

**North Delta Intake Structures Locations**

Under the current BDCP proposal for long term operations five intake structures would be placed into the Sacramento River within the reach between Freeport and the confluence with Sutter Slough. In the current configuration of intakes virtually all juvenile salmonids produced in the Sacramento River system would have to pass all five intakes during downstream migration. The mini-effects analysis identified a concern that the intake structures would attract predatory fish and increase the vulnerability of juvenile salmonids and other covered species to predation mortality. Sutter and Steamboat Sloughs, and potentially Elk Slough, if connectivity were to be restored with the Sacramento River, offer alternate pathways for downstream migrating salmonids and other fish. If one or more of the intakes were sited downstream of the confluence of Sutter Slough those fish that used the alternate migration pathways would not be exposed to predation associated with the downstream intakes. Detailed analyses have not been conducted to evaluate the effects of locating one or more intakes downstream of the Sutter Slough confluence on local hydrodynamics, sweeping velocities, bypass flows, changes associated with future climate change, particle entrainment, changes in predation mortality, or effects on water diversion operations. A summary of some of the pros and cons related to locating (A) all five intake structures upstream of the confluence with Sutter Slough versus (B) locating three intake structures upstream of Sutter Slough and two downstream of Sutter Slough is presented below.

**Consideration of North Delta intake locations**

| <b>A. Five intake structures located upstream of Sutter Slough</b>  |  | <b>B. Three intake structures located upstream of Sutter Slough and two structures downstream</b>  |  |
|---|--|--|--|
| Pros  | Cons   | Pros   | Cons   |
| Small reduction in risk of delta and longfin smelt exposure to intakes and larval entrainment with intakes further upstream and closer together | Many downstream migrating juvenile salmonids produced in the Sacramento River system must pass all five intakes – resulting in possible increased exposure to contact with the screen and potential increased vulnerability to predation. However, many downstream migrating juvenile salmon originating above the confluence with the Feather River would be able to avoid the new diversions by passing through the Yolo Bypass in most years. | Reduced exposure of Juvenile salmonids and other covered fish produced upstream because some proportion of the fish would migrate downstream through Sutter and Steamboat Sloughs and would not be exposed to the two downstream intake structures – reduced risk of contact with the screen and reduced vulnerability to predation associated with the two downstream intake structures | Possible increase in delta smelt and longfin smelt exposure to the two downstream intake structures – Potentially increased exposure of smelt to intakes with sea level rise |
| Reduced probability of bi-directional tidal   | No benefit of alternative migration  | Intakes would be spread over a longer  | Increased probability of bi-directional tidal  |

**BDCP Steering Committee**

**Meeting Handout (revision 1 with revised graphics)**

**January 29, 2010**

|   |   |   |  |
|---|---|---|--|
| flows   | routes through Sutter or Steamboat Sloughs to reduce exposure to all five intake structures | reach of the Sacramento River – increased refuge areas between structures | flows for the two downstream intake structures that would increase exposure duration   |
| Improved sweeping velocities along screens because of greater river flows (less flow diverted into sloughs) could reduce exposure time to intakes screens |   |   | Reduced sweeping velocities at the two downstream intake structures because of reduced river flow – longer exposure duration to the intake screens. Revisions to the Hood bypass criteria would be needed to account for flows entering Sutter and Steamboat Sloughs |
| Locating intakes further upstream would reduce the future effects of sea level raise and salinity intrusion on export operations and protection of fish   |   |   | Locating intakes further downstream would increase the future effects of sea level raise and salinity intrusion on export operations and protection of fish  |
| Intakes located further upstream would be less likely to entrain organic material and food produced in the Cache Slough region                            |   |   | Intakes located further downstream could entrain more organic material and food produced in the Cache Slough region  |
| Determining bypass flows and diversion rates would be relatively simple   |   |   | New diversion rules would need to be developed for intakes located downstream of the sloughs - Determining bypass flows and diversion rates would be more complex to account for flows entering Sutter and Steamboat Sloughs   |

## Recommendation

Based on a consideration of the pros and cons of the two alternative intake configurations the SAIC consulting team recommends:



- the BDCP effects analysis assume that all five intake structures be located in the Sacramento River in the reach upstream of the confluence with Sutter Slough
- ~~the effects analysis include conservation measures to avoid and minimize any increased predation on covered fish species associated with the North Delta intake structures such as:~~
  - ~~increasing channel margin habitat complexity to provide juvenile salmonids and other native fish with increased cover,~~
  - ~~use of localized predator removal strategies,~~
  - ~~use of non-physical barriers and devices to reduce predator attraction to the intake structures,~~
  - ~~use of intake structure design (smooth surfaces that do not provide predator holding habitat),~~
  - ~~removal of other structures that provide predator habitat,~~
  - use of alternate pathways for fish that avoid the new intake structures (e.g., Yolo Bypass, Elk Slough, new deep water ship channel bypass), and
  - ~~other actions~~
- a more detailed analysis of the alternate intake configuration with two intakes located downstream of Sutter Slough and, ~~and re-establishing connectivity between the Sacramento River and Elk Slough to provide an additional alternate migration pathway be included in the EIR/EIS environmental review~~ be conducted to provide the information needed to evaluate the different intake configuration and migration pathways.

# DHCCP Consultant Intake Siting Recommendations

## Site Selection Criteria:

1. 5 in-river intakes at 3,000cfs capacity each
2. Avoid high population density areas
3. Upstream-most suitable locations for improved smelt avoidance
4. Upstream-most suitable locations preferred for reduced tidal influence for:
  - improved screen sweeping velocities
  - increased diversion operating periods
  - improved water quality

No Intakes South of the Confluence with Sutter Slough (June 2009)

-  Diversion Planning Area
  -  DHCCP Consultant Proposed Project Recommended Intake Locations and Configuration
- Current (Aug 2009)

