PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Independent Science Advisory Committee (ISAC) Meeting Minutes

Staybridge Suites Conference Room – Denver, CO
November 29-30, 2011

November 29th

Attendees

Dave Marmorek – ISAC Chair
David Galat – ISAC
Kent Lofton – ISAC
Robb Jacobson – ISAC
Phillip Dixon – ISAC
John Nestler – ISAC
Jerry Kenny – ED
Chad Smith − ED Office
Dave Baasch − ED Office
Jason Farnsworth − ED Office
Steve Smith – ED Office
Mark Czaplewski – Central Platte Natural Resource District
Jim Jenniges – Nebraska Public Power District
Mark Peyton – Central Public Power and Irrigation District
Kevin Urie – Colorado Water Users
Rich Walters – Nature Conservancy
Pat Golte – Nebraska Department of Natural Resources
Mike Besson – State of Wyoming
Suzanne Sellers – State of Colorado
Matt Rabbe – U.S. Fish and Wildlife Service
Jeff Runge – U.S. Fish and Wildlife Service
Chester Watson – Special Advisor
Brad Anderson – Anderson Consulting Engineers
Bob Mussetter – Tetra Tech
Darcy Pickard – ESSA Technology Ltd.

Welcome and Administrative

C. Smith and Marmorek welcomed everyone to the meeting and proceeded with a roll call.

Elm Creek FSM Implementation Design

S. Smith led the discussion and covered introductory information included in Implementation Design Document for the Elm Creek Complex FSM 'Proof of Concept' Management Actions.

- A summary of management actions to date at the Elm Creek FSM proof-of-concept experiment site was provided: summary of in-channel vegetation clearing, and overbank vegetation control.
- Key management decisions related to flow, sediment, and mechanical manipulation were described, including the relevance of the decisions to key information needed for decision makers.

- Galat – all vegetation on islands in the Elm Creek Complex was cleared during 2010.
- Marmorek – results of the 2-D modeling were sobering and it will be important to be realistic about our expectations given current knowledge.
- Mussetter – there are several fundamental assumptions in the vegetation scour hypotheses that may not be correct.
- Galat – even though it appears the assumptions in the hypotheses may not be correct, it is critical that the Program not change the hypotheses, but rather keep them as a reference and build upon current knowledge and consider different strategies.
- Jacobson – the Program should implement the Proof of Concept Strategy to validate the models; S. Smith agreed it would be important to validate the models.
- Nestler – system has changed so much since Crowley (1981) that we may need a different treatment to find the right solution space. The FSM strategy may be valid if applied at a different scale (i.e., more water, sediment, etc).
- Dixon – information from 2 years of natural high flow should help the Program define how to implement SDHF.
- Marmorek – would be nice to explore model results at flows >8,000cfs even though the Program is currently limited in what it could do.
- S. Smith and Farnsworth – agreed extending modeling beyond 8,000cfs would help us understand what resources the Program would need in order to build and scour suitable habitat for terns and plovers.
- Mussetter – increasing flows would increase sediment transport rates disproportionately and would not get us much more energy because the channel extends outside the bank.
- Nestler – models could be revised and extended to different scales to address new questions.
- Runge – flow consolidation provides a means for achieving the SDHF component of the FSM strategy. If flows are high enough, channel may not need to be consolidated to reach our SDHF objectives in the main channel.

Farnsworth led the discussion covering priority hypotheses and assumptions.

- A summary review of priority hypotheses Flow 1, Flow 3, and Flow 5 was provided to the group. All three hypotheses deal with physical response (sand bar height and vegetation scour) to an increase in Q1.5 magnitude.

At the time the hypotheses were developed, no minimum habitat suitability criteria were available for use in linking the potential magnitude of physical response to increases/decreases in suitable habitat for the target species. Those criteria have been developed for terns and plovers and will soon be developed for whooping cranes. Moving forward, hypotheses testing will be conducted within the context of target species habitat criteria. (Comment from Jenniges Review: "The orignal Adaptive Management Plan has hypothesis related to habitat suitability. See xy graphs for species and it was always expected that the actual physical response of management actions both mechanical and FSM related would be evaluated against those hypothesis. Comparing against predefined minimum criteria in my mind has been a way to see if we can even get to what people agree is the bare minimum. The problem with minimums is they are

subject to change either due to changes in opinion or bird selection. The hypothesis in the AMP would set minimums at 1.5 acres of exposed sand <25% vegetation at 1200 cfs in 750 foot channels.")

- Jacobson – the Program needs to figure out how important creating and maintaining islands 1.5 feet above 1,200cfs is because it has a large influence on the modeling results.
- Farnsworth – 1.5 feet above 1,200cfs is somewhat required to provide dry-sand habitat and prevent inundating nests to insure some level of productivity on the river.
    - Runge – Feels that 1.5' is a reasonable benchmark for comparing across years. In other river systems, birds are able to select from different sandbar heights in some years. In other years, birds seem to select the first dry sand exposed after a peak flow. Therefore, the significance of the 1.5 feet to the species is not well understood. . Since the Platte has been highly altered for a long time (i.e., several decades), it is difficult to define habitat for the species in the central Platte River.
- Lofton – would be useful to write out the background information that went into determining minimum habitat design criteria.
- Dixon – green line collected on bank and sandbars before and after flow events.
- Galat – flow duration-magnitude charts may not be entirely valid at lower flows.
- Marmorek – graphs could be updated with current knowledge (plots would move to the left).
- Runge – Observations from several weed management individuals shown that dead phragmites is easier to remove by flow than live stands.
- Marmorek – should articulate and expand upon the alternative hypotheses.
- Jenniges – alternative hypotheses are 'no water management activities will build and maintain habitat' (Comment from Jenniges Review: "My comment was the AMP had alternative hypothesis stated in the System Hypothesis (S1 and S1a) however it was not meant as a direct quote of the hypothesis. I suggest using language out of AMP.")

BREAK

S. Smith led the discussion on the current status of the FSM management strategy.

- FSM flow requirements were met 3 of the last 5 years at the Elm Creek Complex
- Previous modeling indicates upstream portion of Elm Creek Complex is in sediment balance, and downstream portion is in sediment deficit. Should allow contrast and comparison of results in two different sediment regimes.
- Mechanical requirements for FSM have been in place at the Elm Creek Complex since fall of 2010.

- Jacobson – should discuss the QA/QC process for flow data with USGS
- Marmorek – could go beyond the binary classification and build nomograms using models to look at the probability of achieving FSM under different combinations of sediment balance, flow, hydrograph shape, and island height (i.e., what combinations of these attributes would have a high, medium, and low probability of meeting FSM objectives).

- Watson – Q1.5 flow historically has been highly variable, but is a useful measure if calculated consistently.
- Jacobson – should evaluate how hydrological events compare before (1895-1940) and after Kingsley Dam (1940-2011).
- Farnsworth and S. Smith – EDO looked at flow events pre- and post-Kingsley Dam and the duration of high flow events were similar.
- Jenniges – NPPD has augmented 50,000 tons of sediment at Cottonwood Ranch since 2001, but the river eroded the banks and naturally added more sediment than this.
- Nestler – could clear vegetation from islands in the winter so the sand can be mobilized to produce sandbars in the spring.
- Farnsworth – when calculating Q1.5 for flows that recur more frequently than a 10-year event, you tend to under predict the magnitude of reoccurrence. The main issue is how to best use 8,000cfs over 3 days, 2 out of 3 years, to meet Program objectives.

Mussetter discussed the 2-D Modelling that has occurred up to this point.

- Mussetter – Used steady state ACOE HEC-RAS model for sediment augmentation and to set boundary conditions for BoR SRH-**2D** modeling, which is the most stable modeling platform; deals well with wetting and drying issues.
- Model is in two pieces: bridge to just below diversion structure (16,000 elements); from diversion structure down to Odessa (14,000 elements); 16,000 elements is maximum number of elements for sediment routing.
- Model shows that there's not enough shear stress to remove 1-year old cottonwoods, let alone other types of plants. Based on ARS work, we need a velocity of 6.3 ft/s and are only getting 1 ft/s on islands.
- Used model to predict sediment transport, but it's difficult to model sediment transport through the diversion. Used the upstream supply rating curve from HEC-RAS to feed into the 2D model below the diversion.
- Used Manning's n to reflect effects of roughness/vegetation (0.03 for bare sand to 0.15 for vegetated islands)

- Nestler – mesh grid resolution may affect calculations of shear stress
- Farnsworth – 0.25 acre island would encompass about 6 elements.
- Nestler – may be beneficial to ground-truth velocities to validate the modeled sheer field
- Rabbe – form of recession curve affects height of islands. Longer duration recession curve continues to erode downstream end of bars whereas sharply descending limb may maintain sandbars. When you sample after peak flow affects what you infer about height of islands.
- Farnsworth – the hydrograph of the 2010 high-flow event was more similar to a SDHF.
- Dixon – deviation graphs would be worth doing to evaluate model calibration (i.e., subtract out general topographic change to look at actual deviations from measured topography).
- Lofton – could use 'energy spent' to better characterize events.

- Runge – processes other than shear stress may have been recognized as primary drivers in vegetation removal
- Baasch and Farnsworth – the models don't account for lateral erosion, ice scour, inundation mortality, etc that also play a role in maintaining the channel. The models are focused on Program hypotheses.

LUNCH

Farnsworth discussed hypothesis Flow 1 model predictions obtained to date.

- FSM performance as related to Hypothesis Flow 1 was predicted using three approaches/methodologies.
  - Methodology 1 was calculation of a theoretical maximum sustainable unvegetated macroform height based on the observations presented in Crowley 1981. The theoretical maximum sustainable height approximates the Program's minimum nesting sand bar height criterion. As such, this methodology indicates that the FSM management strategy could possibly produce sand bars of sufficient height for nesting.
  - Methodology 2 involved prediction of unvegetated sand bar heights based on 2010 natural flow event individual sand bar analysis (average of maximum sand bar heights in conjunction with 2-D model 8,000 cfs mean stage-change). This methodology resulted in predicted sand bar heights that were typically below the minimum criterion indicating that it would be unlikely that appreciable area would meet the minimum criterion.
  - Methodology 3 involved prediction of probability of unvegetated sand bars meeting minimum height criterion based on 2010 natural flow event area-based sand bar analysis (Monte Carlo analysis of observed sand bar height and 2-D model necessary height distributions at 8,000 cfs). Predicted sand bar heights were well below the minimum criterion indicating that it would be very unlikely that appreciable area would meet the minimum criterion.
- Nestler – Crowley found a series of dry years resulted in macroforms becoming permanent.
- Jacobson – rigorously establishing stage-bar height relationships will be a good contribution to science
- Jenniges – Crowley suggested building bars to within 20cm of the water surface is the point where sandbars stall out and become macroforms.
- Nestler – would not expect large sandbars (e.g., upstream of the diversion) to migrate down the river.
- Jenniges – the sandbars upstream of the diversion were moving in the 1990's, but stopped and became vegetated during the subsequent low-flow years.
- Dixon – could do a bivariate analysis/plot to determine probability of creating islands that meet minimum design criteria in areas of the channel that have the highest stage change.

Mussetter discussed sediment transport modeling that has taken place to date.

- Spent a lot of time getting a reasonable baseline model then applied action scenarios
- **1Aii:** 150,000 tons of sediment (D50=1.2mm) augmented over 3 months starting Aug 1 and SDHF would not occur until April 15. Model predicted this technique wouldn't work because coarse sediment would pile up. Results were almost identical to baseline.
- **1Dv:** Start 300,000 tons of sediment (D50=0.5mm) augmented over 3 months starting Aug 1. Model predicted this technique would work a lot better.
- Over 12 years (1989-2001) baseline cumulative sediment load was 5 million tons. With 1Aii we would get only 5.2 million tons, but with 1Dv we would get 6.3 million tons.
- Rating curve changes with bed material size. Over 12-yr simulation you gradually get more coarsening of grain size (changes from 0.5 to 1.0 mm median particle size), especially during wetter years.
- Some bars bare, some vegetated (simulated experiment)
- Simulate 150 hours (6 days)
- Rough islands result in less sediment flux through the reach
- Transported material is about 0.3 mm; bed material diameter coarsens from 0.6 to 2.2 and then drops back down to 1.0mm
- Hard to boil down all the information, but bottom lines are:
  - SDHF doesn't appear to make much difference;
  - 72 hours appears to be too short of time to move sediment down the river
  - appears to be too long a time lag between sediment augmentation and SDHF;
  - appears to be better to implement SDHF right after sediment augmentation
- Would like to have sediment transport data, bathymetry at high flows, and data on a nested sets of bars monitored during high flow events

- Jacobson – could develop a nested set of bars to monitor intensively during an event to constrain some uncertainties.
- Nestler – would be beneficial to replicate the experiment at additional sites.
- Marmorek – need to figure out if there's any way to build the 8 islands to maximize success of SDHF.
- C. Smith – the Program plans to replicate the study at the Shoemaker Island Complex
- Lofton – shape of the hydrograph may affect the success/fail results of SDHF
- Farnsworth – need to keep in mind FSM strategy is not only to build higher bars, but to maintain them with flow as well.
- Jenniges – models with increased roughness show channel degradation
- Anderson – results indicate we should expect to find channel degradation in unmanaged areas.
- C. Smith – may be a good idea to look at SDHF's of lower magnitude and longer duration as well as other options.
- Farnsworth – options such as these will be incorporated into the design document
- Nestler – it's great that the Program, in light of results of modeling efforts, is coming up with additional options for the water as well.

- Lofton – Do what was negotiated and see what happens, but also explore what it would take to make a substantial difference, regardless of what has been negotiated.
- Jenniges – good idea to look at additional options such as these because we can't go above 8,000cfs unless someone is willing to take responsibility for flooding.
- Anderson – could consider modifying channel width to meet objectives
- C. Smith – efforts to explore additional options could be used to determine what it may take to meet Program objectives.
- Marmorek, Galat, and Lofton – Program actions may be constrained by the context of what the Program can do with available resources during the first increment, but our thinking shouldn't be. It would be beneficial to have various model results so decision makers have the required tools to make informed decisions in the future. The TAC's job should be separate of negotiations and additional modeling should be understand how the system operates and to inform the GC if it appears various strategies will work or not and why.
- Runge – SDHF flows represents one peak flow target among a suite of peak flow targets that the Service considered necessary for channel maintenance. Service maintenance peak flows should be considered along with SDHF to determine effectiveness in channel maintenance.
- Jenniges – Service target flows would require 417,000 acres-feet of water and the Program only has 150,000.

BREAK

Farnsworth discussed hypotheses Flow 3 and Flow 5 performance predictions to date.

- FSM performance as related to Hypotheses Flow 3 and Flow 5 were predicted using two approaches/methodologies.
  - Methodology 1 was application of SedVeg and USDA ARS velocity scour thresholds to 2-D hydraulic model velocity exceedance curves. This analysis indicated that a 750' wide channel could possibly be maintained free of some 1-Yr age-class shallow-rooted grasses but not likely for 2-Yr age-class grasses, woody species, or phragmites and reed canarygrass. In areas of suitable height for tern and plover nesting, scour of any vegetation is very unlikely.
  - Methodology 2 was application of SedVeg and USDA ARS velocity scour thresholds to 2-D model stage-velocity relationships followed by identification of maintainable unvegetated channel widths based on channel flow depth-width relationships for full SDHF release. This analysis indicated that a 750' wide channel could possibly be maintained free of some 1-Yr age-class shallow-rooted grasses but not likely for 2-Yr age-class grasses, woody species, or phragmites and reed canarygrass. In areas of suitable height for tern and plover nesting, scour of any vegetation is very unlikely.

(Skipped Sections 7 & 8 of the Implementation Design Document)

Mussetter discussed results of the first year 2-D Hydraulic and Sediment Transport Modelling

  - Field surveys from 2010, May 2011, Aug 2011 LIDAR show bar heights are not building downstream even though downstream reach is accumulating sediment
  - Green line data seems so highly variable so not sure it's feasible to test H3 given variability.
  - Low elevation bars stayed clear of vegetation in 2011 (between May and Aug), but higher elevation bars re-vegetated with Phragmites despite being sprayed twice, disked, and over-topped with water.
- Farnsworth – some of the plots showed evidence of channel widening.
- Jacobson – should evaluate the green-line data spatially to see it this helps account for the spread in the data. Mussetter indicated there seems to be an error in one of the error bars on the discharge/green-line elevation plot.
- Farnsworth – a hazard of having long-duration high flow is that vegetation establishes on areas that otherwise would be suitable nesting habitat.
- Jacobson – should collect photos on a systematic basis where data is collected.
- Jenniges – phragmites that was inundated for 3-4 months was not killed
- Walters – phragmites was spot sprayed again during August, 2011.
- Marmorek – not sure we could test hypothesis Flow 3 given the variability in the data.
- Lofton – only one measure of green line seems to be captured by the hypotheses.
- Jenniges – green line was to be used to evaluate whether or not vegetation scour was occurring or not
- Farnsworth – multiple green line points on each transect
- Runge – establishing the green line elevation should not include annual vegetation
- Galat – it seems originally the hypothesis Flow 3 was thought of as a simple process, but now it appears as though green line is much more complex (habitat, channel maintenance, etc).
- Jenniges – discharge/green-line elevation plot seems to show we can maintain bare sand up on islands overtopped by 2,500cfs flows.
- Dixon – there appears to be spatial variability which may not equate to an inability to detect change in green line elevation.

November 30th

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Welcome and Administrative

C. Smith welcomed everyone to the meeting and proceeded with a roll call.

Elm Creek Complex Bird Response Islands

C. Smith led the discussion of the Elm Creek Bird Response Document.

- Jenniges – whooping cranes have used the reach of river below the diversion (2005 or 2006) and terns and plovers nested in this reach in the 1990's.
- Galat – should evaluate whether minimum criteria of 3 acres for off-channel habitat and 1.5 acres for on-channel habitat are valid
- Nestler – should consider all exposed bare sand when the terns and plovers arrive as habitat.
- Pickard – using contrasts should help the Program evaluate whether size or elevation influence the birds selection.
- Farnsworth – bars will be designed to be high (MCM), low (FSM), large (MCM), and small (FSM).
- Dixon – should focus the design should be as simple as possible

- Pickard – Islands will be designed to evaluate 2 contrasts (high/low, big/small), but all other measures will be collected as well.
- Nestler – need to consider all factors in the design process
- Pickard and C. Smith – all factors were considered when developing the designing the islands, but that we focused on a couple parameters we felt were most important and that we can control.
- C. Smith – the Program is collecting a lot of data throughout the system and will also have contractor compile information related to bird cognition.
- Marmorek and Galat – should learn from existing broad data sets to assess the attributes of islands where terns and plovers have chosen to nest, including areas in Central Platte, Lower Platte, Niobrara, etc to better inform island design and habitat selection.
- Jenniges and Farnsworth – WC3 plot is a function of discharge and water depth, but something is missing that accounts for the shape of the hypothesized curve. (Comment from Jenniges Review: Not necessarily missing just trying to put something into an xy graph that did not work well. The origonal graph was weighted usable area on the y axis and discharge on the x but at the time of the graph there was not consensus on how to calculate weighted usable area (i.e. C4R model or Farmer model) or that the modeled suitability had any connection to crane use which was our response variable. So we made a very general (i.e.bad) graph that shows crane use verses suitability.)
- Marmorek – include a metric that accounts for population size in the performance metrics
- Galat – may need to consider energetic benefit/detriment of staying on the Platte River longer as well as other factors (weather) that may influence whether or not they stop or not.
- Runge – stated that the importance of migration habitat to WC energetics is not well understood. It is known that the highest rates of WC mortalities occur during migration periods, and protection of secure stopover habitat is important to the species as the population expands.
- Dixon – should include a measure of uncertainty in the tables (need to discuss later)
- Galat – should link sediment augmentation and flow to bird response island persistence.

C. Smith discussed preliminary results for the 2008 Habitat Availability Assessment

- Out of 90 miles, there are:
  - 4,206 acres of bare sand (<25% vegetation) out of 5,668 polygons
  - Applying filters 1.5’ above 1200cfs + 75% sand + >0.25 acres resulted in 424 polygons; 327 acres.
  - Separated from mainland or island bridges by 50’ of water resulted in 23 acres on 90 miles of river
  - 400 ft river channel resulted in 22.5 acres
  - 200’ tree buffer resulted in 20.87 acres
  - More than 1.5 acres within a ¼ mile reach of river resulted in 16.9 acres of suitable on-channel habitat during 2008.

- Runge – Habitat design criteria were developed to help guide island design and were not to specifically target all habitats the birds may select.
- Galat – it would be important to relate Program survey counts to population trends.
- Lofton – important to assess nest and bird detectability
- Nestler –
- Jenniges – People have been building sandbars in the channel since the 1970's and they get eroded away so there's no need to spend a lot of time engineering islands in our Bird Response study.

Pickard discussed updates her and Katy have made to the Rapid Prototype Models

  - Changed the user interface to make the models more user friendly
  - Left original parameters in the models
  - Open for suggestions as to how people like to change the models (add different scenarios, settings, etc).

- Galat – could have people that monitor piping plovers on other systems provide feedback
- Marmorek – McFadden's presentation at the AMP Reporting Session indicated habitat was not limiting the population as the population increased as habitat availability declined. The Program needs to link rapid prototype model parameters to observations on the Platte River.
- Pickard – should reevaluate the parameters included in the models so they better fit central Platte River observations.
- Jacobson –might want to include a flow variable in the models to account for changes in habitat availability during different flow regimes.
- C. Smith – the TAC will have a workshop to discuss the various parameters that are included in the models.

C. Smith led the discussion on Bird Response Island Design

- Baasch – island layout was not intended to be the final design, but was a result of seeing how 8 islands might fit into the channel.
- Nestler – could use historical habitat selection types of analyses to justify small-island / big-island approach to make it more palatable.
- Marmorek – should name the islands by over-topping flows (i.e., 3,500cfs and 7,000cfs islands)
- Farnsworth – during May-July SDHF the inundation risk on all islands will be 66% at a minimum.
- Runge – A recent publication stating terns and plovers nested on the Missouri River during periods when islands were naturally inundated during the nesting season, and the author stated that flows were unsuitable for the species. A response to the publication was developed by a group of biologist and river specialists. In summary, both species are adaptable and are resilient to flooding events.
- Galat – tough to compare an unregulated system to the regulated system we have today.

BREAK

ISAC Membership 2012 and Beyond

- C. Smith led discussion informed everyone the Program is looking to add an ISAC member that has experience with bird ecology.
- Marmorek discussed how advisory committees are structured in other adaptive management Programs. The ISAC discussed the possibility of setting 1-3 year terms which would allow the flexibility of replacing members who have otherwise done a good job, but due to changing needs would easily allow the Program to replace members to meet needs. Marmorek displayed a table that displayed the
- Dixon suggested setting terms at 3 years to allow new members a year or so to catch up to where the Program is at and then could provide more input the second and third year.
- Nestler added that the chair of most committees rotates out as well and that the vice-chair typically replaces the chair.
- Kenny stated the Program is happy with the performance of all current ISAC members; however, there may be a need to set up a rotation system to ensure independence and incorporate new insight and specialization.
- Marmorek presented information and discussed the tendency to evaluate data at finer and finer scales and the Program needs to keep some level of focus on the overall system as well as at a scale of the species' life cycle.
- Nestler – could study processes from a deterministic stand point.
- Jacobson – should take observations at multiple scales to evaluate how they may fit together.
- Marmorek – can't always extrapolate data collected at a fine scale to a larger scale (i.e., can't study all the fine details of 1 lake and assume all other lakes are the same).
- Nestler – there is a cost associated with simplifying things that occur at a finer scale than they are evaluated at.
- Galat – the Program should have an interest in all levels, but the primary focus of the Program should be at the Platte River scale. FWS and others should be more focused on the larger scales.

Closing Business

1. AMP Reporting Session scheduled for March 27-28, 2012 in Denver.