Platte River Recovery Implementation Program

Preliminary Findings of the Independent Science Advisory Committee (ISAC)

Platte River Basin Science & Resource Management Symposium
October 15, 2009

What does the ISAC do?

- Ensure scientific integrity and quality in the Program
- Provide independent reviews of processes and products, advice on scientific issues, including adaptive management
- Reports directly to the PRRIP Governance Committee

Who is the ISAC?

- Mr. David Marmorek, ESSA Technologies Ltd., Vancouver BC, Canada (ISAC Chair)
- Dr. Philip Dixon, Iowa State University, Ames, IA
- Dr. David Galat, University of Missouri, Columbia MO
- Dr. Robert Jacobson, U.S.G.S., Columbia, MO
- Mr. Kent Loftin, HydroPlan LLC, Hobe Sound, FL
- Dr. John Nestler, Fisheries and Environmental Services, Vicksburg MS

ISAC Task for 2009

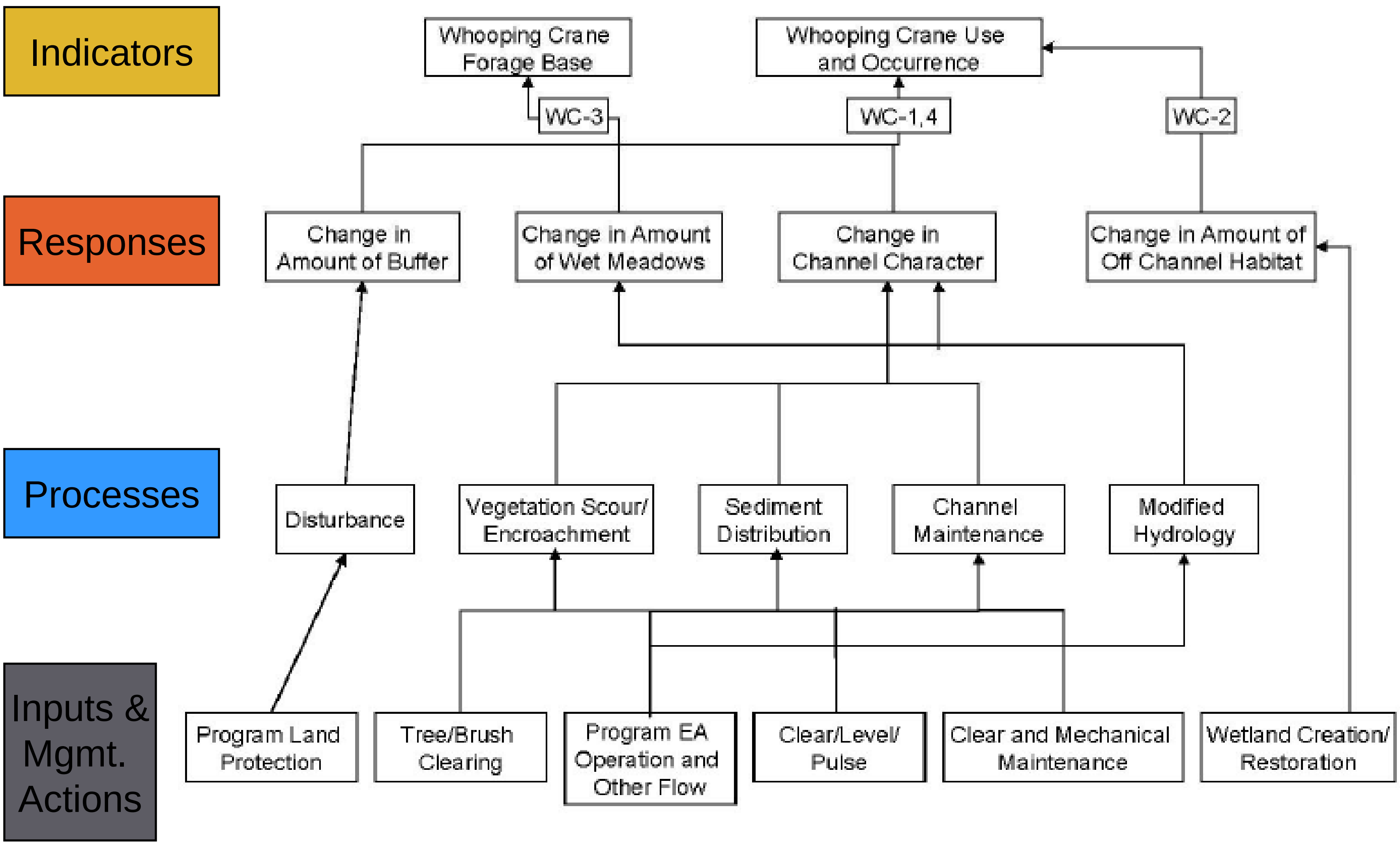
- Provide preliminary answers to 28 questions (in Symposium book) covering 6 topics:
  A. **Conceptual Ecological Models and Priority Hypotheses**
  B. **Experimental Design**
  C. Modeling
  D. **Data Analysis, Synthesis and Reporting**
  E. Invasive Species
  F. AMP Management Objectives

Bolded *topics of higher priority to Program*

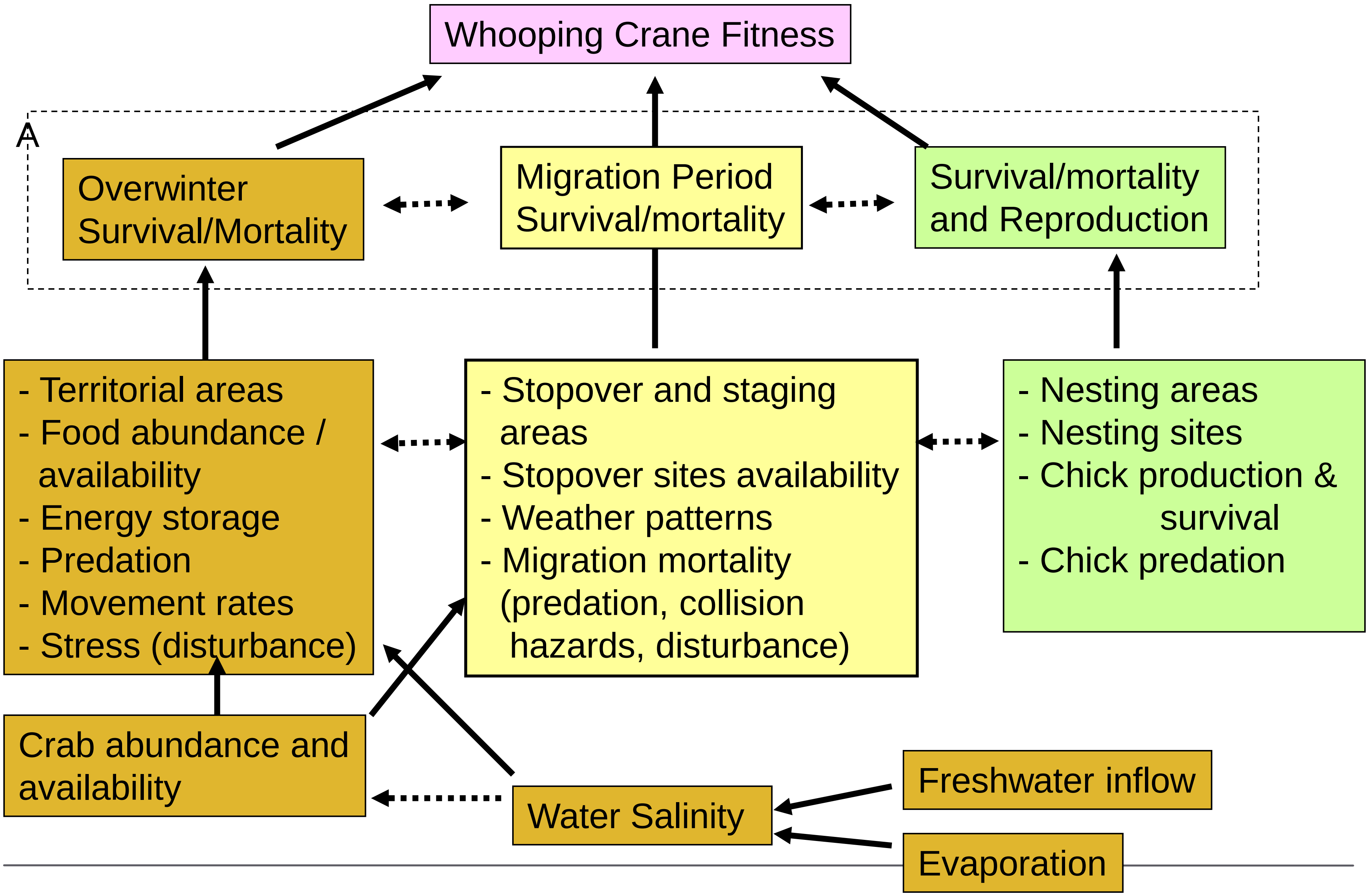
A. Conceptual Ecological Models (CEMs) and Priority Hypotheses

1. Existing CEMs for focal species describe beliefs about how program actions affect processes, responses, species. Very helpful to PRRIP.
2. Need to understand enough of whole system (including factors outside your control) to explain what happened during experiment.
3. Add human actions & external “driving forces” to CEMs potentially affecting the effectiveness of actions under your control, e.g.:
   - Other actions: water withdrawals / diversions, land use change
   - Climate variability and trends
   - External influences on abundance / condition of birds arriving in Platte
4. Adding boxes to CEMs doesn’t change actions or what you monitor.
5. It does motivate strategic partnerships (coordinate actions; get data) to improve outcomes and understanding. Might *reduce* pgm scope.
6. Use modular / nesting approach to keep CEM format understandable.

Example CEM from Program AM Plan (whooping cranes)



A More Comprehensive Whooping Crane CEM

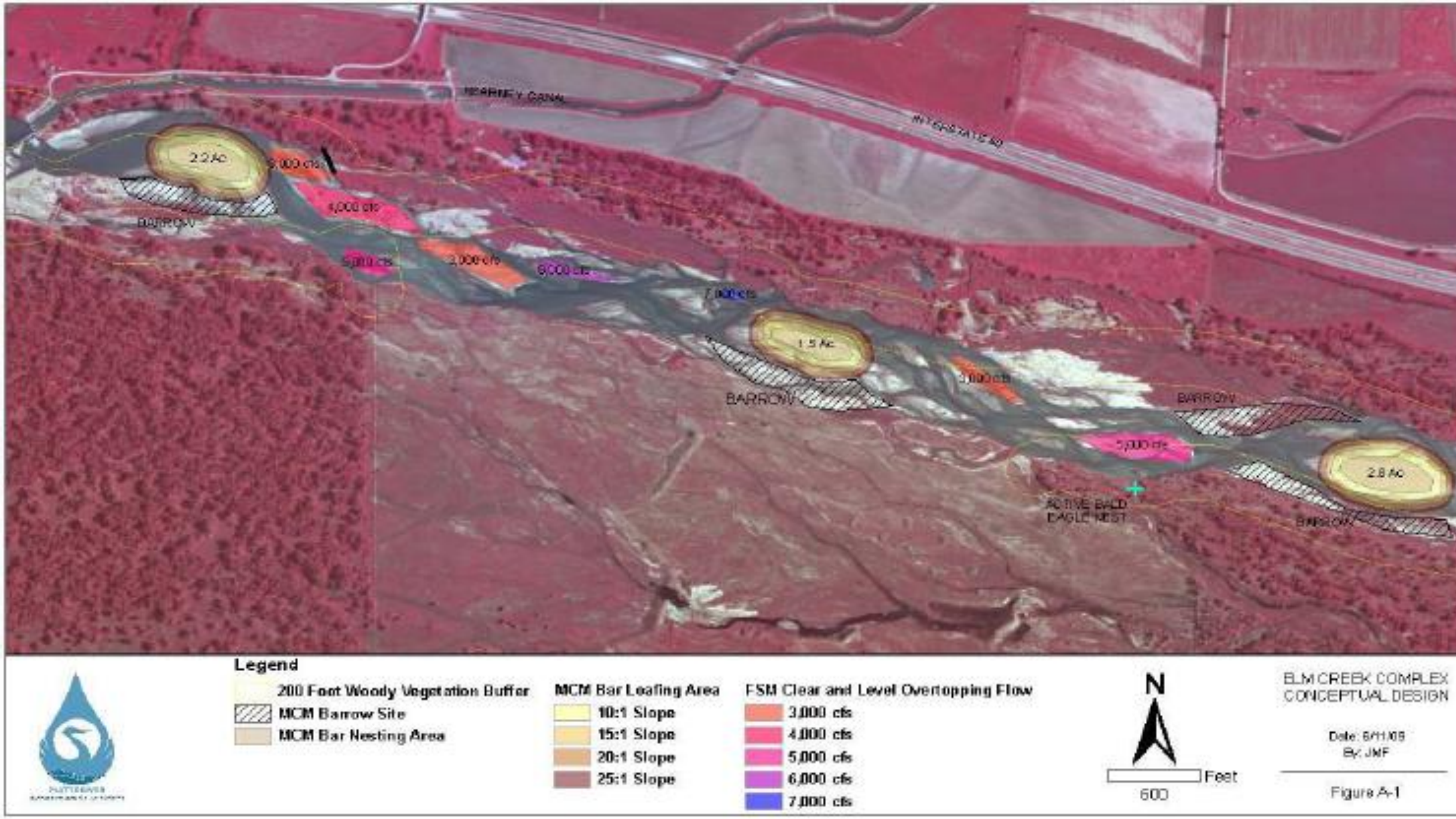



CHANGED
PRIORITIES
AHEAD

A. Prioritizing Hypotheses

1. Great progress! Reduced ~150 hypotheses $\Rightarrow$ 42 *priority hypotheses*
2. But 10 of these 42 H's have "low detectability, sensitivity, feasibility" (especially for whooping crane, pallid sturgeon, sediment)
3. If feasibility low-med, proceed in sequential manner, with clear rules:
   - **IF** feasibility improved to level where effects of interest are detectable -> **THEN** continue to monitor;
   - **IF** *primary* hypothesis test shows X (e.g. PS spawning) & management priorities support …**THEN** test next *contingent hypothesis* (larvae recruit?)
   - Apply principles of good project management (critical path, sequencing)
4. Prioritize the 42 H's: 1) directly relate to Program mgmt objectives for T&E species; 2) habitat that supports them; 3) processes / modeling
5. Complete quantitative estimates of feasibility for key hypotheses with a simple model that generates/analyzes *mock data* (i.e. FSM vs. MCM)
6. Don't discard work on hard H's; try to move from low to medium feasibility by improving methods

B. Experimental Design



B. Experimental Design

1. "Means objectives" (e.g. sediment balance above Cottonwood Ranch) are reasonable
   - reflect current understanding of species habitat requirements
   - regularly reassess based on biological responses

2. Proposed paired design is better than alternatives, given current understanding of central Platte system.
   - flow will create gradient of FSM conditions; monitor variables that might affect habitat selection *within* each treatment
   - appropriate sample sizes depend on variability and critical effect sizes.
   - use existing data on variability in tern / plover performance measures to compute statistical power, assess 4 vs 5 replicates

3. Directed research needs to help design management actions:
   - understand vegetation scouring, flow effects on islands
   - improve sediment augmentation design (modeling and monitoring to estimate sediment budget)

4. Current species monitoring good for detecting whole-system responses, including those not on program lands.

C. Modeling

1. Use coupled hydrology, hydraulics, sediment transport, and vegetation/habitat responses to assess mgmt actions (1D + 2D)
2. Add rapid prototyping models for other system parts (e.g. possible water & land scenarios, T&E species, sampling error) to:
   - Understand, visualize, and predict system responses
   - Coordinate/update with field studies
   - Simulate design of management experiments (as outlined under D)
   - Enable stakeholders to explore model behavior
3. Increase model credibility
   - Documented performance assessment (replicate historical conditions)
   - Documented sensitivity analyses (which inputs critical to predictions)

D. Data Analysis, Synthesis and Reporting

Data Analysis & Synthesis

1. Reliability of FSM vs MCM test depends on factors within & outside Program control – need to explore this
2. Develop *mock report* based on *mock (simulated) data* $\rightarrow$ organize data analysis plan, reprioritize hypothesis tests
3. Analyze data quickly (season or annual is maximum) and share syntheses at annual meetings. Adjust priorities based on learning.

Data Storage / Access

4. Don't duplicate agency databases (e.g. USGS, USFWS, BoR), but skim key variables & metadata into centralized PRRIP database
   - Ensure data quality procedures, consistent spatial / temporal references
5. Make reviewed data available to all in spirit of transparency

Learning from AM experiments: a function of what practitioner can and cannot control

Under AM practitioners control

Spatial / temporal contrast in mgmt. actions (e.g., flow)

Level precision/ investment in monitoring

Natural variability (added noise)

Ability to **distinguish alternative hypotheses** w AM experiments

Value of information for *decisions*

D. Simulate / rapid prototype the whole experiment, including decisions

1. Define decisions that you want to make at different times.
2. Land and water scenarios (e.g. # willing sellers, water use, climate) →
3. Amount of contrast in actions (experimental design) →
4. Effectiveness in producing habitat (alternative hypotheses) →
5. Response of birds / fish to habitat (include confounding factors) →
6. Sampling error in estimating performance measures →
7. "Mock data" →
8. Analyze mock data as you would real data →
9. Write up mock report & draw conclusions for key decisions
10. Gain insight on feasibility of hypothesis tests and ability to make decisions → revise experimental design, hypothesis priorities

E. Invasive Species (example of a surprise)

Invasion of common reed (*Phragmites australis)* into the Platte River Basin

1. Immediate Negative Impacts
   - Constrains channel and floodplain conveyance
   - Increases erosional resistance
   - Influences overall sediment transport dynamics
2. Potential long-term negative impacts
   - Stream bed incision
   - Alteration of experimental design
3. Questions to be answered
   - What factors control expansion?
   - What are effective management measures? (literature review; **experimentation**)
   - Will spreading be accelerated by AMP experiments?
   - What shear stresses are required to scour infestations?
4. Mapping spatial extent in Central Platte over time
   - Document effectiveness of management measures
   - Forecast rate and locations of spreading
5. Early solutions will provide best future and avoid foreclosure of future options, but implement control programs as AM experiments

F. AMP Management Objectives

Program Lands & Non-Program Lands Strategic Partnerships

NEW

5) Gain understanding of WC, LT, & PP population dynamics outside Program area
   - ❑ meta-population dynamics approach

6) Develop strategic partnerships to address impacts and opportunities outside Program area
   - ❑ Based on system-level to species nested CEMs

Existing (good!)

1) Improve production of interior least tern & piping plover
   - ❑ Program Lands: ↑ nesting pairs & fledge ratios ↓ adult mortality

2) Improve whooping crane survival during migration
   - ❑ ↑ suitable roosting & foraging habitat, proportion of population, crane use days

3) Avoid adverse impacts on pallid sturgeon populations
   - ❑ No indicators yet identified

4) Benefit non-target listed spp & non-listed spp of concern and reduce likelihood of future listings
   - ❑ ↑ habitat on central Platte River

F. AMP Management Objectives and Performance Measures

- Change mgmt. objective 2 (*Improve survival of whooping cranes during migration)* to *Contribute to improved survival…* {reduces scope!}
  - Many factors external to PRRIP (e.g. power line mortality in north TX, forage quality at other stop-overs) affect migration mortality. Revise WC CEM.
- Existing performance measures appropriate (e.g., WC use days), but add weight gain and time budgets
- Use contingent, incremental approach for sturgeon objective.
  - Stage sensitivity study will document hydrologic sensitivity of Lower Platte to Central Platte flow management;
  - **IF** flow changes significant, **THEN** use sparse, stationary telemetry framework to define migrations of sturgeon in/out of the Platte
  - **IF** sturgeon using Platte, **THEN** assess larval recruitment
- Design forage fish approach based on tern's perspective, not fishes'

Proposed Sequence for Responding to ISAC Recommendations

1. Work on *Mock Report*, to facilitate:
    a. More comprehensive CEMs for each species
    b. Form strategic partnerships as guided by expanded CEMs
    c. Clear data analysis plan
    d. Additional rapid prototyping models for other system parts
    e. Reprioritized hypotheses
    f. Improved experimental design, performance measures and sampling efforts (if required)
2. Update sediment transport assessment
3. Establish ongoing data management, synthesis and reporting procedures
4. Implement recommendations 1-3 (☺)

Questions for ISAC???