Minutes of the AMWG Meeting May 10, 2005

Attendees:

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

Sarah Beamish Puckett
John Cain
Tom Hall
Jeff Melby
Lauren Hastings

Si Simenstad
Michelle Orr
Richard Grassetti
Michael Parenti

Peter Moyle

Introduction

John Cain provided a brief status report. PWA completed the Preliminary Conceptual Design technical memo and is scheduled to complete draft feasibility study by May 30. Grassetti Environmental will begin work on CEQA/NEPA compliance on May 30 and is scheduled to complete that process by March 2006.

Michelle Orr presented a power point presentation reviewing the research objectives and experimental design at the previous meeting and the preliminary conceptual designs that PWA has developed since the last meeting. The designs were developed to test hypothesis regarding the role of marsh plain elevation and scale on fish use of marshes. In summary, the hypotheses developed at the last AMWG meeting are:

- Low marshes are likely to provide more food, feeding, and spawing opportunities since they are inundated for longer periods of time.
- High marshes are likely to provide greater survival rates for native fishes during the early liefe cycle since there should be less predators on the intermittently inundated marsh plain.

Orr presented 3 alternatives for achieving restoration and research objectives ranging from a minimal grading alternative to a major fill alternative involving import of fill

material. Alternative 2, the intermediate alternative, involves deeply excavating the subsided areas on the north end of the parcels as a source of fill material. The minimal fill alternative had large amounts of shallow open water and does not create much area of high marsh. Each of the alternatives also included the option to divert Marsh Creek onto the Emerson Parcel.

Si S. and Joan F. both asked question about the levees around and dissecting the restored parcels. They were apparently concerned that the levees unnecessarily and artificially reduce connectivity between sloughs and marsh areas. Michelle Orr and John Cain responded that maintaining levees around the parcel was initially viewed as a design constraint need to minimize impacts from wind wave erosion or hydrodynamic changes. But both said that recent comments on the subject by the ERP science board subcommittee have led them to rethink this constraint and revise the levee design accordingly.

Lars Anderson pointed out the accosts of long-term management associated with controlling egeria in open water should be taken into consideration. In other words, the minimal fill alternative may not be the least expensive over time.

Peter Moyle asked about whether alternative 1 was receiving serious consideration as it should since it is the least expensive. Michelle Orr and Bruce Herbold pointed out that alternative 1 doesn't achieve marsh research goals.

Joan F. pointed out that the designs drain the marsh differently than the natural drainage on the parcels.

Si S. asked about the pros and cones of diverting Marsh Creek on to the Emerson Parcel. He also pointed out that the studies comparing high and low marsh after the site is restored will probably yield much different results then comparison of mature marsh areas on high and low marsh plains. He suggested that opportunities for studying the management options for large open water and invasive species might be more fruitful.

Peter Baye agreed with Si's point that the kind of high marsh you get in 5 or 10 years will be far different then the kind of high marsh on newly restored sites. Joan F. pointed out that the marsh plain will evolve differently if it is a big marsh vs. a small marsh.

Si S. and Michelle Orr recommended categorizing research objectives into long-term and short-term.

Bruce H. reminded the group that our overall objective for adaptive management is to provide guidance for future restoration projects in the Delta.

- How big do marsh restoration sites need to be in order to provide a benefit?
- How high do we need to build marsh plains to achieve objectives? Are lower, less expensive marsh plains just as effective as large ones?

Before moving into break-out groups, John Cain described a new option for Marsh Creek which entails diverting Marsh Creek onto 100 acres of Ironhouse Sanitary District land to the west of Marsh Creek. Because Ironhouse plans to change their treatment process, they no longer need the land to spread treated effluent. Cain reported that this new development provides additional options and flexibility for treatment of Marsh Creek.

David Sedlak raised a concern that many years of treated effluent disposal on the site may have contaminated the sediment to the west of Marsh Creek with PCB or other contaminants that were not carefully regulated in the past.

Break Out Groups

Water Quality/Geomorphology

The water quality/geomorphology group was tasked with discussing water quality implications of diverting Marsh Creek. The group consited of Michael Parenti, David Sedlack, Joan Florsheim, and Sarah Beamish.

David Sedlak summarized the groups discussion. The group discussed the following 3 items:

- Marsh Creek as it relates to mercury and methylmercury.
- Urban stormwater runoff and potential impacts on fish and wildlife.
- Drinking water quality and carbon export.

1. Mercury and mercury methylation: There is an abandoned mine in upper watershed and thus Marsh Creek could add mercury to wetland and thus export methylmercury. Regional board is going to start requiring that wetland restoration not export methyl mercury. Not sure it is a deal killer. Very little data about mercury and methyl mercury in Marsh Creek. We need to collect more data, especially during wet weather events, but will not be able to do so until next winter at earliest. Mercury concentrations in Big Break is 1 ppm which is high. Big Break and the rest of the Delta could be just as large a source as Marsh Creek so it would not be any worse. If the only issue is mercury, then the benefits of diverting Marsh Creek onto the parcel would probably outweigh the impacts and we could develop a monitoring plan for measuring that.
2. Run-off from urban areas is more problematic. Wet weather flows will bring nutrients and suspended, but probably not a big deal. Dry weather flows are more problematic. Episodic events such as somebody draining their swimming pool into Marsh Creek or heavy use of pesticides, may be a real threat. By “hooking” Dutch Slough up to Marsh Creek we may be exposing it to harmful urban run-off. It is possible that pollutants will enter site from Marsh Creek via Dutch slough even if the creek is not diverted onto the site. Need to model the hydrodynamics have how Marsh Creek water would move from current mouth into restored site via Dutch Slough.
3. Drinking water and carbon export not significantly related to Marsh Creek.

Summary: Urban runoff during dry weather flow is a real concern. Durin wet weather period, there may be benefits such as importing sediments. It might be possible to divert sediment onto site during wet weather without diverting dry weather run-off.

Joan F. added that we might be able to get benefits of sediment without running marsh creek through the wetlands on entire site by routing Marsh Creek more directly into the deepest areas.

David Sedlak also added that dry weather water may have significant fraction of effluent from Brentwood sewage plant raising question of impacts from endocrine disruptors – yet another reason to be weary of dry weather flows.

Joan F. also added that we don't know whether there is any difference between water quality in Marsh Creek and Delta water in Dutch slough. If they are they same, then it probably worth diverting Marsh Creek onto the site.

Si S. questioned wether there might be some water quality benefits to the diverting Marsh Creek onto site. The group did discuss the issue. If Dutch Slough was a water quality improvement project, then it might make sense to run Marsh Creek through site. If it is a restoration project, then diverting Marsh Creek, particularly summer flows, may not be a good idea.

Peter Baye suggested diverting Marsh Creek into designed water quality treatment wetlands during the summer months to mitigate water quality concerns. He suggested creating a diffusor marsh with non channelized sheet flow on the Ironhouse parcel and diverting summer flows through that and sending high winter flows with sediments through bypass channel.

David Sedlak agreed that this suggestion made sense, but cautioned about diverting Marsh Creek into site where we are creating habitat for sensitive species. He recommended looking into the Prado wetlands in Orange county which are managed for water quality improvement. Bruce Herbold pointed out that native fish targets are using the site during the wet season not the dry season.

<u>Hydrology/SAV/Ecology Group:</u>
Charged with discussing options for treating subsided areas including pros, cons and limitations of pre-cultivation of tules. Group members included Lars Anderson, John Takekawa, Mark Stacey, Peter Baye, and John Cain.

John Cain summarized the groups discussion:

1. The break out group immediately reached consensus that deep open water is not a desirable, predictable, or widely applicable objective. Deep open water is not especially good habitat and may even be quite bad if anoxic conditions become established. Based on the Lucas paper, it would be difficult to predict what we

would get. Since it is not something anyone is planning on creating on a large scale elsewhere in the Delta, it would not yield lessons for future management.
    a. In general the group felt the idea of deeply excavating the subsided areas was a bad idea that sends us in the wrong directions. It would "cannibalize" the site and be largely irreversible.

2. 3-5 foot deep tidal or non-tidal water (with gates/culverts or no gates) would provide much better ecological value and would be much more broadly applicable. 3-5 feet deep is ideal for diving birds and would provide and opportunity to study a number of issues:
    a. Test relationship between water levels (with gates or no gates) and vegetation colonization/persistence including tules.
    b. Measure primary productivity and perhaps release it if culverts/gates are an option.
    c. Experiment with management options to pre-empt egeria by managing for native SAV.

3. We know far more about how to manage wetlands the how to manage deep open water which is a big uncertainty. Managing wetlands is a known quantity, but we could employ it to learn about SAV/plant interactions as well as inundation tolerances of less common species.
4. Filling in subsided areas would be expensive and problematic due to shear volume plus the compaction factor associated with peat soils at the north end of the parcels.
5. Tule cultivation will not require intensive planting according to Peter Baye. It is very easy to get tules established by disbursing root bols and managing water levels. Establishing native SAV will be more difficult.
6. It may make sense to use a mixture of treatments in the subsided areas of the 3 parcels including mixes of native SAV in small areas, subtidal tule cultivation in larger areas, and other types of subsidence reversal elsewhere. All treatments could be optimized for wildlife values.
7. Gates, even multiple gates, would provide opportunites to manipulate hydrodynamics and associated processes.

<u>Hydrology/SAV/Ecology Group:</u>

Fish/ecology were charged with refining fish hypothesis from last meeting, defining character and purpose of paired samples (replicates), and evaluating whether the purpose of the paired cells can be achieved without isolated marsh cells. Refine purpose of small scale cells and evaluate whether it can be achieved without isolated small marshes by studying smaller areas of larger marsh. Group members included Bruce Herbold, Si, Peter Moyle, Si Simenstadt, Michelle Orr, and Sarah Beamish Puckett.

Bruce Herbold provided a summary of the groups discussion. They discussed three items.

1. They evaluated how and whether using 2 sizes of marsh plots could yield information about the relative value of large vs. small marsh restorations. "We know small is not as good as large," but will we learn anything from comparing large parcel to small parcel, since the small parcel would be part of a larger marsh complex. How can we learn something without parceling up the marsh site? Si was trying to figure out a way to use regression analysis to evaluate the size question with out parceling up the site. Bruce preferred the ANOVA study approach.
2. Si questioned the utility of evaluating the size or marsh plain elevation question on a newly restored site. Since newly restored sites will function so differently then mature sites, can we really generalize anything useful? Perhaps it is better to study these questions elsewhere?
3. Low vs. high marsh. The range of elevation in each marsh study plot may be important. Again, Si was trying to determine the potential for using regression analysis to tease out the role of elevation while Bruce H. preferred the ANOVA study approach. Si pointed out that there are distinct questions that can only be answered by one approach. If we are not indebted to paired samples, then we can treat one parcel as structured, separate, drainage cells and the other as a large parcel using regression to tease out scale and elevation effects. The larger areas will provide for a larger extent of range and therefore clarify the role of the range of elevation within any given marsh.

Peter Moyle cautioned that salmon and splittail may not use the site, but thought that the site would be used by stickleback, silverside, prickly sculpine and a mixture of other natives and non natives. Thus, it is very important not to make it just a fish restoration project, but rather an ecosystem restoration project. How to increase the amount of carbon and primary productivity is a big question in the system and Dutch Slough could help for that.

Given that there is no guarantee that salmon and splittail will use the Dutch Slough site, and that studying fish utilization of newly restored sites may not be applicable to mature sites, Si and others questioned whether there were too many expectations placed on fish and fish studies.

Bruce was still hopeful we can learn something about the value of high and low marsh for salmon and splittail.

Si questioned the adaptive management implications of the issue of whether fish will use the Dutch Slough site. Bruce wants to introduce tagged fish and see how they will utilize the site. Si wants to measure how native fish move into and use various parts of the restored site. Bruce is contemplating wire coded tag and caged fish studies to evaluate growth and survival of planted fish on the site. Si wants to see how fish will utilize the site naturally but we might not get any fish using the site due to its location.

Bruce stated that the amount of fish that will cross Big Break and use the site will vary from year to year, but see it as a real opportunity for testing how young fish use marsh in the Delta with important implications for management of Central Valley fisheries.

Summary of morning Break Out Groups

John Cain attempted to summarize the morning break-out group with input from AMWG members.

- If Marsh Creek water quality is a problem, then it may be best to divert it on to Lower Emerson rather than upper Emerson. Joan F. pointed out that we don't have enough information to deterime if water quality in Marsh Creek is a significant problem.
- Perhaps Marsh Creek could be diverted onto Emerson during winter months and not during summer months when water quality could create more of a problem. Peter M. pointed out that this would mimic the natural hydrology which would be a good thing.
- Si pointed out that we could treat Marsh Creek as an adaptive management experiment and modify its alignment on to the site as we gain more information.
- Peter Baye questioned the confinement of flows of MC as depicted on the conceptual design. Why constrict flows or construct levees? Just let the creek flow and self-construct. Riparian habitat may be better if not constructed.

Afternoon Break-out Groups

Water Quality/Hydrology: Discuss pros and cons of subsided area treatment options, water quality, primary productivity implications deep open water. Group included Michael Parenti, David Sedlack, Lars Anderson, and Mark Stacey.

Mark Stacey summarized for the group.

- Deep open water is not aligned with project goals. It does not provide habitat for target species or provide opportunity for developing information that will be applicable to future restoration projects.
    - We may have to excavate subsided areas for borrow material, but it will be a trade off between cost of creating the marsh areas and the ecological function of the excavated areas.
    - If we use fill material from elsewhere to create marsh areas, we need to evaluate these fill materials for Hg, and other contaminants.

- Subsidence reversal treatments could have mercury methylation issues associated with tule cultivation.
- Interior levee slopes should be graded to support riparian vegetation.
- Would mosquitoes be a problem with various treatments of subsided areas? Do some species of SAV harbor mosquitoes. Peter Baye though that wind fetch on

open water areas greater then 1 acre would be enough to limit mosquitoes. Peter Moyle suggested that Sacramento Perch could also be employed.

- Deep vs. open water and relationship to metals. Deep areas would export more metals because deep areas cause heavy selenium through phytoplankton. Shallow areas may cause mor mecruy methylation.
- Active management will be necessary to maintain and control SAV no matter what else occurs.

Michelle Orr pointed out that not excavating from peat areas could have cost implications in the neighborhood of ten million dollars

Ecology/Geomorphology: Identify suitable marsh plain design elevations for non-fish purposes with knowledge of cost implications, pros and cons of diversity vs. homogenous marsh plains. Develop habitat levee design concepts and gradients. Review pros and cons of pre-cultivation gradients. Group members included Peter Baye, John Takekawa, Joan Florsheim, Jeff Melby, and John Cain

John Cain summarized the main points of the discussion before the larger AMWG.

1. Characteristics that provide ecological benefits of high marsh are not necessarily determined by elevation but rather by topographic, edaphic, and botanical diversity. A newly graded high marsh, particularly one created with imported sand, is not likely to yield high marsh charteristics.
2. It is better to grow high marsh than build it to develop diverse organic marsh plain. Marsh can be grown by establishing tule, or letting them establish on their own, and allowing the tules to capture silt and bio accrete.
3. Substrate type matters. Don't want sand lens. Rather, organic and fine mineral slurries may lead to higher diversity and density of vegetation. On the levees, it may be necessary to "rip" the levees to mitigate any soil compaction that might inhibit riparian vegetation.
4. Connectivity is important. Don't isolate high and low marsh or isolate large sloughs from marsh with continuous levees. It is better to create a large scale, highly connected mosaic of marsh rather than many smaller marsh cells. Connectivity and scale will yield ecological benefits associated with scale and connectivity dependent processes. For example:
    a. Larger scale systems will have larger prism creating more energy to convey sediment, form channels, and otherwise shape the site.
    b. Large woody will deposit on marsh plains with high connectivity adjacent sloughs. This large woody debris can precipitate the formation of marsh hummocks that create topographic and biological diversity.

    Thus, berms between subsided areas and marshes need only be at MHHW. Levees should be broken up into islands of different elevations.

5. Work with existing topographic diversity, soils and drainage pattern to create restoration design rather than regrading large areas of the site.
6. Ponds and panes of approximately one acre or more will increase tidal energy, provide habitat. Acre size ponds (even ¼ acre ponds) have large enough surface area to inhibit mosquitoes from wind wave action. Ponds could be stocked with Sacramento Perch for mosquito control and to reestablish the perch in their natural range.

Fish/Geormophology: Charged with identifying suitable marsh plain design elevations with knowledge of cost implications, defining inundation parameters that distinguish high and low marsh for purpose of fish studies. Identify how big of a high marsh area is needed for fish study purposes. Group members included Bruce Herbold, Peter Moyle, Si Simenstadt, Michelle Orr, and Sarah Beamish.

- Sarah Beamish recorded the following notes during the break-out session.

- Salmon will stay in channels. All fish move up tidal channels to forage, but only use the edge of channel, they do not move onto the Marsh plain.

- High marsh need only be high enough to sustain channel systems.

- Peter Moyle expressed concern that the project was too salmon centric. Group discussed focusing hypotheses on functions/conditions that effect salmon, not actually salmon. Some of the functions result from elevation, topography, channel complexity, heterogeneity, and connectivity.

The break-out group discussed the following hypothesis.

1. Larger marsh areas provide greater opportunities for growth, spawning, and survival of native fish. The benefit to fish increases with heterogeneity and connectivity.
2. Higher marsh plains (that don't flood each day) provide fewer benefits.

Low marsh equals MLLW with vegetation
High marsh is between MHW and MHHW.

Q: What is more important/valuable: habitat diversity or a more uniform marsh plain?
A: Habitat diversity more important and valuable.

Q: How big of a channel do we need to support target fish?
A: It depends on channel order. No models in the delta for larger order channels. In general, the bigger the system (greater channel order) the more benefits. However, there isn't a threshold to determine how big.

Si Simenstadt provided a summary of the Break-out group discussion. The group developed a new restoration/research design that would allow for the study of both discreet parcels as well as a larger, interconnected system.

The group develop a new experimental restoration design (figure 1) to balance the various research and restoration objectives. To achieve the ANOVA approach favored by Herbold, the group suggested maintaining 3 tidal marsh cells (small, medium, and large) on the Burroughs parcel but largely removing or grading down the levees while still maintaining discreet experimental treatments. To achieve the desire for a larger, more connected marsh system where research questions would be evaluated through regression analysis, the Gilbert parcel would be graded from low marsh to high marsh and integrated as one large marsh system. Berms on Burroughs would be graded down to approximately 3.5 feet above MLLW, and the marsh cells on Burroughs would be periodically planted with tagged fish for experimental purposes. Channels would be constructed on the Burroughs parcel while they would be left to form naturally on the Gilbert parcel. Marsh Creek would be restored and diverted onto the Emerson parcel.

The elevation of low marsh would be approximately LHW while the elevation of high marsh would be MHW. (Did other members of the AMWG remember this definition of high and low marsh?)

Pros and cons of discrete marsh cells isolated by low berms: Cons are a loss of connectivity, reduced marsh size area, and reduce restoration of tidal energy and processes associated with larger size marsh. Pros are improved opportunities to study fish utilization and topographic/habitat diversity associated with berms.

Discussion

Some AMWG members whether their were conflicts between restoration and research goals. Should we maximize experimental benefit or ecological benefit. Can we find a optimal balance? Should we lean toward ecological goal and incorporate experimental elements only where they do not clearly conflict with ecological goal.

Perhaps we are trying to do too much with this site? What adaptive management experiments/questions are most appropriate for this site vs. which one can be evaluated elsewhere? The opportunity to design this site is a unique for experimental learning.

<u>Key Design Questions</u>

1. How should we treat more deeply subsided portions of the parcels?
2. Should we divert Marsh Creek onto Emerson, and if so, where and when?
3. How much should we grade the site? Should we grade channels? How high should we grade low and high marsh areas?

In making decisions on these design questions, we need to consider which actions are irreversible and attempt to avoid irreversible actions.

With regard to subsidence, deeply excavating subsided areas as borrow pits may be irreversible.

With regard to Marsh Creek, there are many different options and it may be ideally suited for adaptive management interventions whereby we diverted it onto the Emerson Parcel after we have restored tidal action to Emerson and collected enough water quality information on Marsh Creek. We could also use gate or weir structures to divert summer flows away from Emerson but still allow winter flow and sediment to flow onto Emerson.

Should we grade channels or not? Si's experience from the northwest is that artificially graded channels do not perform as well as natural channels. If we don't grade channels, they may never form on their own in freshwater tidal marsh. Tule vegetation may quickly colonize the entire marsh plain creating low channel density and muted tidal action throughout much of the site. If they don't form, it could be very difficult, from a permitting and finance perspective, to ever go back and excavate them once the marsh has formed.

Peter Baye pointed out that the potential for channels to form on their own in low marsh is greater than in high marsh. In high marsh tules are able to clog incipient channels due to minimal tidal flow.

We need to look at Liberty Island for questions to these answers. Data from Prospect and Liberty may be available in a year and ½.

Next Steps

Next meeting. Could discuss: on-site adaptive management interventions, cost trade offs between different designs, results of feasibility study, monitoring program.

Schedule: draft feasibility study due May 31.

John Cain briefly discussed EIS/EIR process.

Joan Florsheim voiced concern that there still seems to be a conflict between adaptive management restoration goals and ecological restoration objectives. She wanted to know how this was going to be resolved and how comments from meeting would be incorporated. She wanted to know whether a different, larger scale alternative would be considered in addition to the version the fish/ecology group developed during the afternoon break-out session.

AMWG members had question about how to capture the meetings discussion and incorporate it into the feasibility study or some other document. We need more than just meeting minutes. Due to schedule, Michelle Orr and John Cain cautioned that it would be difficult to substantially alter the design for the feasibility study draft.