AWMG October 17, 2005
Meeting Minutes Summary
Oakland, CA

Attendees:

Bruce Herbold
Mark Stacey
Joan Florsheim
Peter Baye
John Takekawa
David Sedlak
Lars Anderson
Stuart Siegel

Sarah Beamish Puckett
John Cain
Tom Hall
Jeff Melby
Lauren Hastings

Michelle Orr
Richard Grassetti
Nick Garrity
Michael Parenti

Fish Hypotheses:

1. Survival of juvenile salmon and splittail in channels that drain more frequently.
2. Growth of juvenile salmon and splittail will be greater in channels that do not drain completely, because the longer duration of inundation allows for increased feeding along channel edges.
3. Fish survival will be greatest in intermediate channel networks where some portions of the channel network retains water at low tide but where all portions of the channel network drain sufficiently, to depths of 0.5 meters or less, discouraging populations of piscivorous fish.
4. Food resources for splittail and juvenile salmon will be greater in lower marsh due to increased residence times. (There is less consensus about this hypothesis).

Two Key Parameters that effect growth and survival (hypotheses 1-3)

1. Channel depth: survival is inverse to the number of hour of inundation of greater then 0.5 meters. Is this true? Will predator fish move in when its deep or will they only persist if it is always greater then 0.5 meters.
2. Channel edge: growth = hours and length of inundated edge

Factors that could influence depth of channel or quality of channel edge are:

1. Channel invert elevation:
2. Slope of channel bank: (does not effect depth, but edge availability and quality)
3. Width of channel: (John Cain does not see how this effects depth. Perhaps this factor was originally proposed as something that effects channel area, but we have agreement that we are not interested in testing channel area or density. Besides area does not necessarily influence edge and to the extent we are interested in density of edge, area is not relevant give equal length.
4. Marsh plain scale: Elevation does not effect elevation of channel invert (see assumptions below) but does effect tidal prism which could effect the quality and length of channel edge. At the lower extremes, however, elevation does determine channel invert. For example, a marsh plain at MLLW can not support a channel invert elevation greater then MLLW.
5. Scale. Larger scale systems presumably have a larger diversity of channel sizes (channel order) and therefore could influence the balance between suitable depths for foraging and shallow depths need to deter fish predators (hypothesis 3 above). Scale also effects tidal prism and could therefore effect the quality and length of the channel edge in same way that elevation does.

Design Decisions:

1. Hold channel invert and bank slope constant for all treatment areas.
2. Restore several low marsh areas ranging from small to large scale.
3. Limit restoration of high marsh areas to 1 or 2 medium to large size areas that can be restored without importing large amounts of material.

Key Assumptions:

1. Invert channel elevation is not dependent on elevation of marsh or tidal prism. Lower marshes with larger tidal prisms then higher marsh compensate for increased tidal prism with wider channels, not deeper channels. Thus, if invert elevation is the factor that determines fish growth and survival, it is not dependent on elevation.
2. The tidal range in the Delta is not great enough to generate velocities that will scour deep channels, create channels,
3. Target fish species (juvenile splittail and salmon) feed along the channel edge and will not venture onto the marsh plain to feed.
4. Piscivorous fish are unlikely to persist in channels where water frequently falls below 0.5 meters.
5. What we build is largely what we will get over at least the next decade.
6. Marsh plain elevation and tidal prism do shape elevation channel invert?
7. Channels and marsh plains above –1 foot MLLW are likely to become vegetated with tules. Therefore channels, particularly low order channels that do not convey

a significant tidal prism, that graded to depths of approximately –1 MLLW or greater are likely to become overgrown with vegetation and cease to function as channels.

8. Some combination of inundation depth at MLLW and velocity will limit the establishment of vegetation in marsh channels.
9. The larger tidal prism in lower marshes will result in more length and area of channel per area in lower marsh relative to higher marsh.
10. Native juvenile fish that move into the deep water channels of the large Delta sloughs are more prone to mortality by predation. It may be possible reduce mortality in Little Dutch, Emerson, and Dutch Sloughs by creating more vegetated refuge habitat.

Questions

1. How reliable is this 0.5 meter estimate as a threshold for where predators will persist or not? What fish mechanisms influence this? Is it piscivorous bird avoidance or mortality in shallow water? Is it associated with nesting type behavior of many exotic species? If it is a nesting behavior issue, how would extreme annual low tides shape predator distribution?
2. What are juvenile splittail and salmon feeding on along the marsh edge and what is the behavior and life history traits of these organisms? (i.e. are the black fly larvae and do they live at the base of tules or at some intermediate elevation in the water column? Do they tolerate periodic dessication?)
3. What physical mechanism explains why the invert channel elevation would be the same in low marsh and high marshes? If invert channel elevation does not change with tidal prism, a factor largely controlled by elevation, why would we expect it to change with scale of marsh area, another factor that controls tidal prism? Perhaps the answer is that we don't expect invert elevation to vary with scale but that we expect more variability with large scale due to larger area, more tidal energy and presumably more confluences.

Key Issues

1. What depth below MLLW will tules colonize and persist. This determines not only the elevation of the marsh plain, but also the design elevation of the channel invert. If we design the channel invert too high, then it will become grown over with tules. If we design too low, then the channel will provide water depths beneficial to exotic fish predators.
2. How wide do we design channels? Do we design channels with side berms (levees) to increase flow and velocities onto the marsh plain and prevent colonization of channel?