Trinity River Restoration Program Decision Support System

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Presentation Goals

- Follow up (January) SAB DSS presentation
- Review lessons learned from DSS case studies
- Describe potential TRRP DSS components and resources required for implementation scenarios
- Discuss path forward for TRRP DSS

Why should TRRP invest in a DSS?

- Identify and structure objectives
- Focus TRRP resources on desired outcomes
- Integrate models to predict fundamental objective outcome (i.e., salmon population response)
- Support the scientific basis for decision-making
- Guide monitoring program

DSS Case Studies

- Literature review of natural resources DSSs
  - Recommendations from SAB, other AM experts
  - Examples from DOI Adaptive Management Manual
  - Published literature
- DSS selection criteria
  - Riverine/fisheries management
  - DSS being implemented
  - Used for 2-3 years for decision making
  - Representative of TRRP size

Observations of DSS Search

- Limited number of DSSs
  - Many are still conceptual or pilot exercises
- Few examples have already been implemented
- Examples are much simpler, with few components, than proposed TRRP DSS

DSS Case Studies

- Conducted interviews with representatives from 8 selected programs
  - Horseshoe Crab-Red Knot Management
  - Adaptive Duck Harvest Management
  - Flint River (GA) Integrated Model
  - Lewis River (WA) Salmon Recovery Alternatives
  - Tallapoosa River (AL) Flow Management
  - Cultus Lake (Canada) Salmon Management
  - Wetland Flow Management (Australia)
  - Snowy River (Australia) Restoration
- Preparing summary report of findings, other supporting information

Horseshoe Crab-Red Knot Management

- Links population models for two species to inform horseshoe crab harvest management decisions
- Development
  - Two interest groups with competing values and objectives
  - Interdisciplinary team developed prototype
  - Process was contentious
  - Three competing shorebird models (Bayesian network)
- Implementation
  - Initiated in 2012
  - Informs single management action: optimal harvest of horseshoe crabs

Tallapoosa River Flow Management

- Establishes flow regimes to meet multiple objectives: hydropower production, recreational boater weekends and protection of ecological resources (spawning windows)
- Development
  - Workshop to address stakeholder values and objectives
  - Results prescribe flow management regimes
  - Created R.L. Harris Stakeholder Board
- Implementation
  - Utility staff make day-to-day flow release decisions

Australian Wetland Flow Management

- Links hydrological and ecological models to determine the ecological impact of potential environmental flows
- Development
  - Eight months to develop prototype
  - Significant disagreement between agencies
  - No public engagement
  - Focused on long-term planning, not annual flow deliveries
- Implementation
  - State gov't uses to assist long-term basin planning (evaluate ecological outcomes)

Lessons Learned from Example DSSs

- Stakeholder engagement
  - Establish a sense of ownership
  - Increase confidence in model output
  - Focus programmatic objectives
  - Bring parties together to objectively compare alternatives
- Simple design
  - Prototype to test functionality
  - Utilize existing models and update over time
  - Don’t oversell with graphics

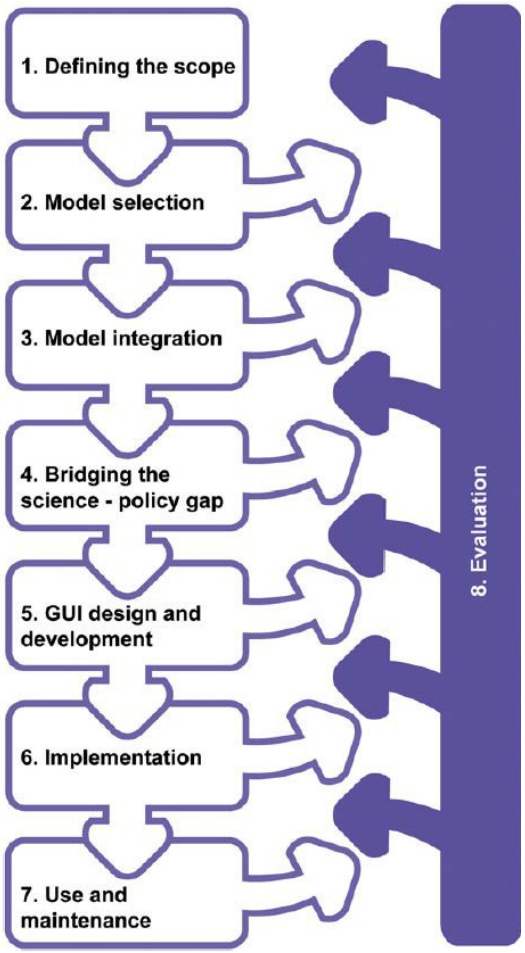
Lessons Learned (cont'd)

- Scoping
  - Identify specific questions to be addressed
  - Design to meet end user/decision maker needs
- Time to develop
  - Examples took from 30 days to 5 years
  - Most time spent coordinating meetings, modifying existing models
- Monitoring
  - Feedback critical to success of DSS
  - Informs future priorities by identifying data gaps
  - Identifies data necessary for decision making

Lessons Learned (cont'd)

- Maintenance
  - Plan for long-term implementation
  - Avoid assigning responsibility to one individual
- Leadership
  - Need a strong leader/champion to coordinate effort
- Governance
  - Need well-established governance structure

Typical DSS Development Process



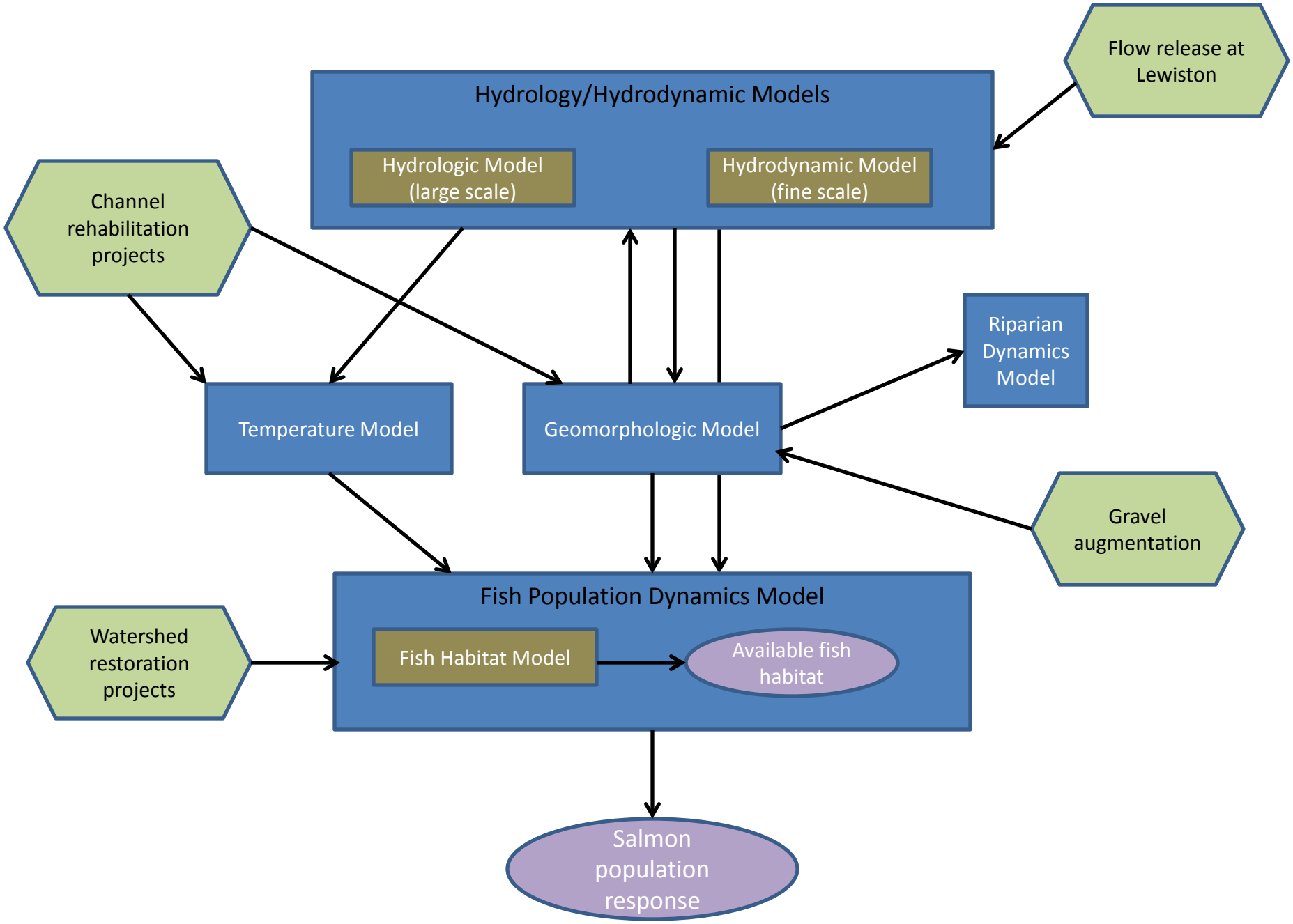
From van Delden (2011)

Components of Potential DSS for TRRP

- Quantifiable objectives
- Alternative management actions
- Integrated predictive models
- Anticipated ecological response
- Monitoring program
- New learning incorporated back into DSS
- New learning applied to develop new management alternatives = adaptive management

Management Actions and Model Components

- Available management actions
  - Flow release at Lewiston
  - Channel rehabilitation
  - Gravel augmentation
  - Watershed restoration
- Model components
  - Hydrology/hydrodynamics
  - Morphodynamic
  - Temperature
  - Riparian
  - Fish Population
  - Water Management


Flow release at Lewiston
Hydrology/Hydrodynamic Models
Hydrologic Model (large scale)
Hydrodynamic Model (fine scale)
Channel rehabilitation projects
Riparian Dynamics Model
Temperature Model
Geomorphologic Model
Gravel augmentation
Fish Population Dynamics Model
Watershed restoration projects
Fish Habitat Model
Available fish habitat
Salmon population response

Development of Scenarios

- Reviewed SAB recommendations in DRAFT Appendix H
- Reviewed Fish Work Group SSS levels
  - Subdivided into sub-levels
- Conducted user/developer interviews
  - Verified model status, data needs
  - Developed rough cost estimates and timeframes
- Developed three scenarios

Model Component Options

Hydrology/ Hydrodynamics

- 1-D HEC-RAS
- SRH-2D
- IRIC
- FASTMECH
- River 2-D

Geomorphologic

- SRH-1D
- SRH-2D

Temperature

- StreamTemp (SNTEMP)
- RMA2/11

Riparian

- TARGETS
- SRH-1DV
- SRH-2DV
- CASIMIR-Vegetation

Fish Population Dynamics

- SSS (in development for Klamath)

Water Management

- WRIMS

DSS Scenario Assumptions and Caveats

- Budgets and timeframes are estimates
- Assumes Klamath SSS model development will continue
- Fish production model is primary variable
- Partner agencies will provide their data
- No WRIMS

Scenario Summary

Scenario 1	Scenario 2	Scenario 3
2 years	2 years and 2 months	2 years and 3 months
$449,000 - $512,000	$536,000 - $699,000	$562,000 - $725,000

Path Forward