Health Evaluations, Flow Targets and Other Technical Bits of Stream Management Planning

River Network Stream Management Planning Peer Learning Workshop
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Overview

Discussion of the various approaches used to characterize impacts to E&R uses associated with streamflow alteration and outline methods used to set management targets/objectives for supporting and protecting those uses. Provide a sense of the differences between:

- Assessing Environmental vs. Recreational Uses and Needs
- Risk Ratings, Threshold Setting, Response Functions, Water Supply Deficits
- Setting the appropriate context
  - Focus area delineation, attribute selection, planning objectives
- Selecting the appropriate assessment methodology(s)
  - R2Cross, Wetted Perimeter, Effective Discharge, 2D Model, Boatable Days, etc.
- Understanding limitations of selected assessment approaches
- Setting targets and management goals based on one or more of the following:
  - % change from natural conditions
  - Existing water supply deficits
  - Predicted change under future scenario modeling
Setting the Context
Careful Preparation Improves Outcomes

1. Delineate planning area and map diversity of E&R attributes throughout
2. Identify the environmental and recreation attributes of highest interest/value
3. Articulate planning objectives relevant to the planning area and the selected attributes
4. Conduct an assessment that produces information conformant to the planning objectives
Selecting Assessment Methodology(s)
Hydrological risk rating based approaches

Based on statistical comparisons of hydrological regime behaviour under natural conditions vs managed conditions

01 | Indicators of Hydrological Alteration (IHA): suite of regime behaviour metrics

02 | Watershed Flow Evaluation Tool (WFET): maps flow alteration statistics to attribute risks

03 | Locally developed streamflow report cards (e.g. Friends of the Yampa Streamflow Report Card)
Environmental threshold-setting

Typically use locally collected data to generate minimum or maximum flows necessary to support different environmental attributes. Examples include:

01 | Tennet Method: Minimum flows based on mean annual flows under natural conditions
02 | R2Cross: Minimum flows based on channel geometry and hydraulic characteristics
03 | Wetted Perimeter: Minimum flow based on cross-sectional geometry and water depth
04 | Effective Discharge: regularly recurring flood flows based on channel geometry and sediment characteristics
Response Function Development

Methods that consider environmental attribute characteristics that vary as a function of streamflow.

01 | Generally relate hydraulic characteristics to habitat quality or sediment mobilization/surface scour
02 | Includes methods/models like PHABSIM, CASIMIR, River2D and others
03 | Typically require collection of detailed site-specific data
04 | Produce outputs that allow users to compute an attribute value for any given streamflow value
Recreational Use Opportunities

Based on stated preferences for streamflows by recreational users on a specific reach of river/stream. Typically results in application of the Boatable Days methodology:

01  | Requires deployment of community surveys that ask respondents to identify acceptable and optimal flow conditions for different uses

02  | Computes the number of days in a given year type that fall in different flow categories

03  | Identifies differences in recreational use opportunities between reaches and/or year types as a function of streamflow
Dealing with Limitations and Uncertainties
Apply Assessment Results Carefully

1. Assessment methodologies provide a specific view of environmental and/or recreational use needs that rely on a set of assumptions.

2. Important constraints on environmental and/or recreational uses may exist that cannot be effectively considered by a given assessment methodology.

3. Ideally, stream health and recreational use assessments provide useful and important information, they almost NEVER provide all the information you will need to make a good-decision.
Setting Targets and Management Goals
Percent Deviation from Natural Conditions

Based on statistical comparisons of hydrological regime behaviour under natural conditions vs managed conditions

01 | Relative differences between stream reaches for a given metrics may help identify priority areas

02 | Stakeholders may select an objective for limited deviation from natural conditions on some or all reaches (e.g. < 20% deviation)

03 | Targets may be informed by academic literature or local/historical observations
Existing Water Supply Deficits

Where environmental and/or recreational use needs are stated as flow thresholds, water supply deficits can be computed across year types.

01  | Can be assessed in units of volume (acre feet) and/or duration (days).
02  | Useful approach for computing needs against ISF water rights.
03  | Relative differences between reaches can help set geographic priorities.
04  | Computed deficit volumes can be used to inform discussions of augmentation or water leasing.
Predicted Change Under Future Scenarios

Scenarios may be based on expected future projections of streamflow, climate, and/or infrastructure.

01 | Colorado Water Plan Technical Update provides 5 scenarios for water supply.
02 | Environmental and recreational use needs can be assessed against the scenarios on a given reach.
03 | Outputs can help identify locations, year types, or times of year when certain attribute are at greatest risk.
Predicted Change Under Future Scenarios

Scenarios may be based on expected future projections of streamflow, climate, and/or infrastructure.

04 | Expected changes due to outcomes associated with specific projects can also be assessed.

05 | This approach can be useful for demonstrating the benefits of a completed project or for stating the benefits of a proposed project in terms that are conformant to the planning objectives.
Placing Results in Context of Other Expected Changes

Don't forget to consider other important constraints and opportunities!!

01 | Place assessment results in context of other observations/predictions for watershed health
02 | Priority areas/issues identified today may change drastically following some future event like wildfire
In Summary

- Articulating planning objectives in terms of geographies and E&R issues/attributes is critical prior to selecting assessment methodologies.

- Understanding the different types of outputs you will produce from application of various methodologies should help you make the most appropriate selection.

- There is no substitution for critical thinking about how any given set of assessment results fit into the bigger picture.
Thank you.