

Integrated Status and Effectiveness Monitoring Program

Project 2003-01700

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**Actual work on the project done by ~100
collaborators**

ISEMP Pilot Projects Progress FY04-06

- **Motivation and Context for project**
- Data products
- Design and Coordination Products
- Resource Management Tools
- Next steps

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Common goals shared by many groups or agencies in the Northwest:

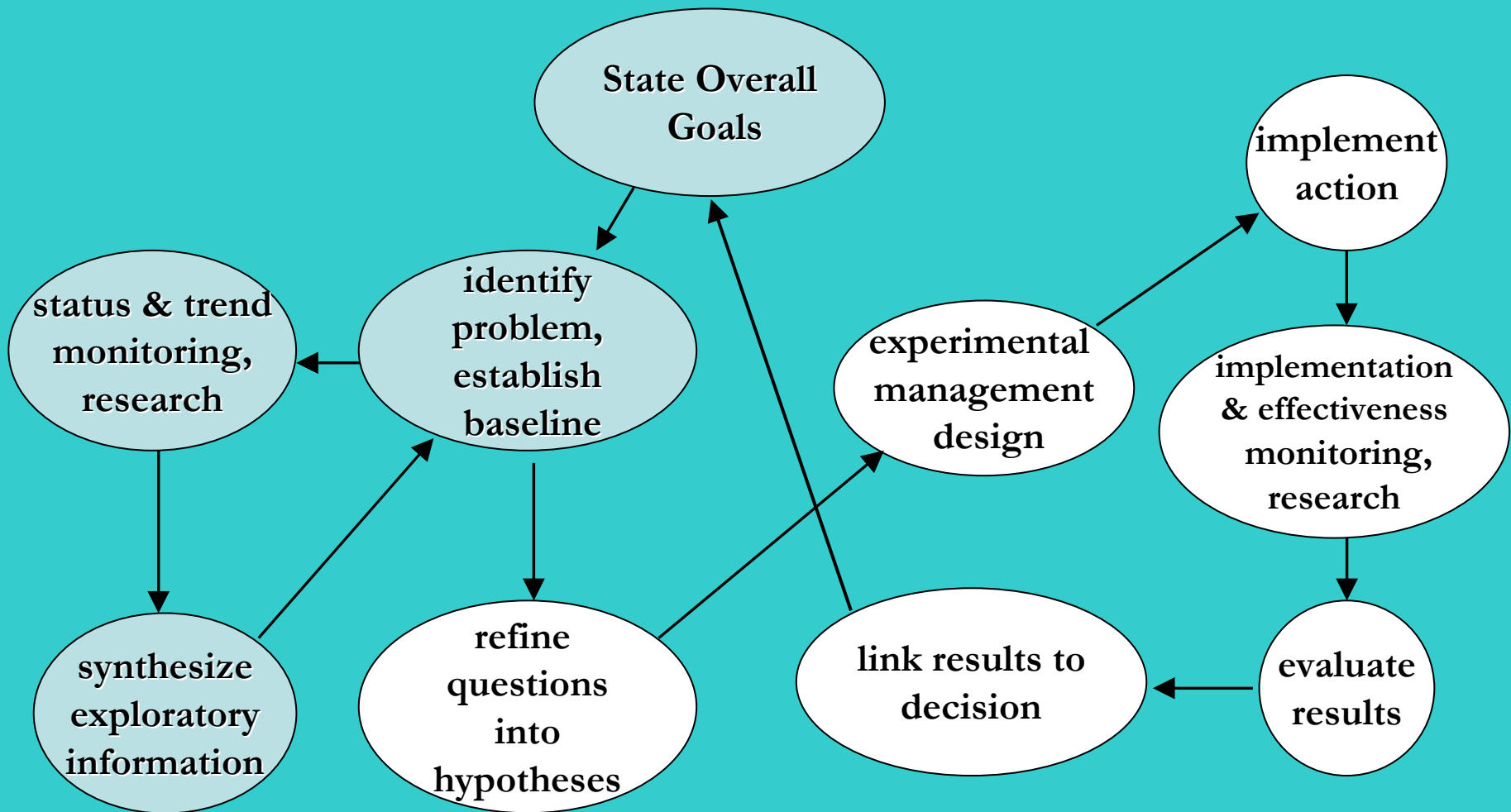
- Assess and manage salmonid populations and their aquatic habitat
- Restore human impacted aquatic habitat
- Be cost effective
- Be accountable

Are these goals contradictory or mutually exclusive?

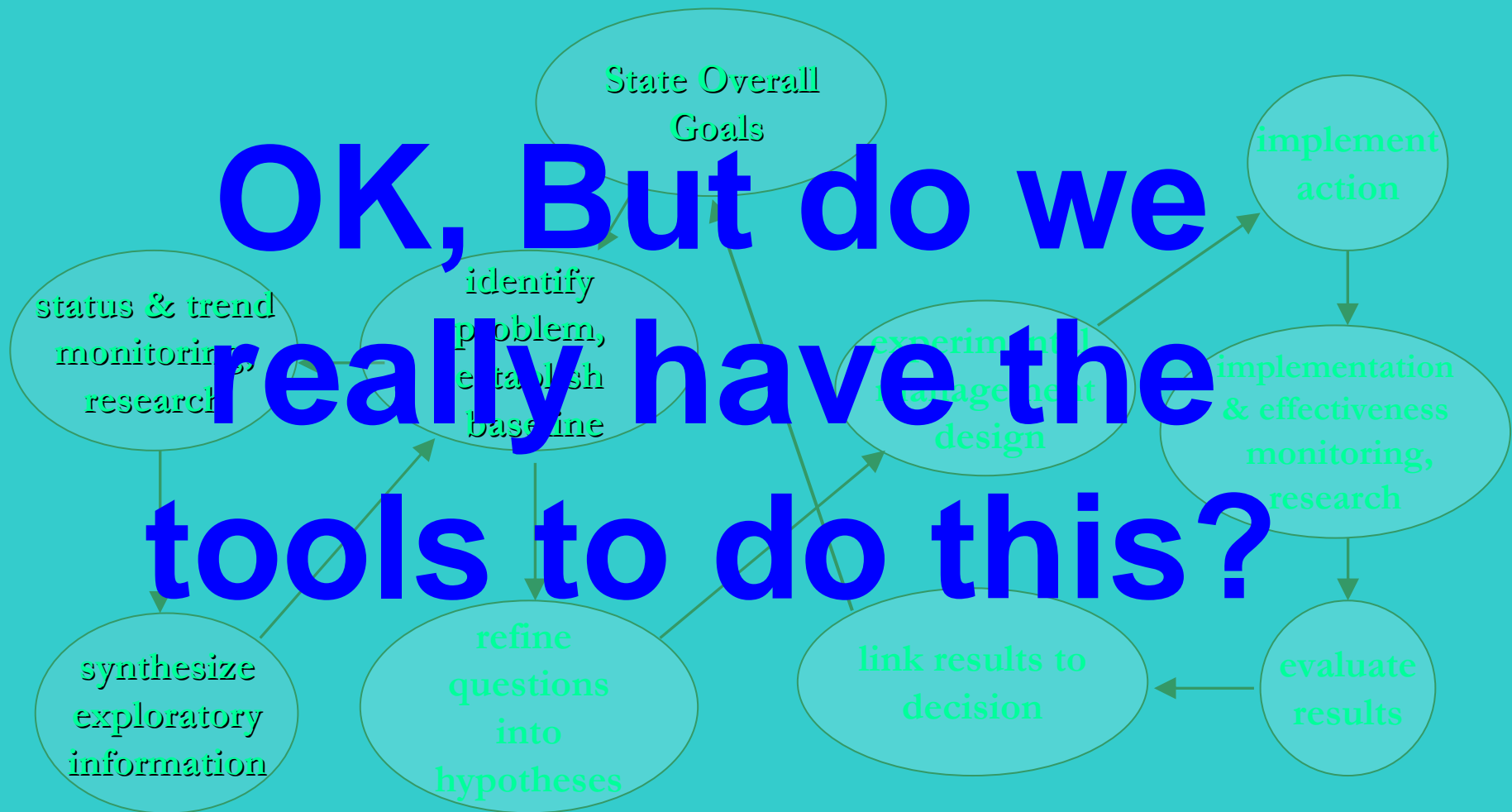
- Assessment takes data, but monitoring is expensive, so how can we be cost effective?
- Restoration takes money, but so does monitoring, so if we monitor, won't we do less restoration?
- Resource assessment monitoring doesn't address habitat restoration project impacts, so how can we be accountable?

All you have to do is design a program that balances cost, learning, management needs, restoration goals, and accountability?

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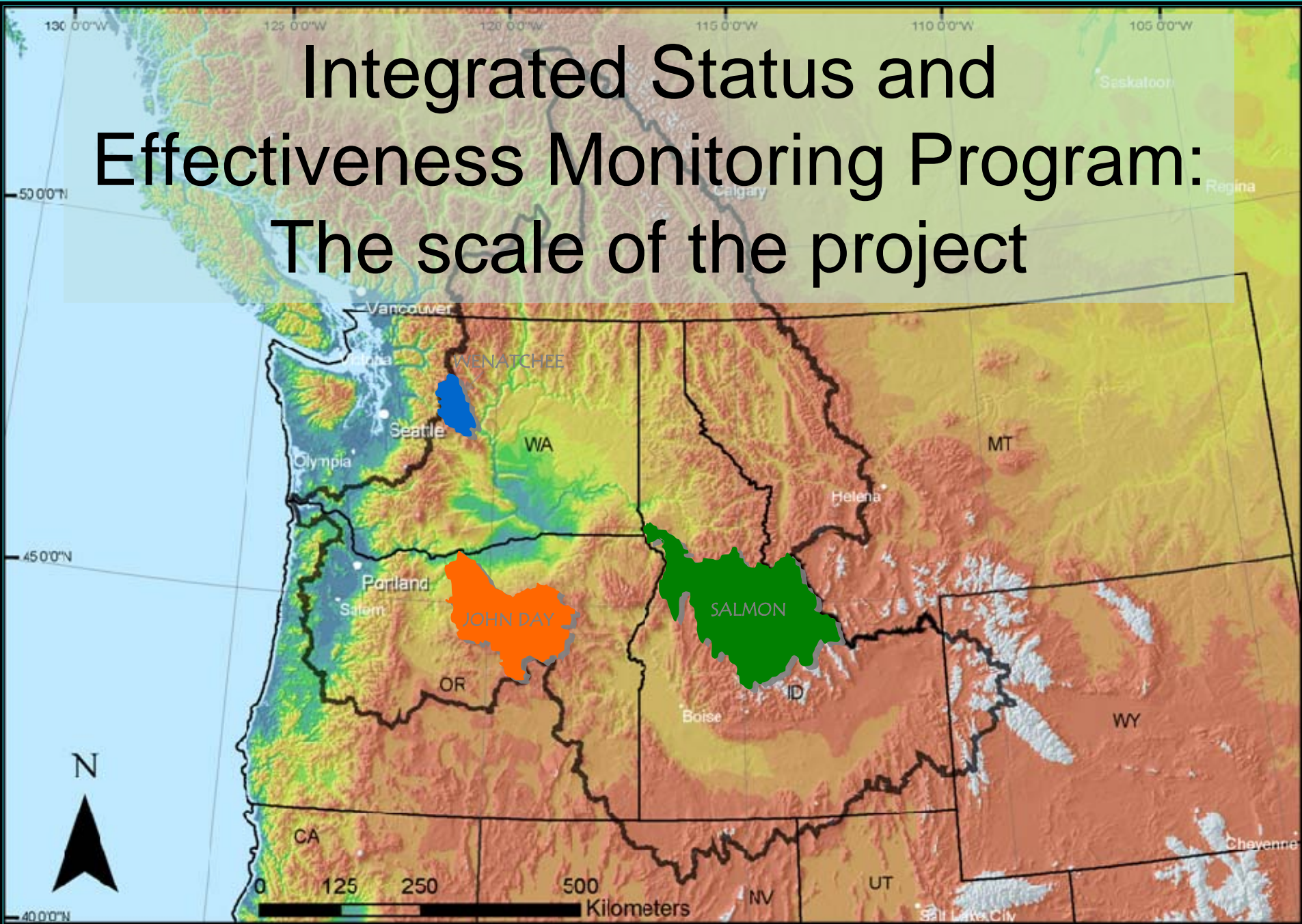
All you have to do is design a program that balances cost, learning, management needs, restoration goals, and accountability?



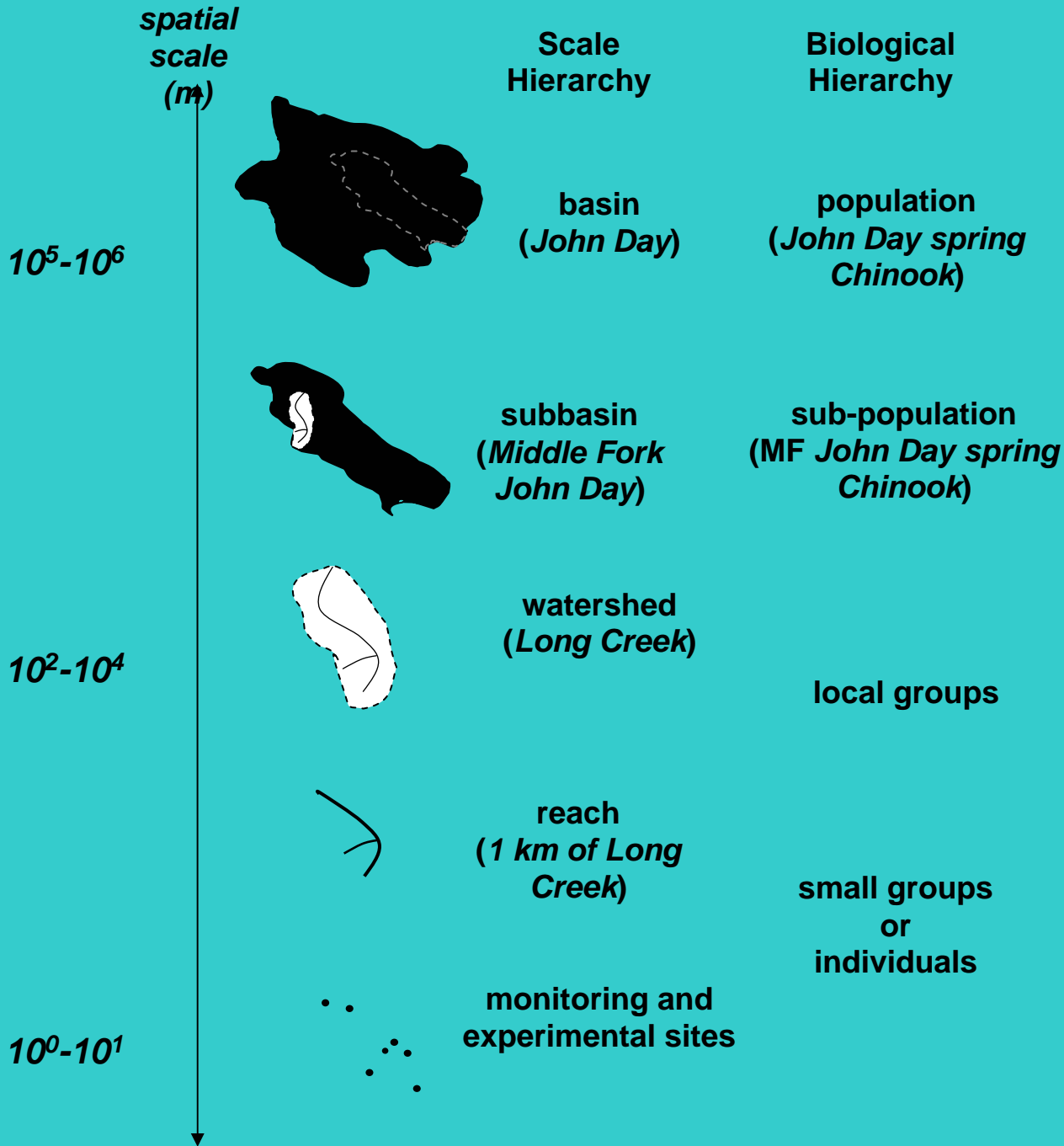
Integrated Status and Effectiveness Monitoring Program

- Test a 'novel' structure for RME programs that integrates across scales and programs
- Test protocols and indicators for information content (relative to ESA fish population processes)
- Test sampling designs for robustness and efficiency
- Test the community of practitioners' willingness to try something different
- Develop tools (data management and analysis) for general distribution

Integrated Status and Effectiveness Monitoring Program: The scale of the project



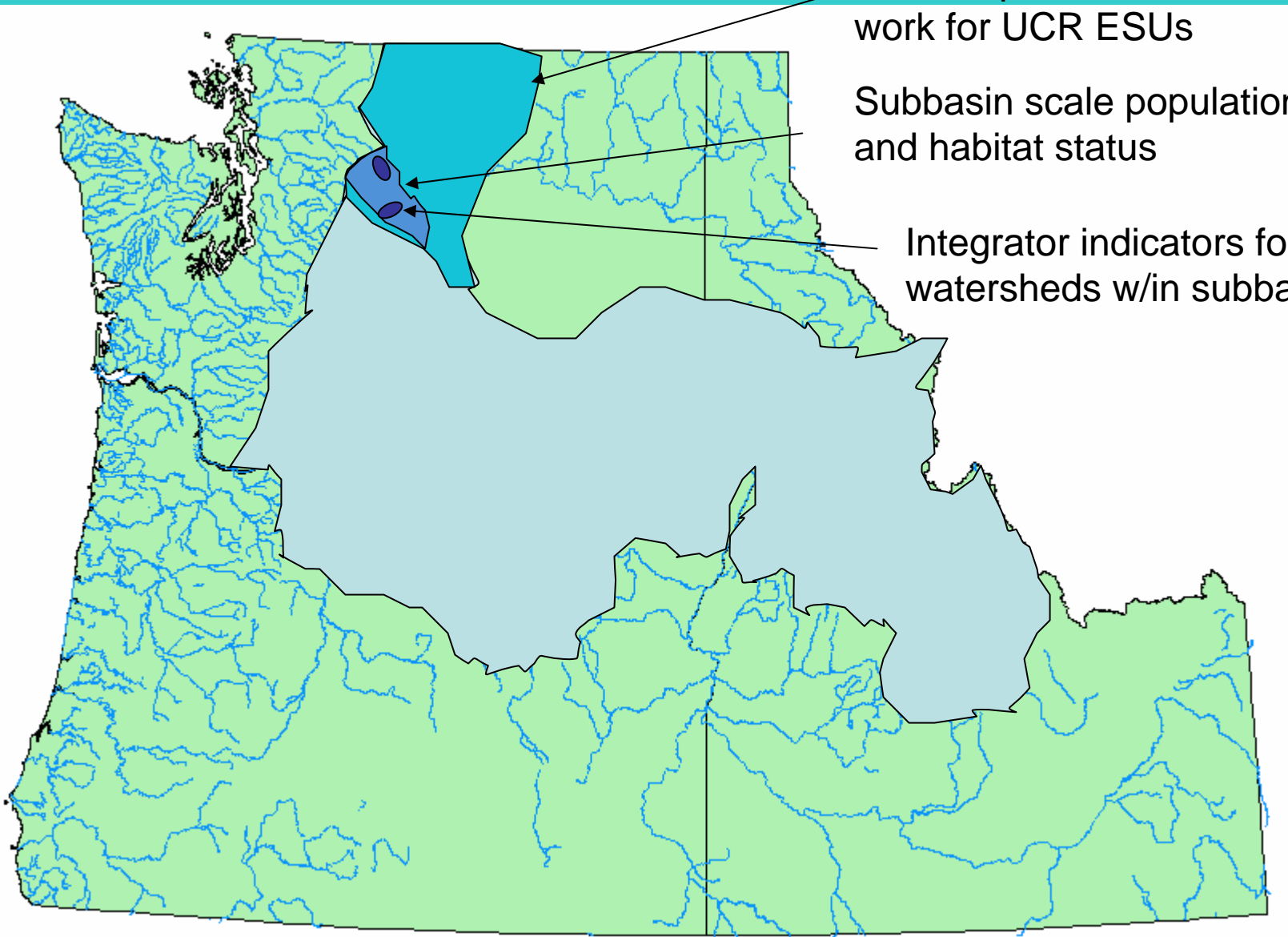
The other scale of the project...



Hierarchical monitoring program for salmonid populations, habitat and restoration actions in the Columbia River Basin

- Landscape classification – basin wide, decade scale
- Probabilistic sampling of reach scale stream habitat condition – annually at major subbasin scale
- Probabilistic sampling of juvenile density and adult spawning – annually at major subbasin scale
- Probabilistic sampling of headwaters streams as intersection between aquatic and terrestrial processes – single sampling episode (2-3 yrs) for each major ecoregion
- Watershed integration measures – continuously for several watersheds within each subbasin
 - Smolt trapping
 - Water quality/chemistry
- Oh yeah, and monitoring for restoration actions too...

***Integrated* Status and Effectiveness Monitoring Program**



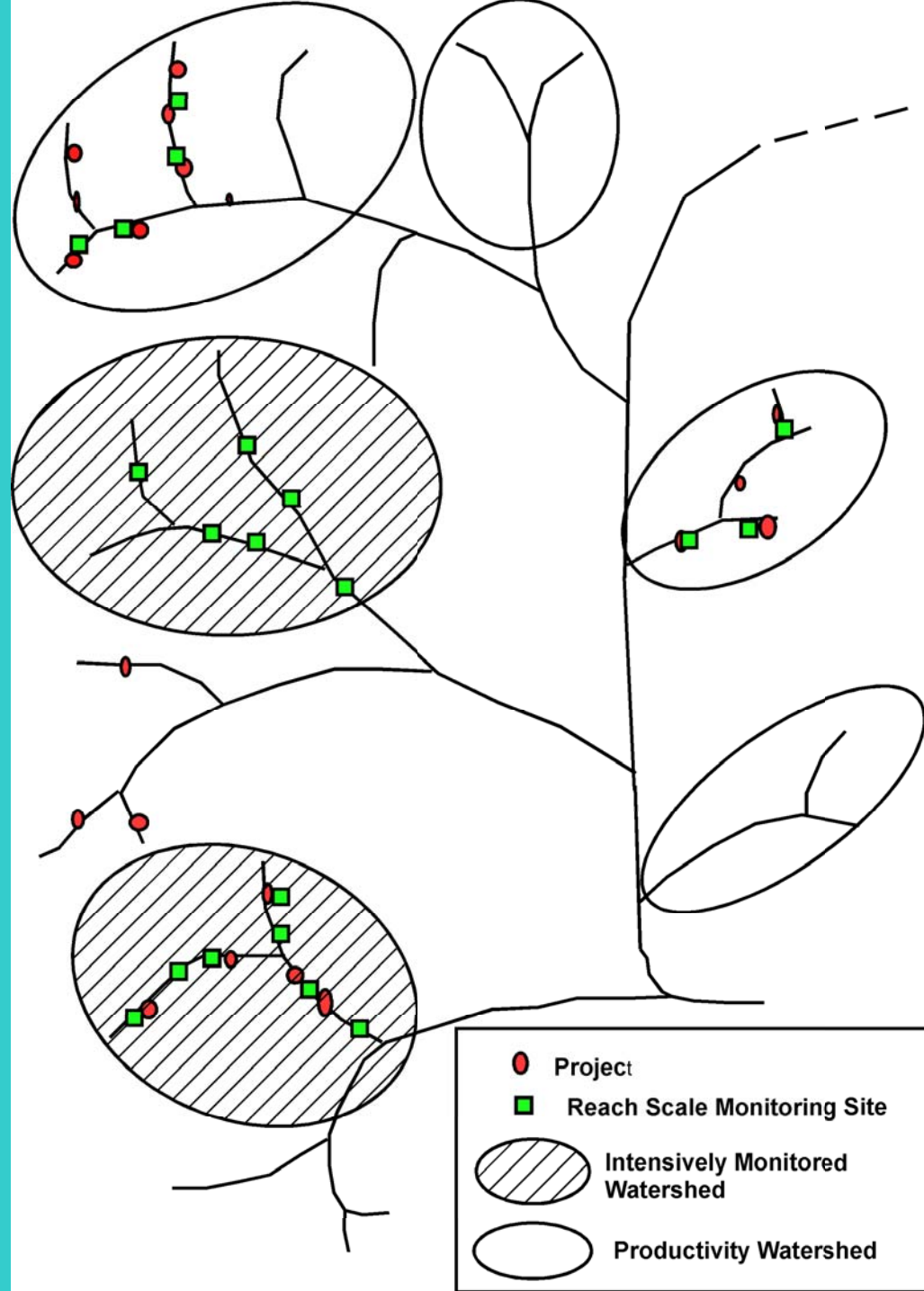
Landscape Classification work for UCR ESUs

Subbasin scale population and habitat status

Integrator indicators for watersheds w/in subbasin

Integrated Status and Effectiveness Monitoring Program

- Linking project scale effectiveness monitoring with status monitoring
- Linking watershed scale effectiveness monitoring with status monitoring



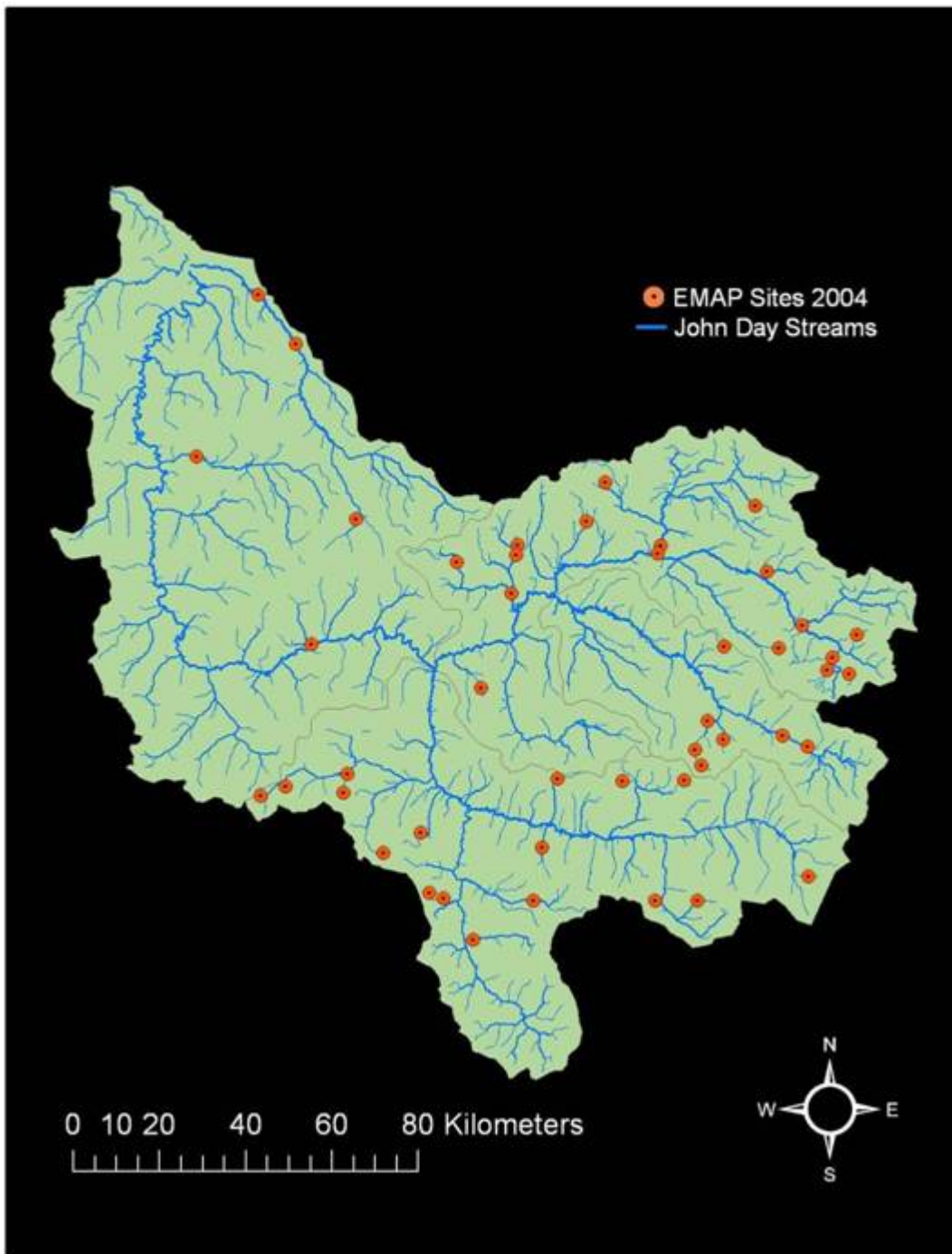
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Classification Components

- Ecological Classification of Upper Columbia ESUs. Developed GIS layers depicting those ecological classification systems in the following categories
 - *Regional Setting Classification*
 - *Drainage Basin Classification*
 - *Road Classification*
 - *Valley Segment Classification*
 - *Strahler Stream Order*
 - *Channel Gradient*
 - *Channel Segment Classification*
 - *Riparian Vegetation Classification*



Status Monitoring:

In 2004, ODFW began a monitoring program in the John Day River basin that mimicked their OCN Coho program:

- EMAP based site selection (50 sites in multiple panels)
- Stream habitat monitoring at each site
- Juvenile abundance estimates at each site
- Adult spawning surveys also based on spatial sampling program

Wenatchee River Basin
~3,200km²

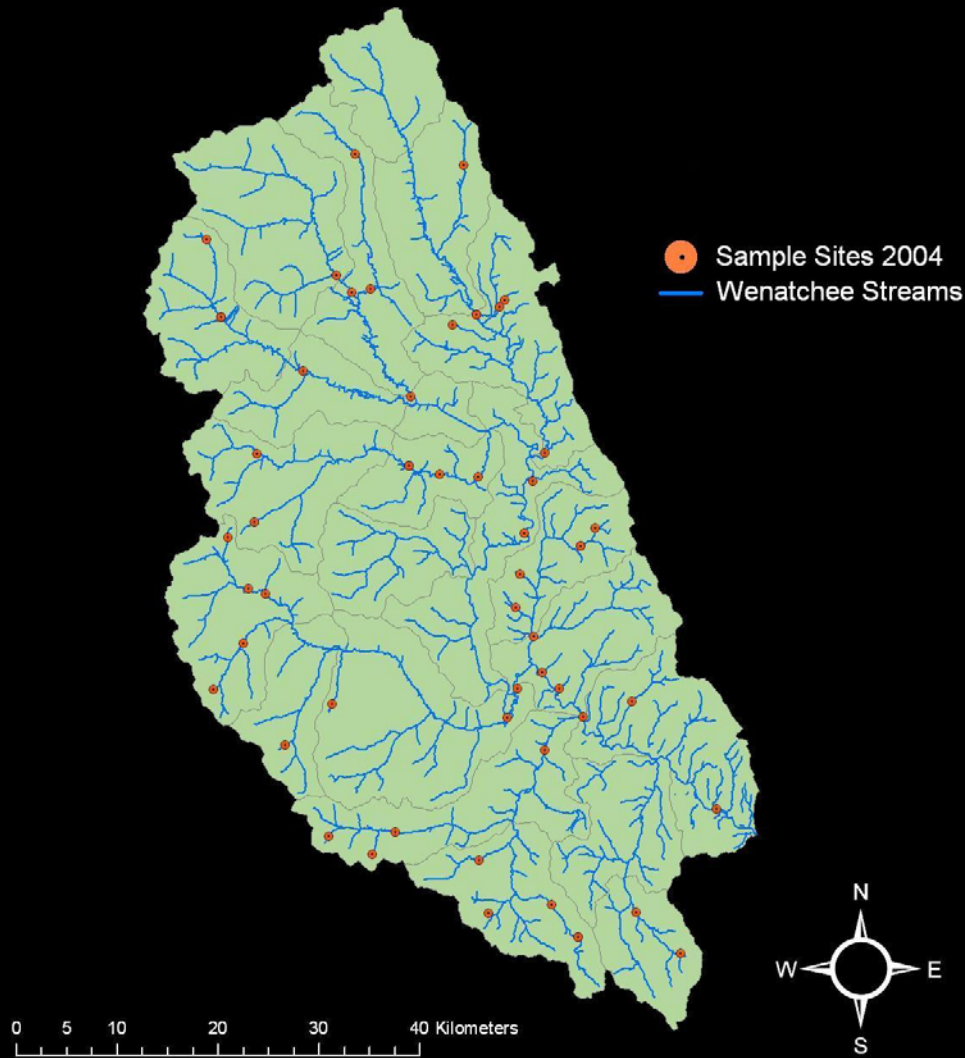
John Day River Basin
~20,000km²

Trying to balance: “copy your neighbor” and “we don’t know what we are doing” we are testing most aspects of the monitoring design process:

- Increasing spatial resolution.
- Duplicating indicators.
- Mixing spatial scales.
- Implementing new habitat quality assessment approaches.
- Testing ongoing data collection approach along side novel sampling trials.
- Performing “side-by-side” indicator and protocol tests for “standard” stream monitoring programs.
- Developing parallel data management and analysis.

In 2004 we began field work:

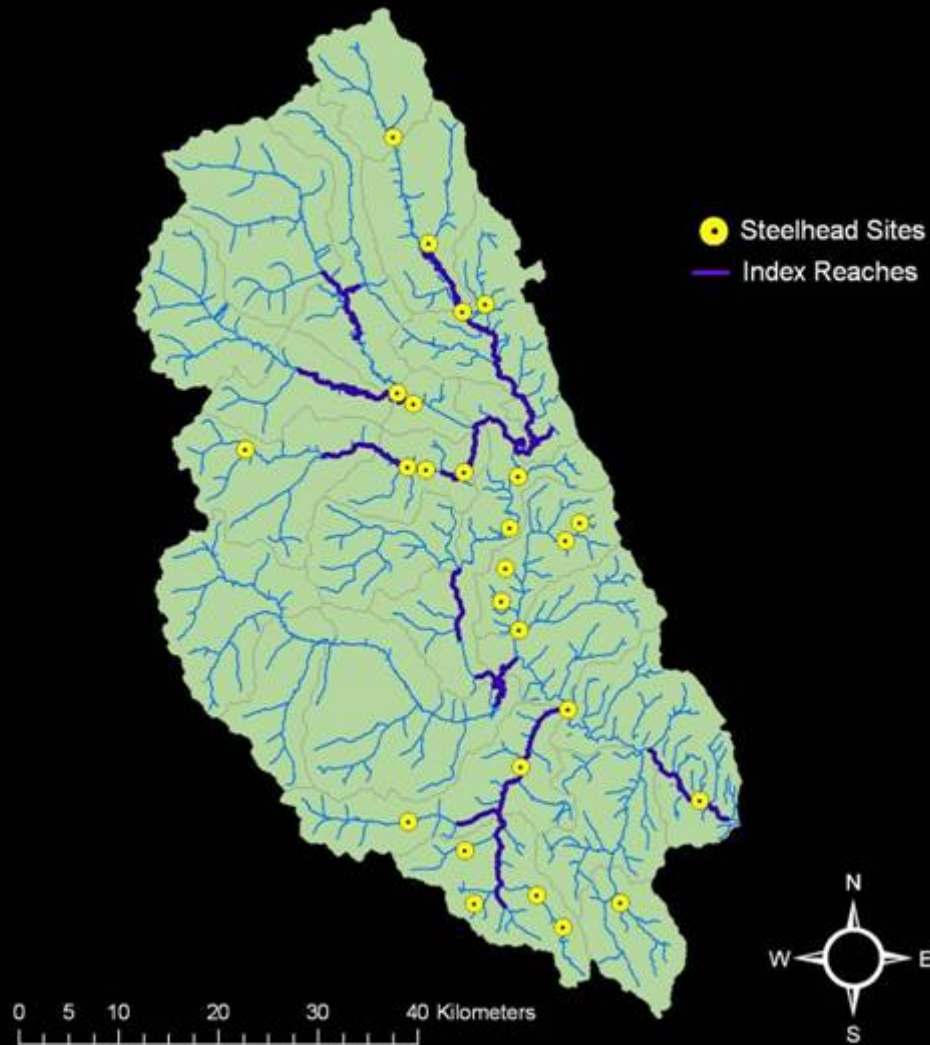
- 50 EMAP sites for physical and biological stream reach habitat metrics (~EMAP indicators) stratified by stream order and gradient
- 50 EMAP sites for snorkel surveys
- 60 headwater streams samples quarterly for organic matter input to fish bearing streams stratified by ecoregion and land use



In 2004 we began field work (cont.):

- 25 miles of Steelhead spawning ground index surveys done weekly.

- 25 EMAP sites for Steelhead spawning surveys outside of index areas sampled monthly.

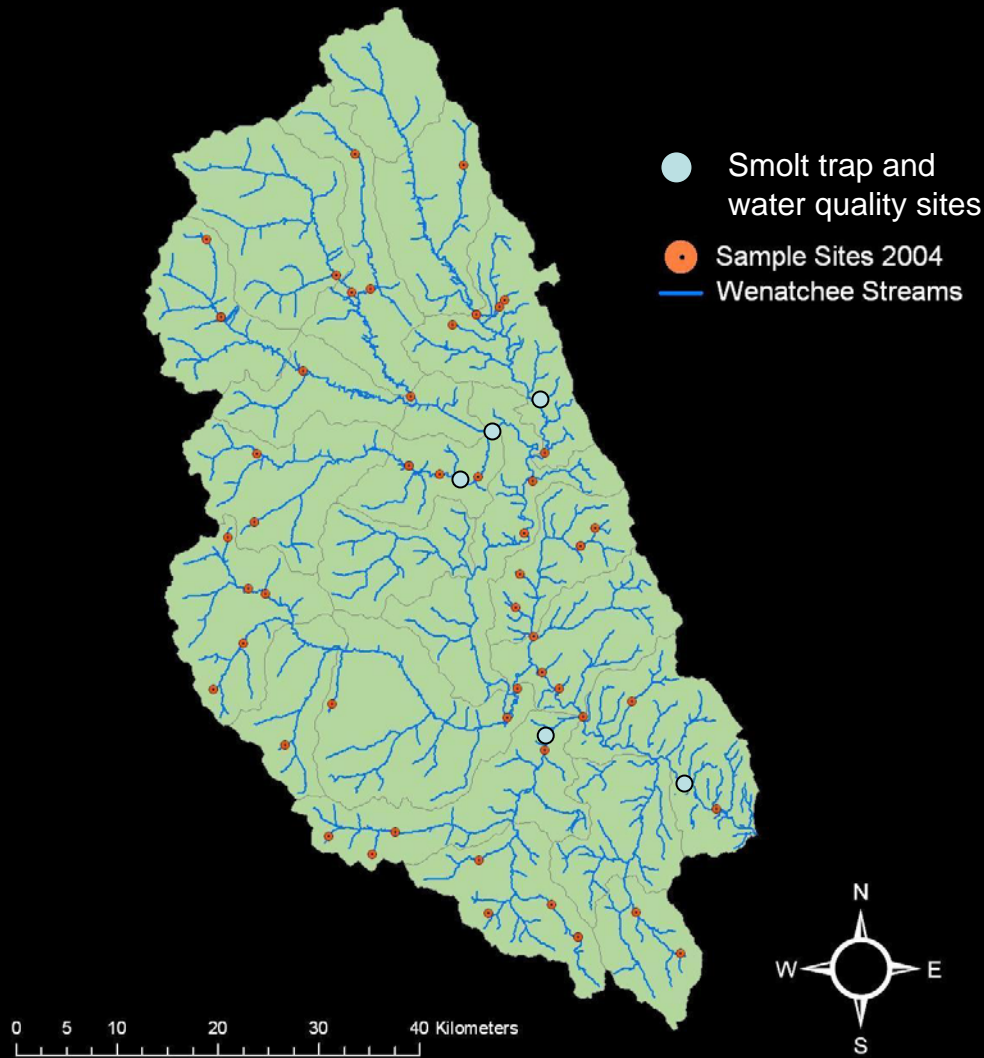


Watershed scale effectiveness monitoring:

Identify 4 watersheds w/in subbasin to develop more detailed integrative picture of habitat/fish relationship for assessment of management actions:

- 5 RSTs run “continuously”
- 5 Hydrolab WQ monitors w/ 5 sensors logging hourly, plus monthly water grabs for chemistry

Supplement these activities with PIT tagging and remote PIT tag detection across basin.



What we have accomplished

- Implemented a hierarchical monitoring program that nests watershed-scale effectiveness monitoring w/in status monitoring w/in a regional context or setting.
- Developed collaborative approach where multiple stakeholders and co-managers are key partners.
- Developed an experimental environment to test the design and implementation of large-scale monitoring programs.

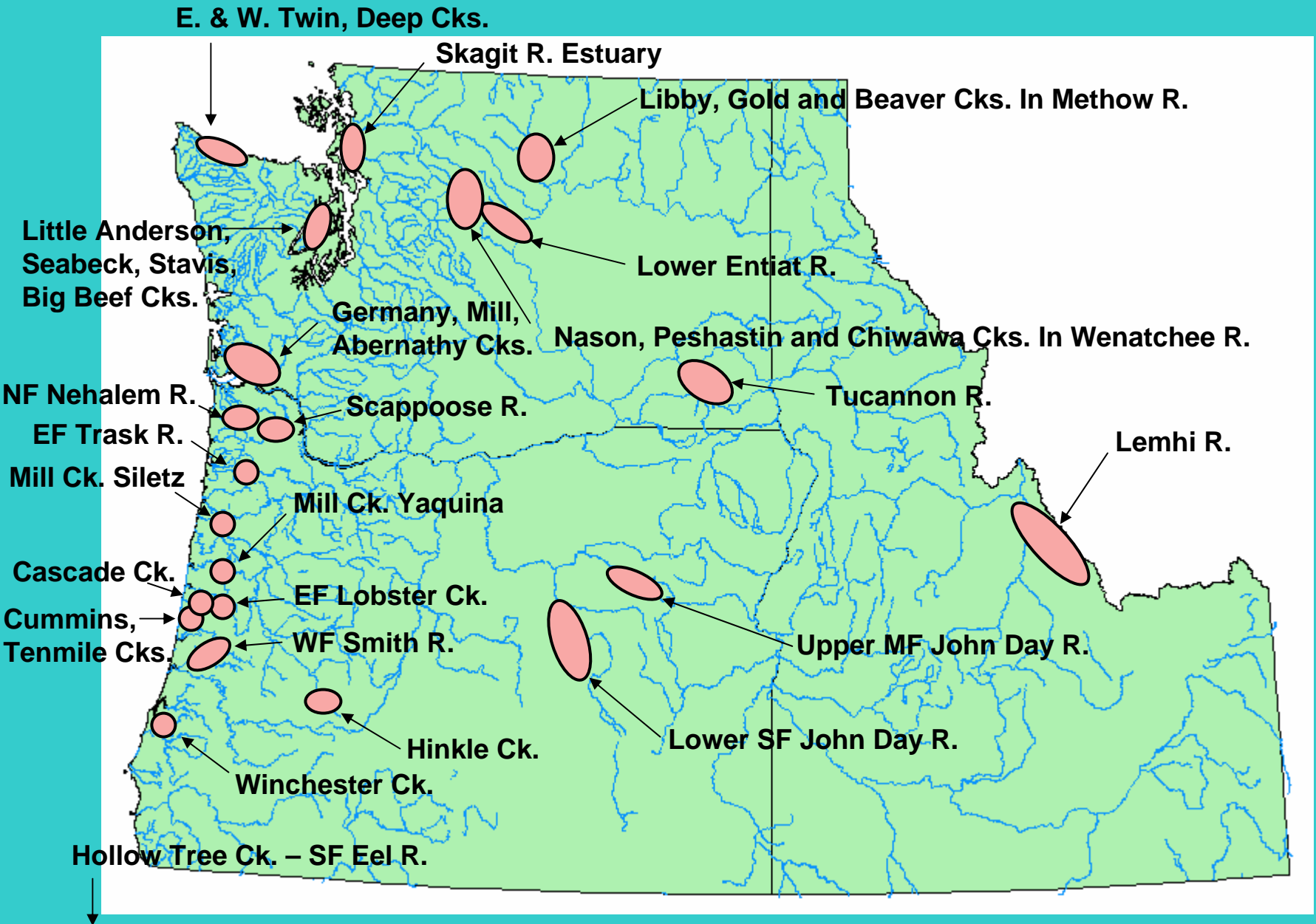
So what was so hard about that?

- Coordination, coordination, coordination.
- Even with expansion from UCR to Oregon Plateau and Snake River, it still is only a “pilot” project.
- It is still just (?just?) a monitoring project -- the monitoring world is disconnected from the restoration planning world. This is the major failing of the way the region is planning for salmon recovery -- too compartmentalized.

What next?

- Continue expansion of pilot project and testing of monitoring design process.
- Further partner with the Intensively Monitored Watershed movement.
- Try to convince funding, regulatory, management units that monitoring won't solve any problems -- it's "just" data collection.
- Try to implement watershed scale management "experiments" w/in the monitoring program.

There is a developing network of Intensively Monitored Watersheds



ISEMP Pilot Projects Progress

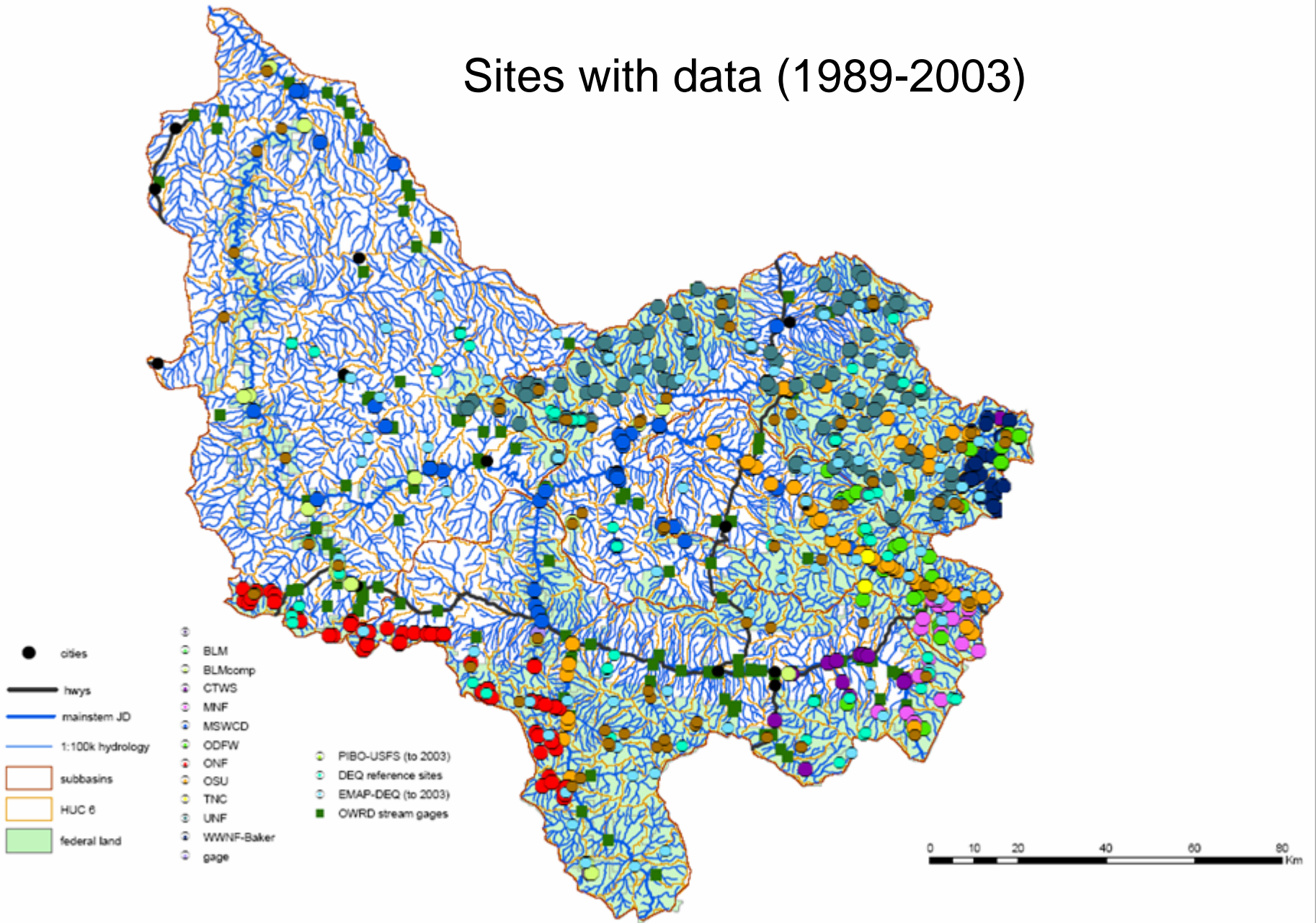
FY04-06

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Temporal Variability in Snorkel Surveys – one of many examples of monitoring indicator/protocol tests w/in Wenatchee data collection.

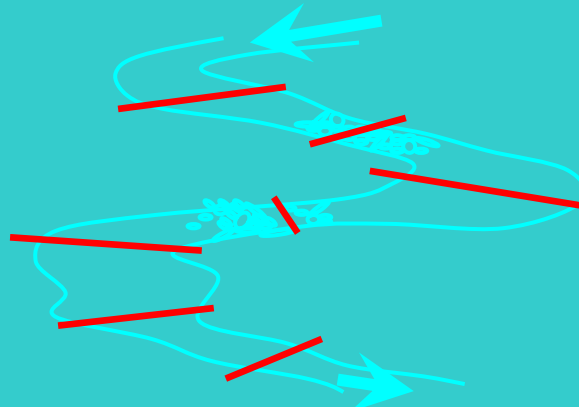
- Daytime versus Nighttime (50 sites sampled night and day)
- Daily Variability (3 sites sampled on 24 hour interval)
- Weekly Variability (3 sites sampled on 7 day interval)
- Monthly Variability (3 sites sampled on 4 week interval)

Sites with data (1989-2003)



Physical Habitat Monitoring Protocol Comparison

- ◇ compare protocols from 9 different programs – PIBO, AREMP, EMAP/EPA, ODFW, WDE, CDFG, R6, Wenatchee....
- ◇ make comparisons at 12 reaches – 4 step-pool, 4 pool-riffle, 4 planebed complexes
- ◇ LiDAR taken at all 12 sites
- ◇ compare to intensive survey, i.e. “truth”

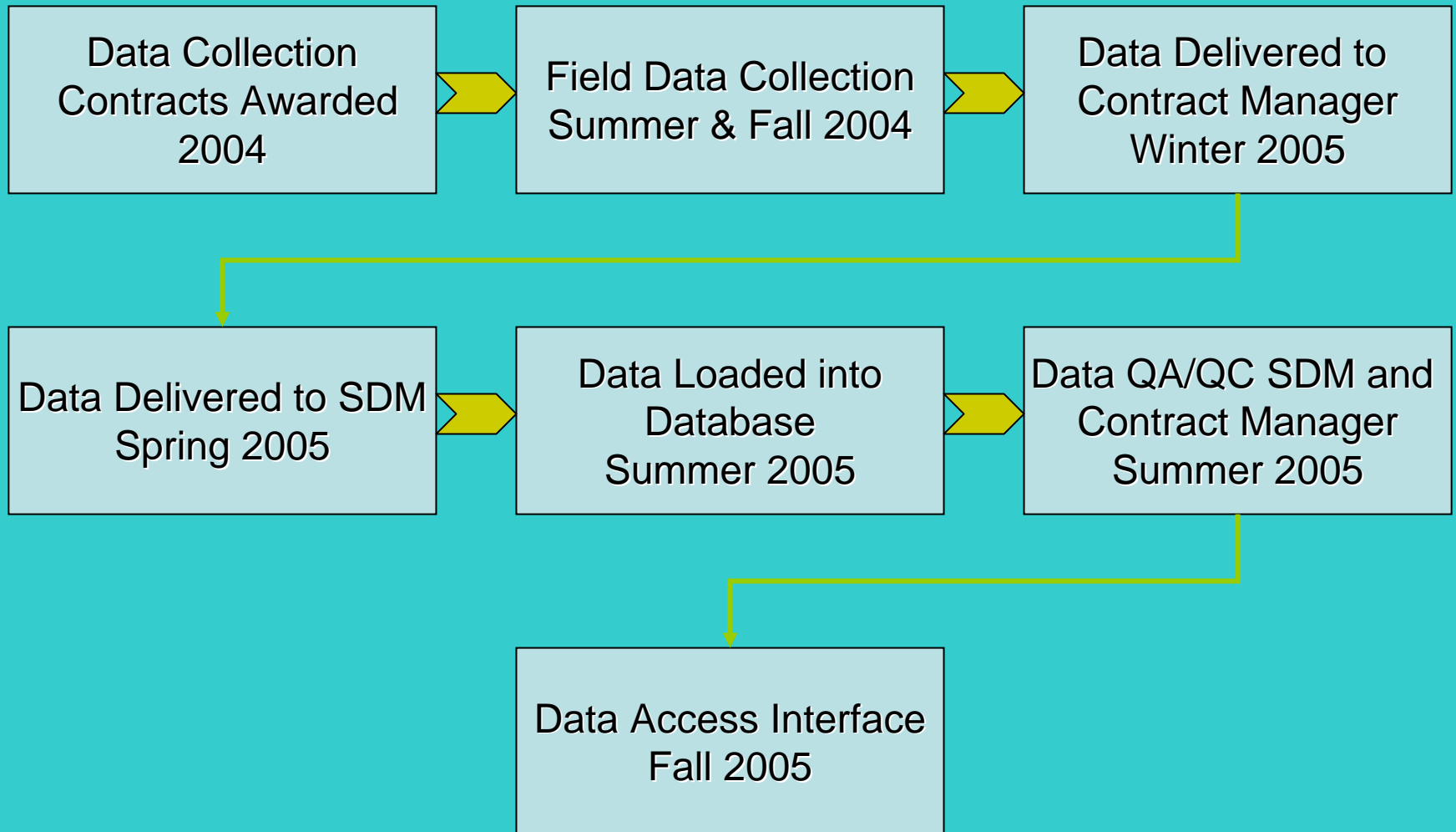


ISEMP Pilot Projects Progress FY04-06

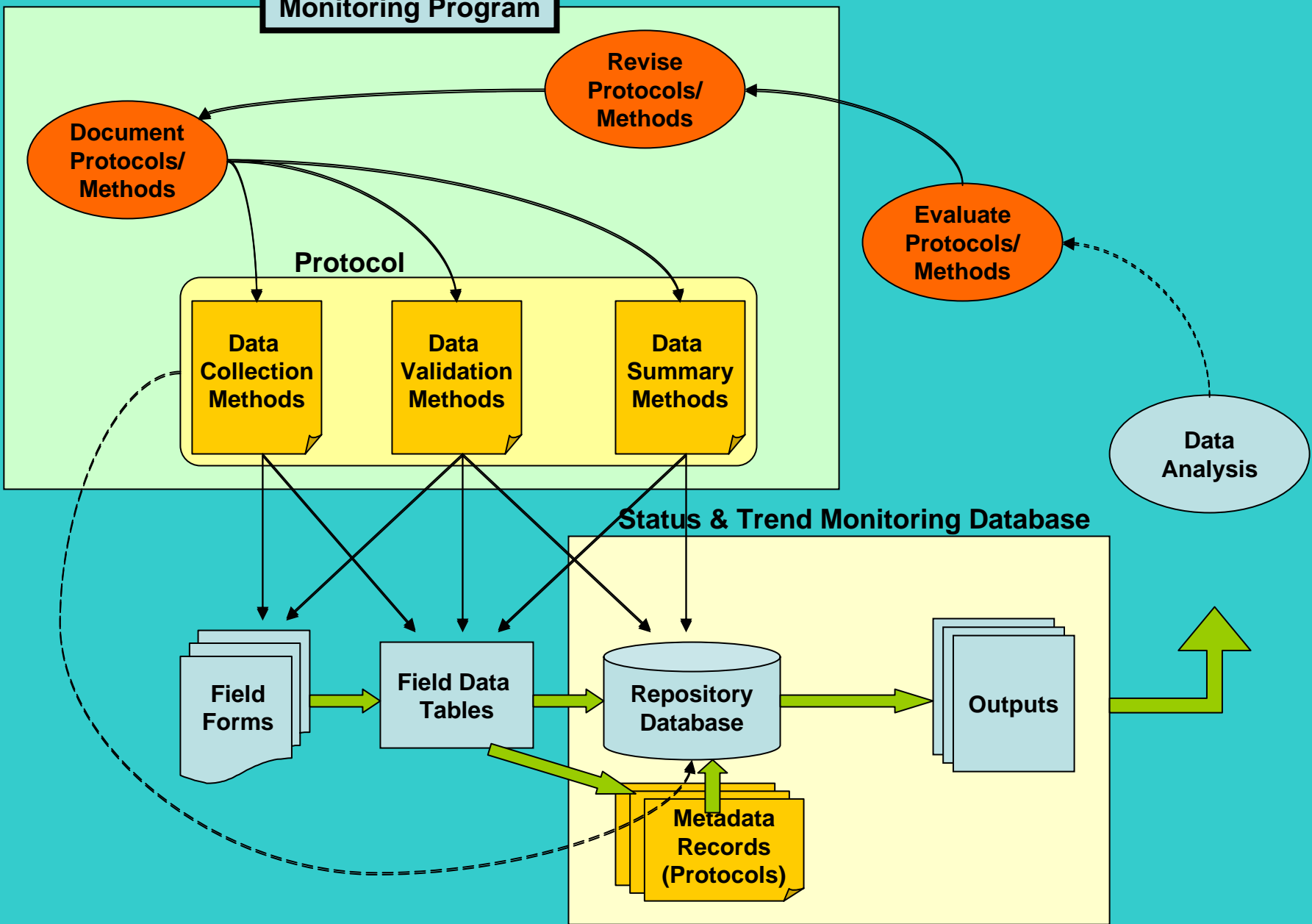
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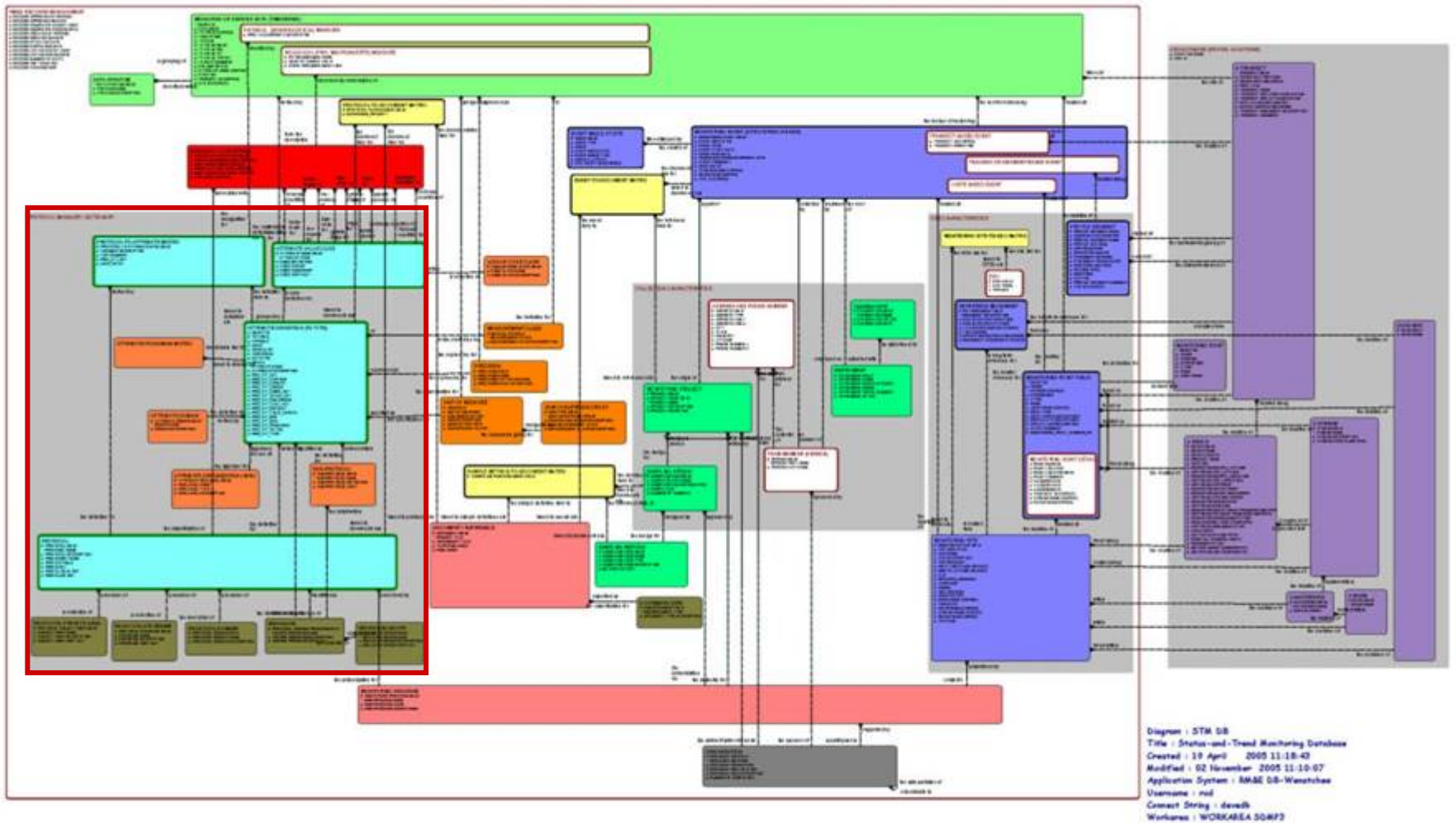
Data Flow



Protocol Manager



Inside the Database



Wenatchee Data Received

Habitat Quality (50 Sites)

Extracted into STM Database

50 Survey Sites (includes Thalweg Profiles)	WADOE Glenn Merritt	MS Access database	55 Reference Monuments 56 X-Sites 57 Reaches	556 Transects 6050 Profile Segments 14660 Events 95287 Observations
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Smolt Traps

2 Survey Sites	USFWS & Scott Prevatte	Excel spreadsheets	Uses 2 X-Sites	424 Events 22471 Observations
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Macroinvertebrates

47 Survey Sites	Rhithron Assoc.	Excel spreadsheets	Uses 47 X-Sites	52 Events 2200 Observations
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Water Quality

5 Survey Sites	Mike Rickel	Excel spreadsheets	Uses 5 X-Sites	26399 Events 104685 Observations
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Steelhead Redds

26 Survey Sites	Mike Ward	Excel spreadsheets	Uses 26 X-Sites	26 Events 104 Observations
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Total Observations = 224,747

Tying It Together



OBJECT ID	REVERSED	UNREVERSED
1	1	2
2	1	4
3	1	16
4	1	20
5	1	31
6	3	7
7	3	4
8	3	16
9	3	20
10	3	31
11	4	31
12	4	7
13	6	5
14	6	43
15	6	44
16	6	46
17	6	48
18	6	13
19	11	14
20	11	9
21	12	11
22	12	13
23	12	14
24	12	32
25	12	32



Status & Trend Monitoring Database

Wenatchee Pilot

Home | Map | Water | Fish | Habitat
Welcome Joe Developer [Logout](#)

Add Site
 Add Sites Upstream

Data Cart -- You have selected

Sites: WC503432-016, WC503432-151, WC503432-158, WC503432-166, WC503432-169, WC503432-002, WC503432-014, WC503432-039, WC503432-159, WC503432-032, WC503432-047, WC503432-153, WC503432-175

Water: temperature, conductivity, turbidity

Fish: age, size, species

Habitat: length, area, depth



Status & Trend Monitoring Database

Wenatchee Pilot

[Home](#) | [Map](#) | [Water](#) | [Fish](#) | [Habitat](#)

Start Date **daily dis oxy : Sat Jan 01 00:00:00 PST 2005 - Fri Jul 01 00:00:00 PDT 2005**

2005

Available Su

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Min	Max	StdDev	Mean	Count	Date	Site ID
10.49	10.89	0.11030589877403577	10.7075	24	2005-01-01 00:00:00.0	WC503432-175
10.68	10.96	0.07737425516487277	10.829583	24	2005-01-02 00:00:00.0	WC503432-175
10.92	11.3	0.12628398523778156	11.107917	24	2005-01-03 00:00:00.0	WC503432-175
11.19	11.49	0.09606666616379526	11.36125	24	2005-01-04 00:00:00.0	WC503432-175
11.36	11.56	0.0521685534686797	11.452084	24	2005-01-05 00:00:00.0	WC503432-175
11.21	11.4	0.04933617304792187	11.334167	24	2005-01-06 00:00:00.0	WC503432-175

um,

PROTOCOL_NAME	PROTOCOL_DESCRIPTION	ATTRIBUTE_NAME	DESCRIPTION	UNITS	CAPTION	DATA_COLLECTION_PROJECT	COLLECTED_BY
WQ-Conductivity	Water Quality - Conductivity - Based on Upper Columbia RME - Auth. Tracy W. Hillman	SampleConductivity		mhos/cm	Sample Conductivity	Upper Columbia Wenatchee Sub-Basin STM	Mike Rickel
WQ-DO	Water Quality - DO (dissolved oxygen) - Based on Upper Columbia RME - Auth. Tracy W. Hillman	DO	amount of dissolved oxygen (DO Saturation)	ppm (parts per million) or mg/l (milligrams/liter)	DO	Upper Columbia Wenatchee Sub-Basin STM	Mike Rickel
WQ-DO	Water Quality - DO (dissolved oxygen) - Based on Upper Columbia RME - Auth. Tracy W. Hillman	DO100%Saturation	saturation point at certain temperatures - values according to table	Percent xx.%	DO 100% Saturation	Upper Columbia Wenatchee Sub-Basin STM	Mike Rickel
WQ-pH	Water Quality - pH - Based on Upper Columbia RME - Auth. Tracy W. Hillman	Temperature	Recorded Temperature level	Decimal Degrees C	Temperature	Upper Columbia Wenatchee Sub-Basin STM	Mike Rickel
WQ-pH	Water Quality - pH - Based on Upper Columbia RME - Auth. Tracy W. Hillman	pHLevel	ph level of water	pH Level	pH Level	Upper Columbia Wenatchee Sub-Basin STM	Mike Rickel
Wenatchee Water Quality	Attributes submitted in the Wenatchee Water Quality data files from Mike Rickel 2004	Run_in_Meters	Distance (meters) along which slope and bearing was measured.	Meters		Upper Columbia Wenatchee Sub-Basin STM	Mike Rickel
Wenatchee Water Quality	Attributes submitted in the Wenatchee Water Quality data files from Mike Rickel 2004	Turbidity-SC	Turbidity of the stream/reach			Upper Columbia Wenatchee Sub-Basin STM	Mike Rickel

11.11	11.46	0.07771067671409328	11.287084	24	2005-01-17 00:00:00.0	WC503432-175
11.09	15.47	1.2336454021560934	12.74875	24	2005-01-18 00:00:00.0	WC503432-175
12.68	18.29	1.0919186013087505	13.345834	24	2005-01-19 00:00:00.0	WC503432-175
12.23	12.95	0.2248139327262127	12.5325	24	2005-01-20 00:00:00.0	WC503432-175
12.22	12.43	0.05985338366568664	12.327917	24	2005-01-21 00:00:00.0	WC503432-175

Habitat Queries

- Channel Morphology
- Stream Profile
- Substrate Size
- Substrate Composition
- Fish Cover
- Large Woody Debris
- Canopy Cover
- Riparian Vegetation
- Human Disturbance

Status & Trend Monitoring Database

Wenatchee Pilot



[Logout](#)

[Logout](#)

RME-Status and Trend

COWENJE

COWENJE

Common Query Parameters

Habitat Data

Water Quality

Fish Cover Metrics Query Result

sample_year	site_id	transect_id	Algae Mean	Macrophytes Mean	Live Tree Roots Mean	OverhangVeg Mean	Boulder Mean
2004	WC503432-001	D	0	35	5	5	0
2004	WC503432-001	H	0	35	5	5	0
2004	WC503432-001	J	0	35	0	0	0
2004	WC503432-002	E	0	35	0	5	0
2004	WC503432-002	F	0	35	5	0	0
2004	WC503432-006	A	0	35	5	5	0
2004	WC503432-006	B	0	35	5	5	0
2004	WC503432-006	C	0	35	0	5	0
2004	WC503432-006	D	0	35	0	5	0
2004	WC503432-006	E	0	35	5	5	0
2004	WC503432-006	F	0	35	5	5	0
2004	WC503432-006	G	0	35	0	5	0
2004	WC503432-006	H	0	35	5	0	0
2004	WC503432-006	I	0	35	5	5	0
2004	WC503432-006	J	0	35	0	5	0
2004	WC503432-006	K	0	35	0	5	0

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mediate

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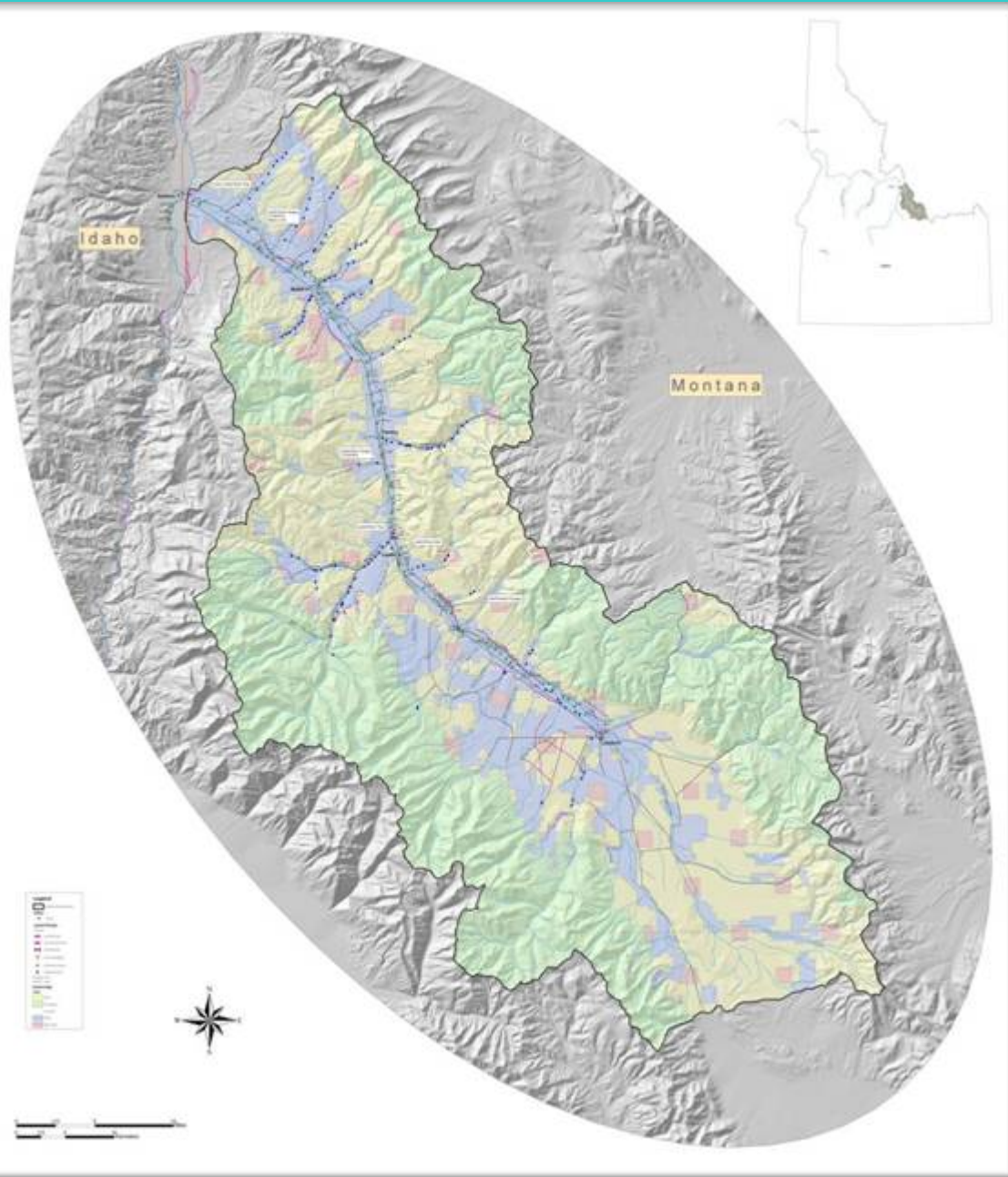
Data Cart

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 - **Data analysis expansion and standardization**
 - **Restoration projects as experiments**

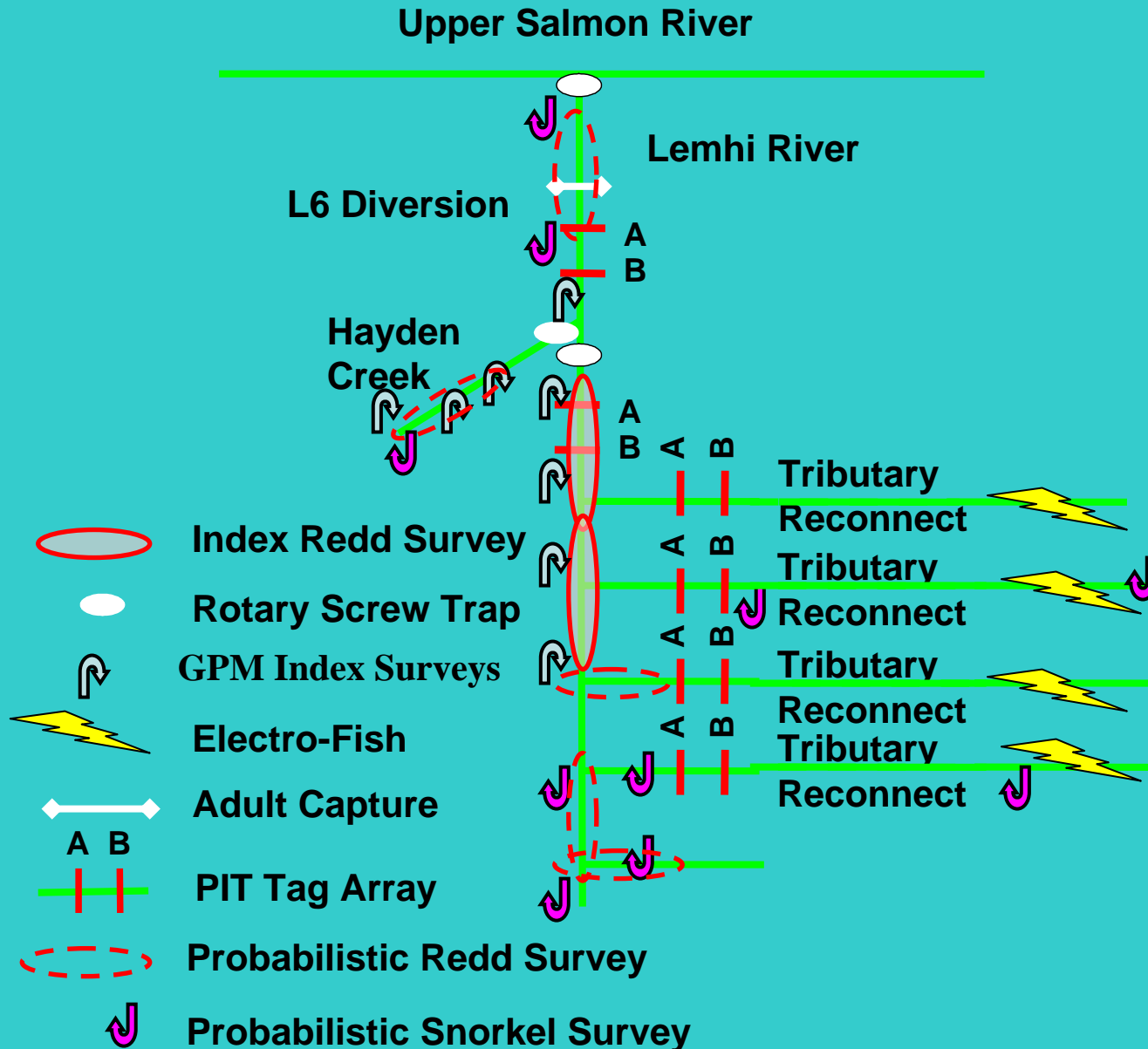
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Lemhi River Effectiveness Monitoring Pilot



- Lemhi HCP
- Hydrograph normalization
- Tributary reconnection
- Need to monitoring overall program for “effectiveness”

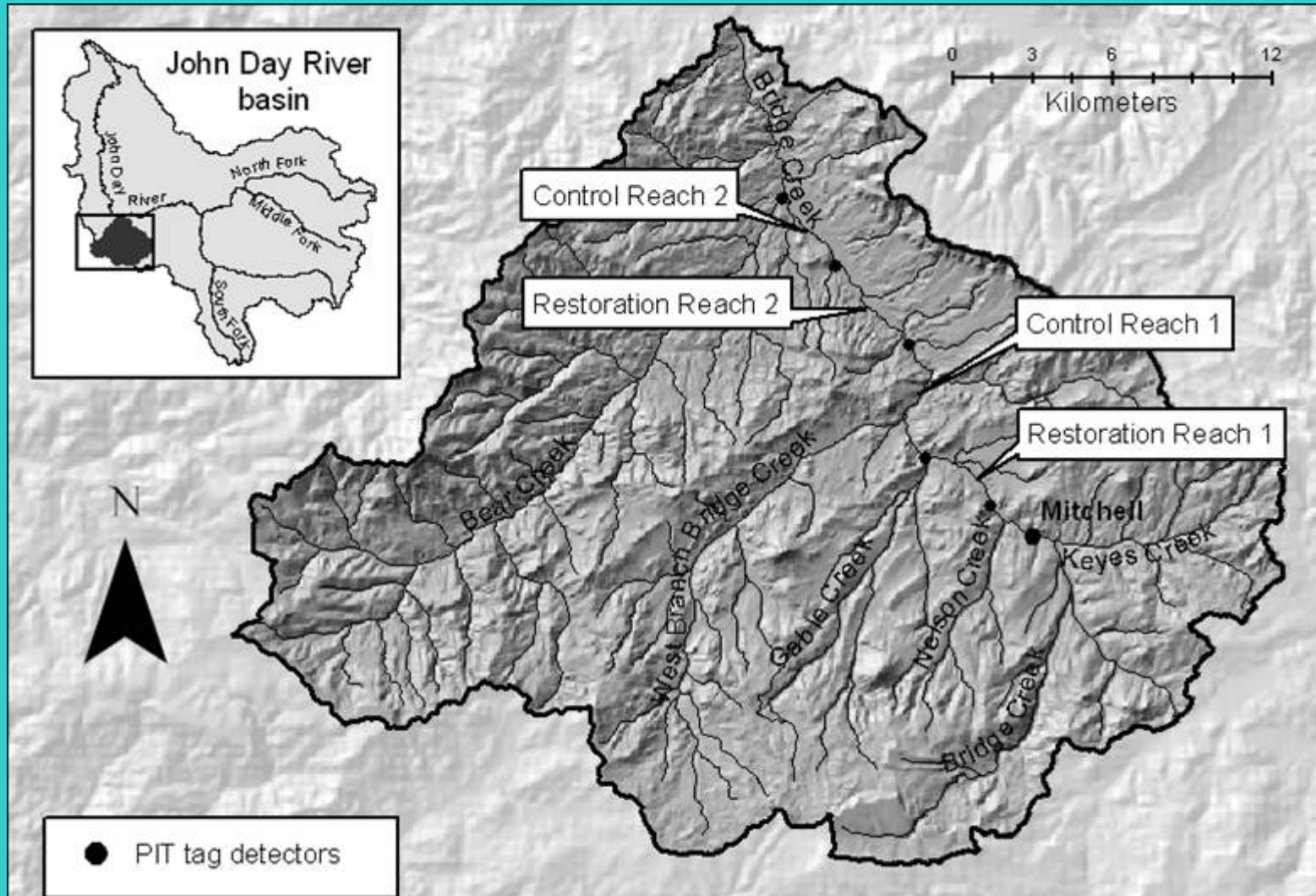
Lemhi River Effectiveness Monitoring Pilot



Entiat River Effectiveness Monitoring Pilot

- Lower 25 rm is simplified plane-bed channel
- On-going, proposed and potential in-stream restoration projects
 - 3 treatment sites
 - 3 pre-existing treatment sites
 - 3 untreated control sites
- Snorkel, habitat surveys, other on-going monitoring

Bridge Ck (JDB) Effectiveness Monitoring Pilot



Bridge Ck (JDB) Effectiveness Monitoring Pilot

