A. Purpose and Objectives of Project and Panel

The purpose of the Lower Yolo Restoration Project is to meet requirements for habitat restoration under the OCAP Biological Opinions RPAs. Project objectives as originally defined in the Prospectus and Draft EIR are focused on achieving certain ecological functions:

1. To enhance regional food web productivity in support of delta smelt recovery.
2. To enhance rearing habitats for out-migrating salmonids.
3. To support a broad range of other aquatic and wetland-dependent species, including Sacramento splittail.
4. To provide ecosystem functions associated with the combination of Delta freshwater aquatic/tidal marsh/floodplain/seasonal wetland/lowland grassland interfaces that once existed historically.

According to the FRPA Implementation Plan (2013, p. 28), the Project monitoring plan is to be independently reviewed by technical teams or a science panel. The expert panel for the Lower Yolo Project was convened in January 2013. Feedback has covered a wider array of topics, including:

1. Design recommendations for a project more compatible with the regional landscape context, one that will maximize ecological outcomes and not foreclose options to achieve a functional landscape,
2. Hypotheses and experiments that can be tested with this operational landscape unit, to contribute to adaptive management,
3. Metrics and monitoring protocols to test hypotheses and assess project effectiveness.

As discussed below, the feedback from the expert panel has been incorporated and will continue to be considered where possible in the design, proposed experiments, and monitoring. However, the window for further modifications is growing limited: the design is at 90% stage, the EIR is being finalized, and the Project is scheduled for construction this fall. Therefore, the second meeting will focus on hypotheses and observations that can be made given the most recent design. Minor modifications will be considered, but large-scale modifications of the physical design will not be possible.

B. February Expert Panel Meeting

The panel consists of scientists and technical experts with expertise in regional ecosystems and hydrology (Table 1).

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Role and Expertise</th>
<th>Feb</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chris Enright</td>
<td>Delta Science Program</td>
<td>Lead, hydrology, geomorphology</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bruce Herbold</td>
<td>USEPA (ret.)</td>
<td>Delta smelt</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Larry Brown</td>
<td>USGS</td>
<td>Tidal wetlands, fish</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Janis Cooke</td>
<td>CVRWCB</td>
<td>Mercury</td>
<td>X</td>
<td>X</td>
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<td>John Durand</td>
<td>UC Davis</td>
<td>Fish, Foodweb</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Eric Ginney</td>
<td>ESA PWA</td>
<td>Hydrology</td>
<td>X</td>
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<td>Letitia Grenier</td>
<td>SFEI</td>
<td>Historical ecology</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Robin Grossinger</td>
<td>SFEI</td>
<td>Historic ecology</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Josh Israel</td>
<td>USBOR</td>
<td>Fish, Experimental design</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Anke Mueller-Solger</td>
<td>Delta Science Program</td>
<td>Phytoplankton, Foodweb</td>
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<td>X</td>
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<tr>
<td>Stuart Siegel</td>
<td>Wetlands &amp; Water Resources</td>
<td>Tidal wetlands</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Ted Sommer</td>
<td>DWR</td>
<td>Salmon, floodplain</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>
The original project design included extensive grading to lower surface elevations and create tidal channels for daily tidal inundation. A second alternative with a reduced footprint and less grading was presented at the February meeting. We reviewed SFEI’s historic analysis and some hydrologic modeling. Robin Grossinger highlighted the site’s unique location at the historic intersection of the Putah Creek alluvial fan, historic Yolo Basin, and historic North Delta tidal marshes. Levees and ditches have disrupted hydrological connectivity, while berms and leveling have altered topography. Nevertheless, the site still retains the physical signature of historic lake features and underlying geology. The meeting concluded with a site visit.

Feedback from panel members included:
- Modify the design to have minimal or no grading of existing site topography,
- Incorporate experimental treatments in the design to test hypotheses of tidal wetland function, productivity, and foodweb support for delta smelt,
- Use/monitor nearby reference sites, such as Little Holland Tract (natural restoration) and Wildland’s Kerry property (mitigation bank a few years old),
- First Mallard Branch (Suisun Marsh) could be a similar model/reference site for what could evolve at Lower Yolo (J Burau USGS).

C. New Design Concepts

Since the February panel, the LYR project design has been further modified based on feedback from the February panel, additional analysis by SFEI, and ongoing discussions with individual panel members.

The new design is mindful of the site’s landscape context, with only enough site manipulation to ‘tip’ the landscape onto a more resilient and productive ecological trajectory (Figure 1). The goal is to preserve as much of the historic hydropediod diversity as possible, in order to optimize function in the current altered landscape and to preserve opportunities for long-term landscape-scale restoration. This will provide the maximum resiliency in the face of sea level rise and regional stressors such as changes in tides, floods, salinity mixing and invasive species. Two concepts for different units on the site include the following:

- **Subsidy Marsh** - This design for Networks #2 and #3 removes obstructions to tidal inundation and adds flow control onto Network #3. These modifications allow ponded water to drain slowly through the plains. The goal is to maximize productivity and periodic export from these units, to subsidize the foodweb in the surrounding channels.
- **Transition marsh** – the design for Network #1, which has the historic lake, seeks to maintain seasonal and high elevation marsh, while reconnecting the historic lake features to swales that transgress northward along the elevation gradient of the Yolo Bypass (i.e., a transgression corridor).
D. Objectives

The original Project objectives are expressed in terms of the BiOps purposes. These objectives may be further focused in the adaptive management and monitoring plan, as we step down to detailed questions and hypotheses. There have been suggestions to refine and expand these objectives to address processes, habitats, species, and stressors, both on-site and regionally. For example:

1) Reestablish the hydrologic, geomorphic, and ecological processes necessary for the long-term sustainability of native habitats and the plant and animal communities that depend upon them.
2) Enhance wetland and upland habitats;
3) Contribute to delta smelt recovery by enhancing food web productivity and export;
4) Provide rearing habitats for out-migrating salmonids;
5) Support a broad range of other aquatic and wetland-dependent species, including Sacramento splittail;
6) Minimize mercury methylation and export.
7) Maximize regional carrying capacity by increasing producer/consumer exchange and enhancing food web productivity.

E. Hypotheses and Experimental Treatments

To demonstrate project effectiveness and maximize learning about functional performance, several hypotheses will be developed for testing at the Project site.

Wetland Subsidy Experiments

The Lower Yolo project has designed experimental treatments into Networks #2 and #3, the “Subsidy Marsh.” These treatments are guided by two food subsidy objectives. The first objective is to replicate the natural high marsh tidal signal where waters spill out onto the marsh plain during the higher spring tides and slowly re-enter the neighboring channels carrying a rich supply of bugs and nutrients. The second objective is to actively monitor and manage the nutrient dynamics of the project in order to optimize “turnover” time (the reproductive cycle times for various foodweb constituents) and increase net-flow through the tidal marsh into Liberty Cut. The turnover time will be monitored for various components of the food web as will the net nutrient flux into Liberty Cut. In simple terms, tide water will be brought onto the site and allowed to “cook” for the optimal period and then tidally pumped back into the subsidized neighboring ecosystem, thus creating a natural “donor-receptor” relationship.

There are two distinct experimental treatments. The first experimental treatment includes some number of operable flap gates and flash boards in tandem at the Network #3 channel entrance. The size and number of flap gates and flashboard risers will be determined through hydrodynamic modeling and included in the final designs. The second experimental treatment includes lowering the east-west roads and berms in Network 2 to mean higher high tide thus capturing these larger flows during every spring-neep cycle. Again, the exact design elevations will be determined through hydrodynamic modeling and included in the final designs.

The hypotheses being tested are that hydraulic control structures can be used to manipulate residence time on the networks and then release enriched water to the surrounding channel in order to optimize food subsidies and donor-receptor systems. Modeling analyses will be used to initiate treatments and monitoring
will designed to adaptively manage the hydraulic experimental controls to optimize food subsidy, productivity, food availability and transport.

**Other Potential Questions**

- Floodplain Productivity - Measure primary productivity and secondary productivity (zooplankton) and compare to other floodplain sites, notably Cosumnes floodplain and Yolo Bypass
- Juvenile Salmonid Growth – measure growth and survival of juvenile Chinook salmon on different sites (Networks 2/3, Network 1, and channel), using PIT tagged hatchery fish in enclosures
- Nutrient flux and transport off the project site
- Others to be developed as needed

**F. Adaptive Management and Monitoring Plan**

An adaptive management and monitoring framework is in development and will be refined with input from the expert panel. The plan will need to address status and effectiveness monitoring, as well as science to reduce uncertainties. For each objective, we will work with the panel to define and prioritize key questions and hypotheses, define restoration targets, identify performance measures and indicators, and develop monitoring/study protocols.

**G. Schedule**

A second workshop will be held June 24. The expert panel will work with the project team to provide more detail on desired outcomes, identify uncertainties, generate hypotheses, and propose monitoring to evaluate outcomes. Restoration scenarios will be evaluated and refined, based on new modeling data. An adaptive management strategy will be outlined with hypotheses, metrics, monitoring approach, and potential management responses.

1. Draft EIR released April 22, comment period closed June 6.
2. Core monitoring included in the draft Long Term Monitoring Plan in the Prospectus - May 26
3. New hydrologic modeling for Tidal March Complex alternative in progress by cbec, expected in June
5. Final Design and bidding of Project – July
6. SFCWA Board to adopt Final EIR – July 18
7. Adaptive Management and Monitoring Plan to be developed by Project team with Expert Panel input – Late Summer/early Fall 2013

*Notes by R. Swenson, Cardno ENTRIX*
Figure 2-7: Draft Lower Yolo Ranch Restoration Long Term Management Plan 2013.

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Figure 1 - Tidal Marsh Complex Alternative – Proposed Project