Northwest Power and Conservation Council

April 27, 2006

MEMORANDUM

TO: Council Members

FROM: Steve Waste, Manager for program Analysis and Evaluation

SUBJECT: Intensively Monitored Watersheds

This briefing is informational and does not require a Council decision. This is the fifth in a series of briefings on different monitoring activities underway in the region. It is intended to portray our experience to date, illustrate on-going work, and provide structure to the conceptual discussion of a "regional approach" to monitoring. This briefing will address the efforts of the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) to foster coordination amongst its members, who are sponsoring work in intensively monitored watersheds (IMWs),

The presentation will be made by Steve Leider of the Washington Governor's Salmon Recovery Office. Steve is chairing the PNAMP Workgroup on Project Effectiveness and a key initiative of this workgroup is to establish a network of intensively monitored watersheds (IMWs). The workgroup has developed adopted a guidance document titled, " Establishing a Network of Intensively Monitored Watersheds in the Pacific Northwest," released April 5, 2005. (The document is available on the PNAMP website: http://www.pnamp.org//web/workgroups/PEM/meetings/2005_0830/2005_0405IMWPlan.doc).

The brefing will explain the key points that illustrate the thinking and approach embodied in the PNAMP guidance document.

Background

The U.S. Congress, the Northwest Power and Conservation Council, and state Legislatures allocate hundreds of millions of dollars each year to aid recovery of salmonid species listed under the Endangered Species Act, and enhancement of other non-listed anadromous and resident fish. There is a tremendous need to document the contribution that these efforts are making to improvements in watershed condition and listed species.

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Basic questions about how fish respond to well-intended actions cannot be answered unless a significant amount of existing and new information is obtained and rolled up in a manner that, to date has typically not been done. There is a growing realization and risk of losing significant funding for salmon and habitat recovery if the region does not demonstrate the coordinated monitoring necessary to answer basic questions posed by appropriators.

Along with other complementary monitoring activities, the Pacific Northwest Aquatic Monitoring Partnership (PNAMP), a consortium of entities with a common interest in coordination of monitoring, has recommended establishing a regional network of "Intensively Monitored Watersheds" (IMWs) to evaluate the effectiveness of restoration projects, programs and policies at the landscape scale (PNAMP 2004). Effectiveness monitoring at the IMW scale addresses the following general questions:

> *Does the collective effect of restoration and/or management actions result in improved watershed condition and fish response? Why or why not? What are the causes of those responses?*

The PNAMP Strategy (PNAMP 2005 v2/23/05) contains specific objectives and actions associated with effectiveness monitoring objectives aimed at IMW outcomes that are excerpted below.

> "**Objective 4. Coordinate Pacific Northwest effectiveness monitoring efforts**"
>
> "**Outcome G. Develop a network of Intensively Monitored Watersheds (IMW) and reach specific studies for effectiveness monitoring.**
>
> Intensively monitored watersheds are designed to address key questions in a disciplined scientific manner. All possible factors need to be considered: accurate measures of fish populations including spawners entering the watershed and juvenile migrants leaving the watershed, and accurate estimates of mortality factors such as marine conditions, harvest, hydro, predation, and other factors directly affecting salmon abundance and survival. Without a holistic approach, it will not be possible to determine the response of salmon to habitat restoration and other management efforts.
>
> **Action item 1.** *Recommend a strategy for placing IMWs throughout the Pacific Northwest to monitor and evaluate "cause and effect" relationships between habitat restoration and management actions, and changes in fish population responses and other viable salmonids population criteria.*
>
> **Action item #2.** *Develop a regional map with agencies identified geographically that will be responsible for funding and implementing intensively monitored watershed monitoring*.
>
> The IMWs should be coordinated to reflect differing ecoregions, species, and treatments. Selection of IMWs should be a cooperative process between federal and State agencies, and local watersheds.
>
> **Action Item 3.** *To reduce the risk of not being able to detect a change resulting from habitat improvements, PNAMP will encourage federal and state governments that select and fund habitat restoration projects to cluster them in the identified intensively*

monitored watersheds so that the amount of habitat improved can be at a scale measurable in terms of migrant salmonids produced."

Distinguishing features of the IMW approach, in contrast to other PNAMP effectiveness monitoring recommendations, are that IMWs will provide:

- integrative watershed-scale evaluations,
- assessment of fish population responses to habitat actions evaluated at the watershed scale in terms of causal or correlative relationships, and
- results from rigorous designs used to adequately address confounding factors and experimental controls or reference conditions

Broad interpretation of results from IMWs will be most effective if information from concurrent status and trend monitoring of specific ecosystem components, including watershed habitat conditions, water quality, stream morphology, riparian condition, and the viability of salmonid populations is available. Status and trend information provides a context within which results of IMWs can be interpreted and extrapolated beyond the local lMWs. IMWs need to be designed to assess the relative contribution of restoration and management actions in the context of other factors or ecological stressors.

Establishing a Network of Intensively Monitored Watersheds in the Pacific Northwest

Steve Leider
Pacific Northwest Aquatic Monitoring Partnership
Effectiveness Monitoring Workgroup

Briefing to the
Northwest Power and Conservation Council
May 10, 2006

PNAMP

Data management

Watershed condition monitoring

Fish population monitoring

Effectiveness monitoring

Estuary monitoring

Other topics as interest merits

Effectiveness monitoring is multi-faceted

- Reach or projects
  - Tests effects of actions on local habitat and fish density at the project site
- Intensively Monitored Watersheds
  - Tests effects of management actions and projects on watershed-scale responses of fish populations (freshwater productivity (smolts per female))

“Effectiveness monitoring at the IMW scale addresses the following general questions:

Does the collective effect of restoration and/or management actions result in improved watershed condition and fish response?

- *Why or why not?*
- *What are the causes of those responses?”*

Biology of fish-habitat relationships is complex: *there is no alternative to Intensively Monitored Watersheds*

- Can best be understood by concentrating monitoring and research efforts at a few locations
- Enables enough data on physical and biological attributes of a system to be collected
- Develop a comprehensive understanding of the factors affecting salmon production in freshwater

A “network” is needed because

Too expensive to do everywhere

…each IMW will be able to address only a part of these general questions.

…the distributed “network” of IMWs is intended to address ***a range of species, ecological contexts, and management scenarios that are most relevant to policy interests, and that are technically feasible.***

PNAMP Strategy

- *Objective 4. Coordinate Pacific Northwest effectiveness monitoring efforts*
  - *Outcome G. Develop a network of Intensively Monitored Watersheds (IMW) and reach specific studies for effectiveness monitoring*
    - *Recommend a strategy for placing IMWs throughout the Pacific Northwest…*
    - *Develop a regional map with agencies identified geographically that will be responsible for…IMWs*
    - *…encourage…projects…cluster them in IMWs…*

Essential criteria for inclusion in the IMW network

- **Limiting factors** are understood and addressed (e.g., per sub-basin, watershed, or recovery plan(s))
- Activities in the IMW can be controlled to the extent necessary to maintain the integrity of the **experimental design** throughout the life of the project
- Suitable **control or reference** streams exist to provide comparisons to the treatment stream(s) that will remain adequately unaffected by the restoration actions of management actions being evaluated
- The degree of **certainty** with which management - monitoring questions are to be answered is known or will be developed, affecting design, sampling frequency, and feasibility

Secondary criteria

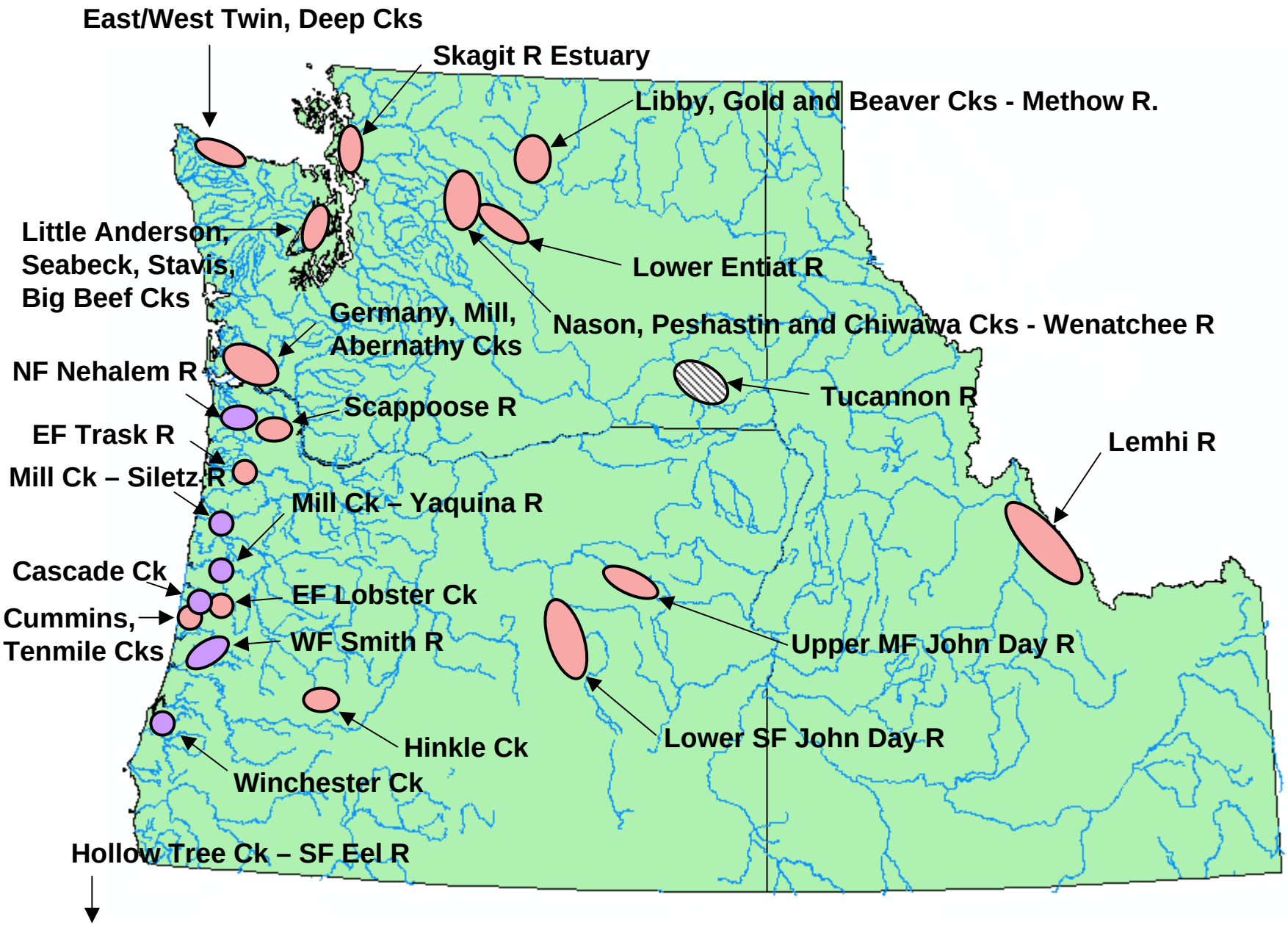
- Treated **size** is sufficient to be able to detect significant changes in the context of the management scenario(s) (or treatments) being evaluated

- The desired **time frame** for study results is known

The IMW network

- ***shall have broad base of local support in the affected area!***
- shall capitalize to the extent possible on the **pre-existing** availability of suitable **scientific knowledge**
- shall have **long term commitments** to juvenile, outmigrant, and adult fish monitoring
- shall support important **management questions** of PNAMP members
- shall be **distributed** across areas/ecoregions, species, and categories of project and/or management activities consistent with bullet #4
- shall have sufficient **type and duration of management actions** for reliable implementation of long term experimental designs

Phase 1 - Network of Intensively Monitored Watersheds



Overview of PNAMP Phase 1

- 17 IMW opportunities identified
- 32% address Chinook, 24% bull trout, and 20% coho and steelhead
- 50% address forested, >30% agriculture
- >50% address habitat complexity and riparian
- All but one have some current funding

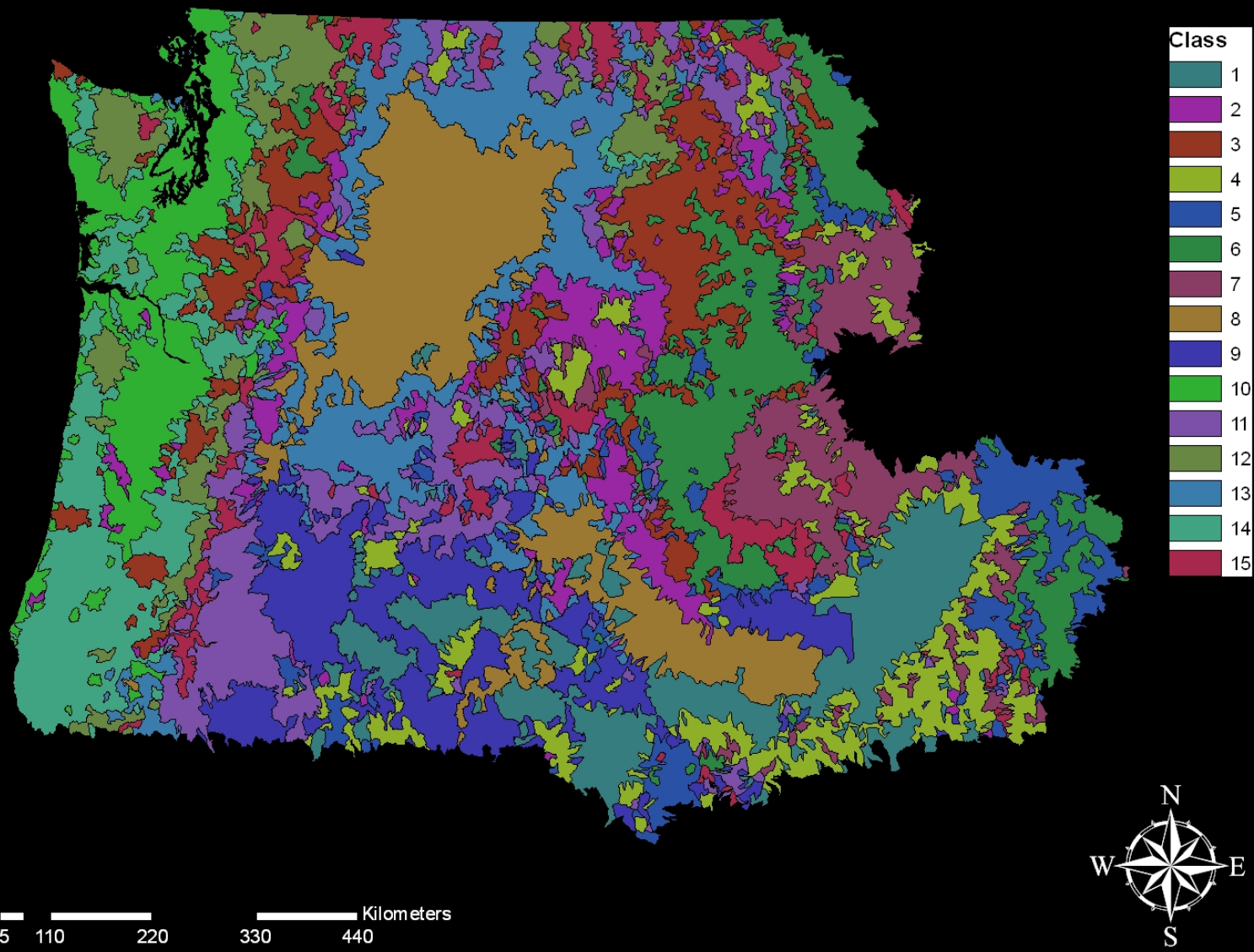
Summary of distinguishing features
(compared to other effectiveness monitoring)

- Integrative, watershed-scale
- Assesses fish response at watershed scale, in terms of causal relationships
- Rigorous experimental designs account for confounding factors and control or reference conditions

How can results be extrapolated?

- Classification/stratification analysis
  - E.g., climate, topography, geology, channel network
- Use to
  - help clarify limitations of initial IMWs
  - identify potential new IMWs, and
  - support extrapolation between monitored and non-monitored watersheds
  - assist interpolation of data across areas not monitored as intensively as the IMWs
- Availability of status and trends information provides temporal context

Watershed Classification of the Pacific Northwest



Emerging lessons: what will it ***really*** take to do watershed-scale restoration (with IMW monitoring)?

- Projects must actually be implemented to address watershed-scale response, with sufficient coverage and duration
- Treatments and controls must be well matched
- Implementation of actions ***and*** monitoring must be coordinated at the watershed scale
  - At other scales it is OK to separate effectiveness monitoring from implementation of restoration actions
  - *BUT, there can be no separation between monitoring and actions at watershed scale*

Emerging lessons

- Effectiveness and IMW monitoring have risen to the level of programmatic attention
  - But… the stakes have risen too
    - if we are promising something that we aren't in a position to deliver, what are the risks?

- Importance of key IMW criteria – limit IMWs to where support and capacity for restoration ***and*** monitoring are present (plan for success)? Where
  - limiting factors are quantified
  - problems have restoration solutions
  - population level responses
  - long-term institutional and local support for restoration and monitoring

Next steps for PNAMP IMW network

- Phase 1 (ongoing): evaluate initial IMWs
  - Identify and describe initial opportunities
  - Stratify/classify PNAMP area
  - Overlay results from classification, identify gaps or potential changes (w/policy input)
- Encourage clustering of projects in IMWs
- Outreach IMW strategy
- Coordinate with data workgroup to identify and address data access and sharing issues
- Implementation funding assistance
- Report to Executive Network

PNAMP

PNAMP IMW Subgroup Participants

BLM
BPA
CDFG
CBFWA
Consultants
NMFS
NPCC
OWEB

ODF
ODFW
USBR
USFS
USGS
WA ECY
WA GSRO
WA SRFB
WDFW

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