and outflow, we have not detected any similar periods of low DO levels. It is possible that the long period of DO was the result of the pond being cut off from tidal circulation from August 1 through August 10, 2005.

Another possibility is that the fish in the pond used up the limited amount of available DO while the pond was cut off from tidal circulation. Before the Refuge started operating Pond A16 as a part of the Initial Stewardship Plan on March 31, 2005, the salinity in the pond was almost always well above 80 parts/thousand (ppt). The tolerance limit for most fish is about 70 to 80 ppt. Topsmelt, the fish that were thought to be in the pond in August can survive up to about 70 ppt but don't do well at that concentration for very long. So the fish in Pond A16 were probably not in the pond before the Refuge lowered the salinity after March 31. The current salinity in Pond A16 has ranged between 22 to 23 ppt during August. These are excellent levels of salinity for the topsmelt. It is possible that a large number of fish entered the pond to take advantage of the new habitat provided by the lower salinity. It is also possible that when the pond was cut off from tidal circulation, the fish were not able to leave the pond. When the DO lowered in the pond, a large number of fish may have used up what little available oxygen existed in the pond which contributed to the low DO levels and the fish kill.

We may never know exactly what caused the fish kill on Pond A16. It appears that it may be related to closing the pond to tidal flow for the week. The Refuge will consult with

the staff at the Regional Water Quality Board to determine if this method of reducing the quantity of low DO waters entering the slough/Bay waters should be used again.