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Science Plan for Near Shore Ecology and Fall Steady Flows

M.E. Andersen, T.A. Kennedy, L.G. Coggins, Jr., M.D. Yard

SBSC, GCMRC

U.S. Department of the Interior
U.S. Geological Survey

Approach to Studying Steady Flow in September/October

1. Current Science Program
2. Near Shore Ecology/Steady Flow (NSE/SF) solicitation and project
3. 2008 NSE/SF Pilot project

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1. Current Science Program – FY08 approved work plan

- 2000 Low Summer Steady Flow (LSSF) Synthesis underway (synopsis July 2008)
- Current Studies
  - Physical
    - Mass Balance
    - Near Shore Temperatures
  - Biological
    - Aquatic Food Base
    - HFE Backwater Investigations
    - Lees Ferry Rainbow Trout
    - Fish Monitoring

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2. Near Shore Ecology/Steady Flows

- Requested/received input from NPS, BOR, FWS
- Solicitation reviewed by Science Advisors (May 08)
- Competitive solicitation (June – July 08)
- Responses reviewed by independent panel (Aug. 08)

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2. Near Shore Ecology Study – Background

- **Biological Opinion Conservation Measure**

  "…. nearshore ecology study … will relate river flow variables to ecological attributes of nearshore habitats (velocity, depth, temperature, productivity, etc.) and the relative importance of such habitat conditions to important life stages of native and nonnative fishes. This study will incorporate planned science activities for evaluating the high flow test on nearshore habitats as well as the 5-year period of steady flow releases in September and October."

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Near Shore Ecology/Steady Flows

- **Primary Science Questions**
  - **What sampling and analytical methods are appropriate for determining abundance, density or occurrence of small native and nonnative fishes?**
  - **What are the habitat types that juvenile native and nonnative fish select?**
  - **How do abiotic and biotic factors influence individual growth and survival in these habitat types?**
  - **How available are these habitat types?**

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Near Shore Ecology/Steady Flows

- Primary Study Objectives
  - Determine abundance, density, or occurrence of native and nonnative fishes among different habitat types
  - Utilize past and current data and integrate data across multiple sources and disciplines to determine small-bodied and juvenile fish habitat selection
  - Measure/estimate small-bodied and juvenile fish vital rates (growth and survival) among different habitat types
  - Determine the key factors (abiotic and biotic) influencing habitat selection among small-bodied and juvenile fish
  - Develop an appropriate spatial model
  - Design and implement a multi-year (2009-2012) experimental plan (process-oriented) to determine the effects (of) fluctuating and steady flow releases (September-October)
  - Develop a contingency plan for releases above peak-power plant capacity

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3. Pilot Study

- Study plan developed by GCMRC (May 08)
- Reviewed by Science Advisors (June 08)
- Apply for permits (June 08)
- Conduct pilot study with cooperator (Aug – Sep 08)

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Pilot Study (Aug. & Sep. 2008)

- Objectives
  - Evaluate methods to obtain density, abundance, and occupancy of near shore habitats by small, juvenile fishes
  - Estimate relative piscivory risk among different habitat types and flow patterns
  - Estimate use and movement of fish in backwater habitats
  - Evaluate methods to assess flow impacts on growth of rainbow trout (otoliths, RNA/DNA ratios)

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Challenges of Studying SF Conservation Measure

- Biological response may be limited by timing and duration of steady flows
- Conclusions will be confounded – habitat stability or warming more important to humpback chub?
- Fish spawn in spring, growth is slowing by September

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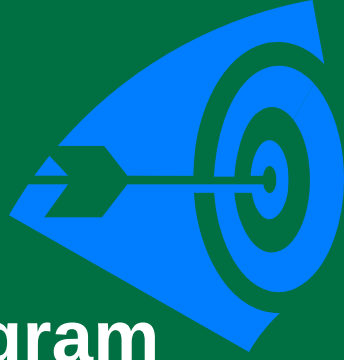
Challenges cont'd

- Inter-annual variability of flow and temperature regimes are likely
  - Equalization
  - Natural hydrology
- Fish capture methods
  - Methods for estimating abundance of small-bodied fishes still under development

GCMRC Approach



1. Continue with the current science program
   - Existing projects help inform future projects
   - 2000 LSSF synthesis underway
   - Existing projects contribute to understanding 2008 SF
     - Aquatic food base
     - Rainbow trout monitoring
     - Near shore temperature modeling
2. NSE/SF Solicitation
   - Develop new science plan in FY 09
3. Pilot Study

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