Notes for PowerPoint presentation: Fish Salvage Status and Trends

Slide 1:

- This presentation is a broad, basic overview of a very large salvage database.
- The presentation is not meant to repeat previous talks on Fish Facilities or to cover topics such as salvage vs. entrainment, calculation of fish loss or salvage, or significance of salvage numbers or trends.
- All following slides deal with the last 10 years of salvage (1993-2002).

Slide 7:

- Shows the most prevalent species of fish salvaged, their 10-year annual average salvage, and the % of total salvage over the 10-year period.
- Species in yellow are non-native, species in blue are native.
- The top 6 species account for about 95% of the salvage, on average. Five of the 6 species are non-native. The top 3 species are also non-native.
- Striped bass formerly accounted for a much larger proportion of the total salvage, but recent juvenile production has been low.
- Salmon and delta smelt make up only a little more than 1% of the total salvage, but are obviously of greatest interest.
- Some species, such as Silverside and some gobies, on the list have been introduced to the estuary very recently.
- Splittail made it into the top 4 by virtue of 2 years of very high salvage, 1995 and 1998.

Slide 8:

- Species composition is similar between the 2 facilities, but the CVP salvages slightly more threadfin shad and splittail, but fewer striped bass than the SWP (probably because most striped bass are coming from the Sacramento River and the SWP pumps more Sacramento than San Joaquin water).
- Chinook makes the list at the CVP probably because of San Joaquin R. salmon being salvaged (the CVP pumps more San Joaquin water than the SWP).
- More delta smelt, which inhabit the central delta, are salvaged at the SWP.

Slide 9:

- Since the late 1980's, the proportion of threadfin shad (TFS) in the total salvage has been increasing. Possibly due to recent wet years.
- Since TFS are a forage fish for striped bass, could have implications for older juvenile striped bass growth and survival.

Slide 10:

- Native species tend to spawn earlier than non-native species, so are salvaged earlier in the year, mostly in May and June.
- Most salvage is of young-of-the-year fish, but some adults of small fish are salvaged.
- Salvage rates vary seasonally more than exports, on average. Variations in salvage are due more to occurrence of fish.

Slide 11:

- Contrasts SWP and CVP salvage density. Dry year symbols are red, wet years are blue.

- Salvage density corrects for export rate.
- CVP salvages more salmon than SWP, probably because predation in Clifton Court Forebay limits the number of salmon reaching the screens at the SWP.
- Recent low salvage may be the result of VAMP or barriers.

Slide 12:

- Steelhead salvage densities far lower than for salmon.
- Steelhead tend to be large (about 200 – 400 mm).
- Similar densities for both facilities.

Slide 14:

- Longfin prefer a more brackish water habitat, so tend to be salvaged in high numbers only in dry years, when they become vulnerable to the pumps.

Slide 15:

- Splittail are salvaged in high numbers during wet years with significant floodplain inundation. The Midwater Trawl (MWT) splittail indices correlate well with salvage densities.

Slide 16:

- Striped bass reside in the delta, so salvage tends to track abundance, which is indexed by the Townet Survey(TNS). Young-of–the-year abundance has been low in recent years.

Slide 17:

- Monthly salvage density of salmon is highest in April and May, reflecting the salvage of the most abundant race, fall-run. Other races, including winter-run, are salvaged earlier in the year.

Slide 18:

- Steelhead are salvaged earlier in the year than salmon, mostly in Feb. and March.
- Salvage is higher at the SWP than the CVP in the peak month of February. This contrasts with salmon, which are salvaged in higher numbers at the CVP – this may indicate that steelhead do not suffer the same high predation rate that salmon do in the Forebay or may indicate the origin of the steelhead is mainly the Sacramento R.

Slide 19:

- Delta smelt salvage is highest at SWP – probably reflecting their origin (Sacramento R.).
- Spawning occurs mainly in March and April, juveniles become vulnerable to pumps later in May and June.
- Adults are salvaged from December-March.

Slide 20:

- Longfin spawn earlier than delta smelt, so are salvaged earlier.

Slide 21:

- Splittail spawn early in the season, but remain in flooded areas, then emigrate in late spring, when they become vulnerable to the pumps.

Slide 22:

- Larvae are present at pumps in large numbers in late April and May, but are too small to be salvaged until June.

Slide 23:

- Delta smelt in the 30-34 mm length group are salvaged in greater numbers than smaller delta smelt. However, we know that in May, when smelt are first observed at the facilities, 20-24 mm smelt are really more abundant. The fact that fewer are salvaged indicates that they are being lost at some point during the salvage process – that is, salvage for 20-29 mm smelt is less efficient than for larger smelt. Therefore, salvage is not a good measure of loss for delta smelt. The same phenomenon is seen at the CVP.