Ecological Flows for Hydrologic Modeling in North Carolina

Environmental Review Commission

December 14, 2011

Overview

- What are ecological flows?
- Why are they important?
- How do other states handle ecological flows?
- What is North Carolina doing?

What are Ecological Flows?

- Flow needed to maintain instream uses.
- Site Specific – habitat type, species of interest, drainage area
- Varies with Time – monthly, seasonal , or yearly variation

Instream Flows Provide for a Diversity of Uses

Water Supply

Thermoelectric Energy

Offstream Uses are Critical for Society

Agriculture

Hydropower diversion

Ecological Flows vs. Minimum Flows

- Minimum flows – a minimal threshold to maintain aquatic life for short periods of time
- The lower the minimum flow – the more it is suited only to allow survival for brief periods
- Ecosystems suffer when the minimum flow becomes THE flow for extended periods.

Ecological Flow Regime

- **Retains natural stream flow variability:**
  - **magnitude**
  - **timing**
  - **frequency**
  - **duration**
  - **rate of change**
- **Variability differs depending upon location & type of water body**
  - **This makes statewide determination of proper ecological flows very challenging.**

What Are Other States Doing?

- **Minimum Flow Thresholds**
  - 7Q10 drought flow (e.g., AL, LA, MS)
  - Percentage of Average Yearly Flow (e.g., AR, GA, SC)

- **Flow Regime with Allowable Percentage Reduction**
  - Florida - SW Florida and Suwannee River WMDs

- **Under Development**: NC, VA, TX

What is NC Doing?

- SL 2010-143 mandated that DENR:
  - Identify the flow necessary to maintain ecological integrity.
  - Incorporate ecological flows into hydrologic river basin models.
  - Determine if ecological flows will be adversely affected by existing or future water withdrawals.
  - Create a Science Advisory Board to assist in characterizing and determining ecological flows.

Why must Ecological Flows be Incorporated in Hydrologic Models?

- If not included – the assumption would be that all flow in a stream is available for withdrawal and offstream use.

Challenges to Eco Flow Determination

- Wide variety of water bodies
  - One-size fits all approach is not suitable for NC's diversity of rivers and streams
- Seasonal fluctuations
  - Flow should vary throughout the year
- Field studies at every location are not practical

1st Step - Stream Classification

- Sorting streams by hydrology also sorts into ecologically distinct types
- Other states have started similarly
- Consistent with differences in geology
- Evaluating consistency with different types of aquatic ecosystems (underway)

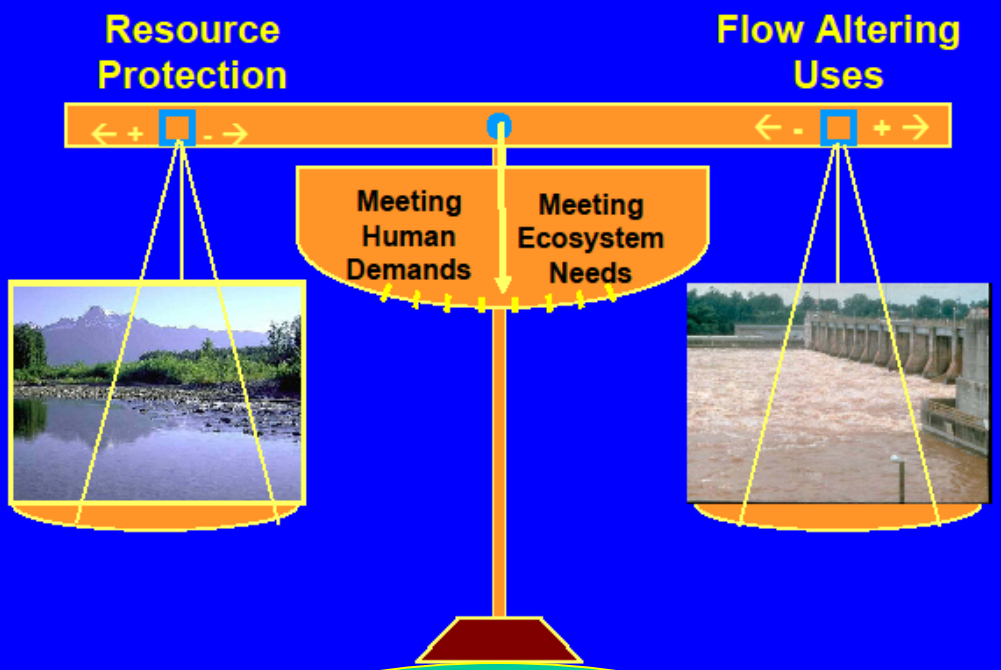
Next Steps

- **Ensure the hydrologic classification system captures ecological differences**
- **Determine the threshold to include in the models for each classification**
  - **How much can flow change without unacceptable ecological impacts?**

Ecological Flows Science Advisory Board (SAB)

- 16-member panel of experts in aquatic ecology, representing diverse stakeholders as specified in SL 2010-143
- Monthly meetings open to the public
- Will recommend approach/method for determining ecological flows
- SAB will recommend methods, not determine specific flow numbers.

Finding the Balance[3]



Policy Makers

Science Advisory Board

Scientific-Technical Workgroup

Policy-Implementation Workgroup

[3] From Charlottesville City Council Work Session: Community Water Supply Plan 5/6/08
Ridge Schuyler, Director, Piedmont Program, The Nature Conservancy

http://www.ncwater.org/Data_and_Modeling/eflows/

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