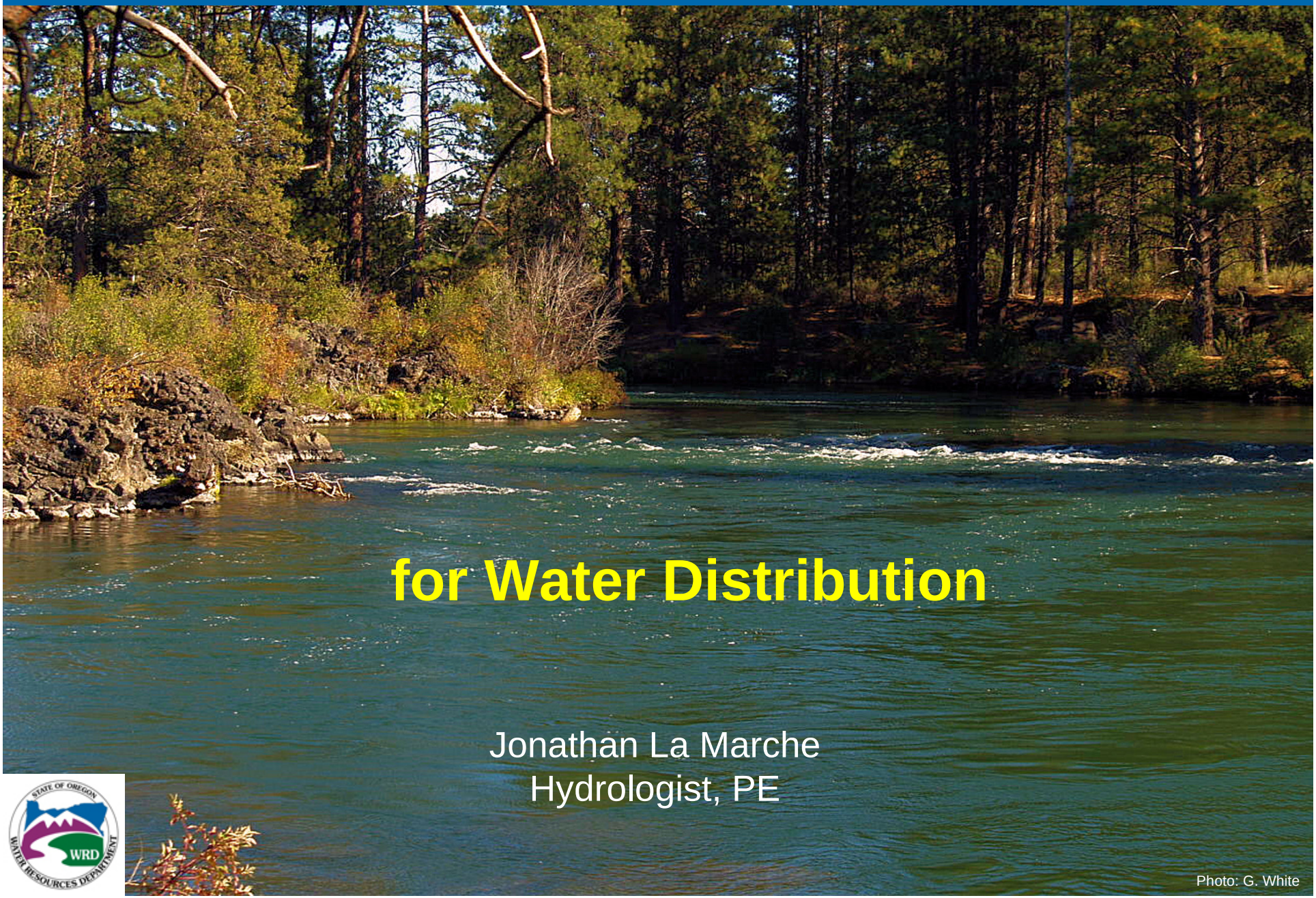
OWRD Stream Gaging Network Evaluation



for Water Distribution

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Hydrologist, PE

Photo: G. White

Overall Gage Network Evaluation Project Review

What?

Evaluation of the OWRD (and related) stream gaging network as it pertains to the defined agency goals.

Why?

- Oregon specific gage network was last formally evaluated by USGS in 1970 (no management component).

- Changes to water science and management related needs have occurred since last formal Oregon evaluation.

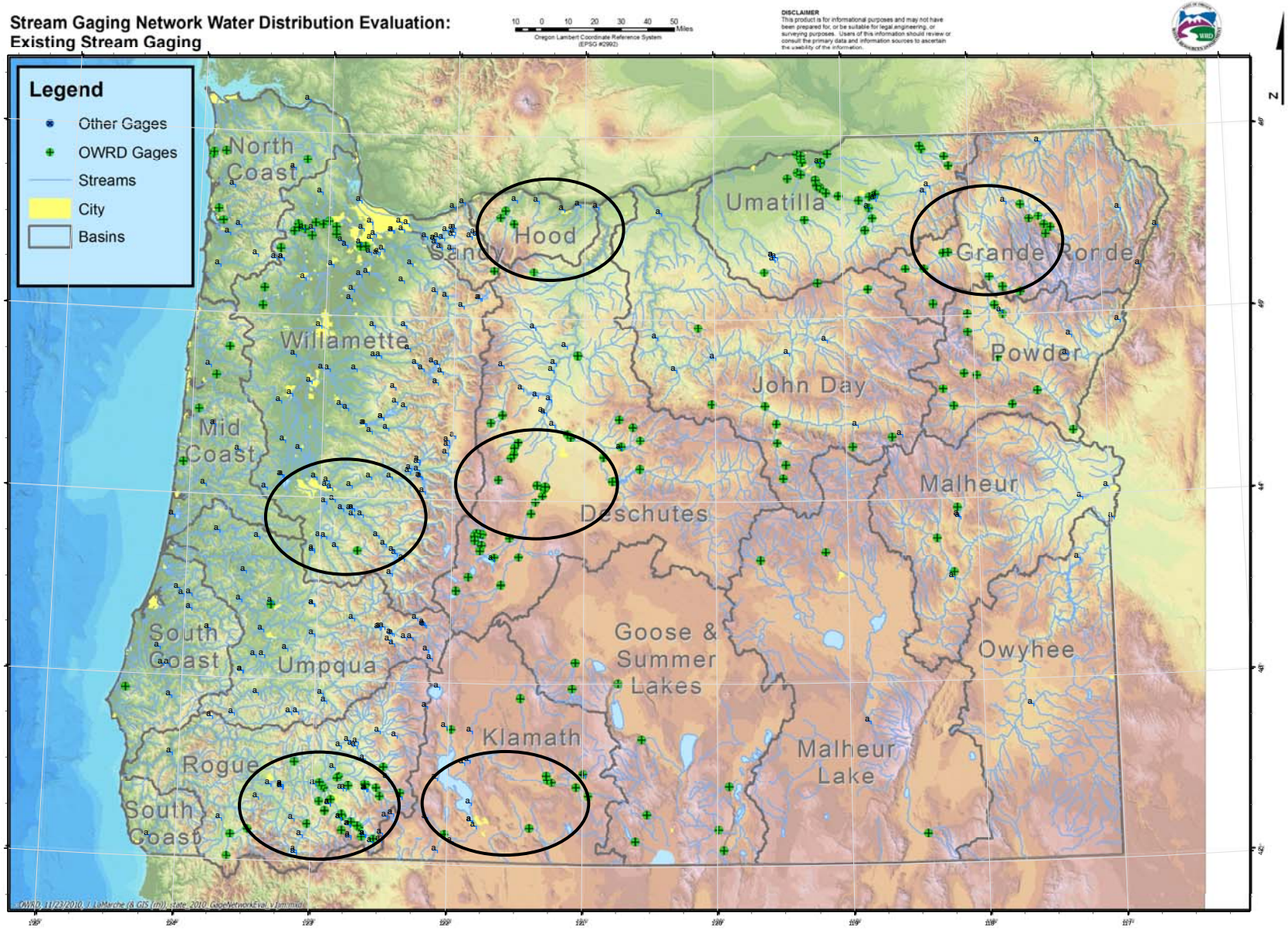
- Does current gaging network meet OWRD goals?

- Find optimum network given constraints.

Overall Project Review

OWRD operates gages for two primary purposes

- Science
  - multiple agency goals
- Water Management
  - multiple agency goals
    - Water Distribution and Regulation


Stream Gaging Network Water Distribution Evaluation:
Existing Stream Gaging
10 0 10 20 30 40 50 Miles
Oregon Lambert Coordinate Reference System (EPSG #2992)
DISCLAIMER
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Legend
Other Gages
OWRD Gages
Streams
City
Basins
North Coast
Hood
Sandy
Umatilla
Grande Ronde
Willamette
Powder
John Day
Mid Coast
Deschutes
Malheur
South Coast
Umpqua
Goose & Summer Lakes
Owyhee
Klamath
Malheur Lake
Rogue
South Coast
N

Gage network evolution*

*related to water distribution needs

Inherited regulation and monitoring scheme:

- **Complaint Driven**

  High Competition >> Increased Monitoring

- **Resource constrained**

  Cooperator Funding >> Increased Monitoring

- **Beneficial Use**

  Put all waters to beneficial use. no ISWRs

- **GW/SW interactions**

  Generally not considered. Unknown interactions or unknown implications for water distribution.

Gage network evolution*

*related to water distribution needs

Current regulation and monitoring pressures:

- **ISWRs**
  (including IS_XFR common in Salmonid streams)
- **Increased water right complexity.**
  (e.g., permit conditions commonly related to limited supply)
- **GW/SW interactions.**
  (e.g., water management implications)
- **Increasing demand**
  (e.g., population pressures or climate change)
- **Increasing supply pressures**
  (e.g., ASR)

Gage network evolution*

*related to water distribution needs

Result of current monitoring pressures:

More real time monitoring needs for effective water distribution in the face of growing demand and finite supply.

Current gage network heterogeneity due to:

Fish, Flows, and Funds: FFF(*w*)

Explains most of variation in gage network for water distribution.

Fish:

Salmonids? Typically related to IS_XFR activity and outside interests in flow/diversions.

Flows:

Supply relative to demand.

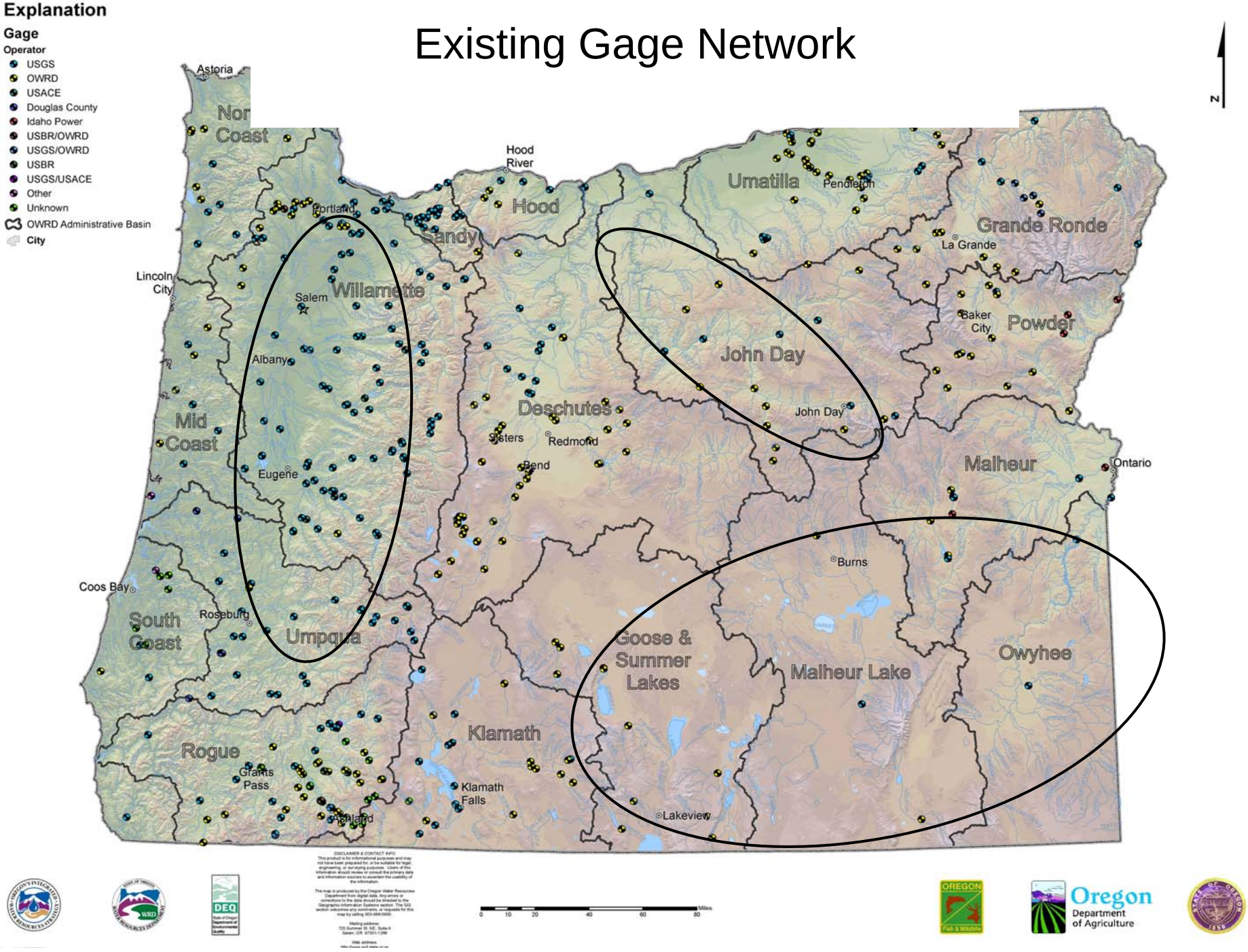
Funds:

Cooperators enhance monitoring.

Watermaster:

Inherited gages and sets local monitoring priorities.

Existing Gage Network



Evaluating the network

This presentation covers OWRD gaging needs for water distribution only.

- All active gages (OWRD and non-OWRD).
- Monitoring alternatives to gaging.
- Gaging needs for water distribution related to
  - ISWRs and IS_XFRs
  - Diversions on high regulation streams
  - Watersheds where CU > NF
  - Large diversions and storage
  - GW/SW interactions

Photo: Gary White

Methods

Qualitative criteria: survey and interview based on:

- OWRD databases
- Areas of known or suspected GW/SW interactions.
- Field and technical staff knowledge, experience and analysis.
- Gaging needs considered without resource constraints.
- Monitoring alternatives to gaging also considered.

Photo: J. La Marche

Stream Gaging Network Evaluation: Expected High Management Areas

10 0 10 20 30 40 50 Miles

Oregon Lambert Coordinate Reference System (EPSG #2992)

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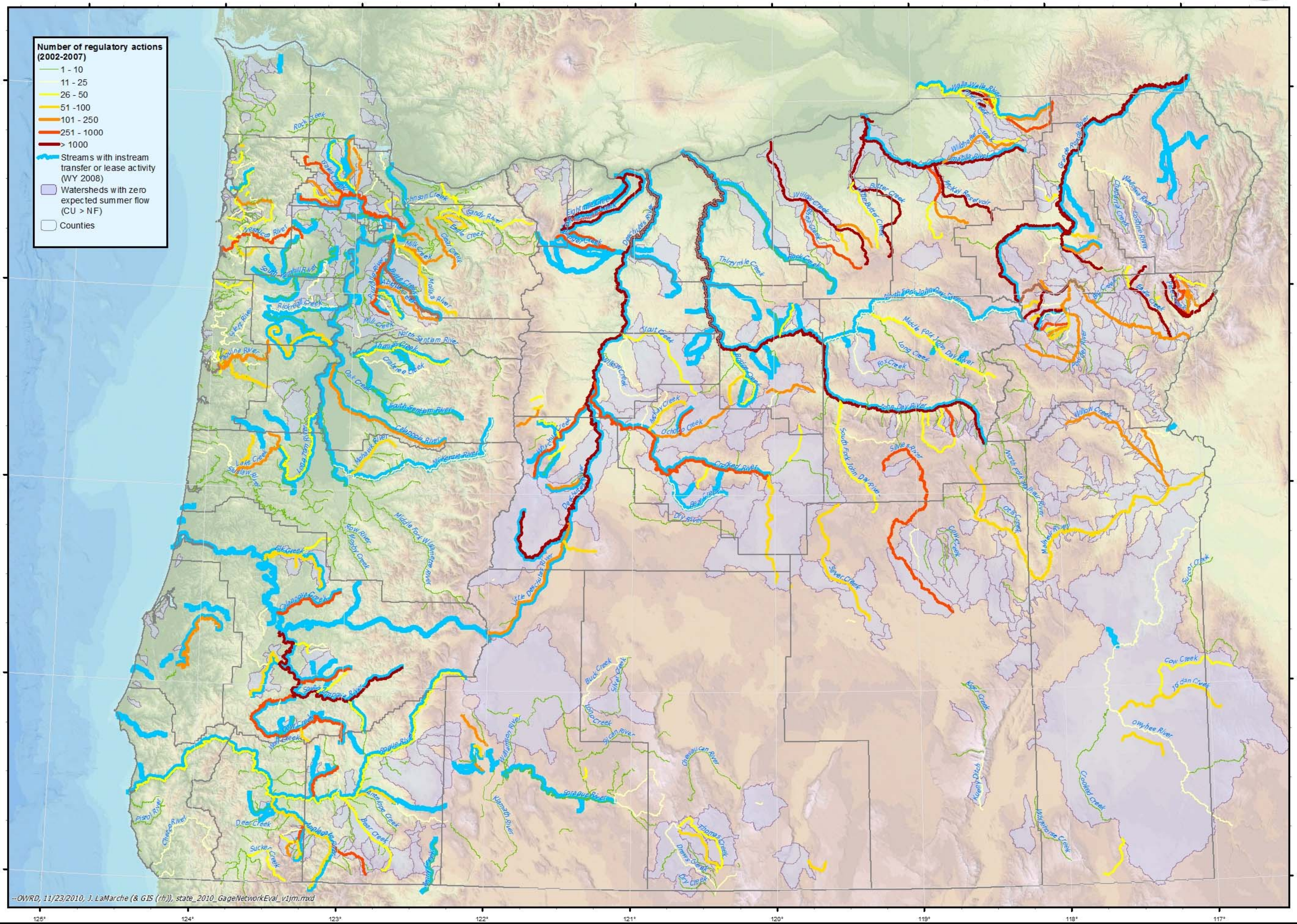
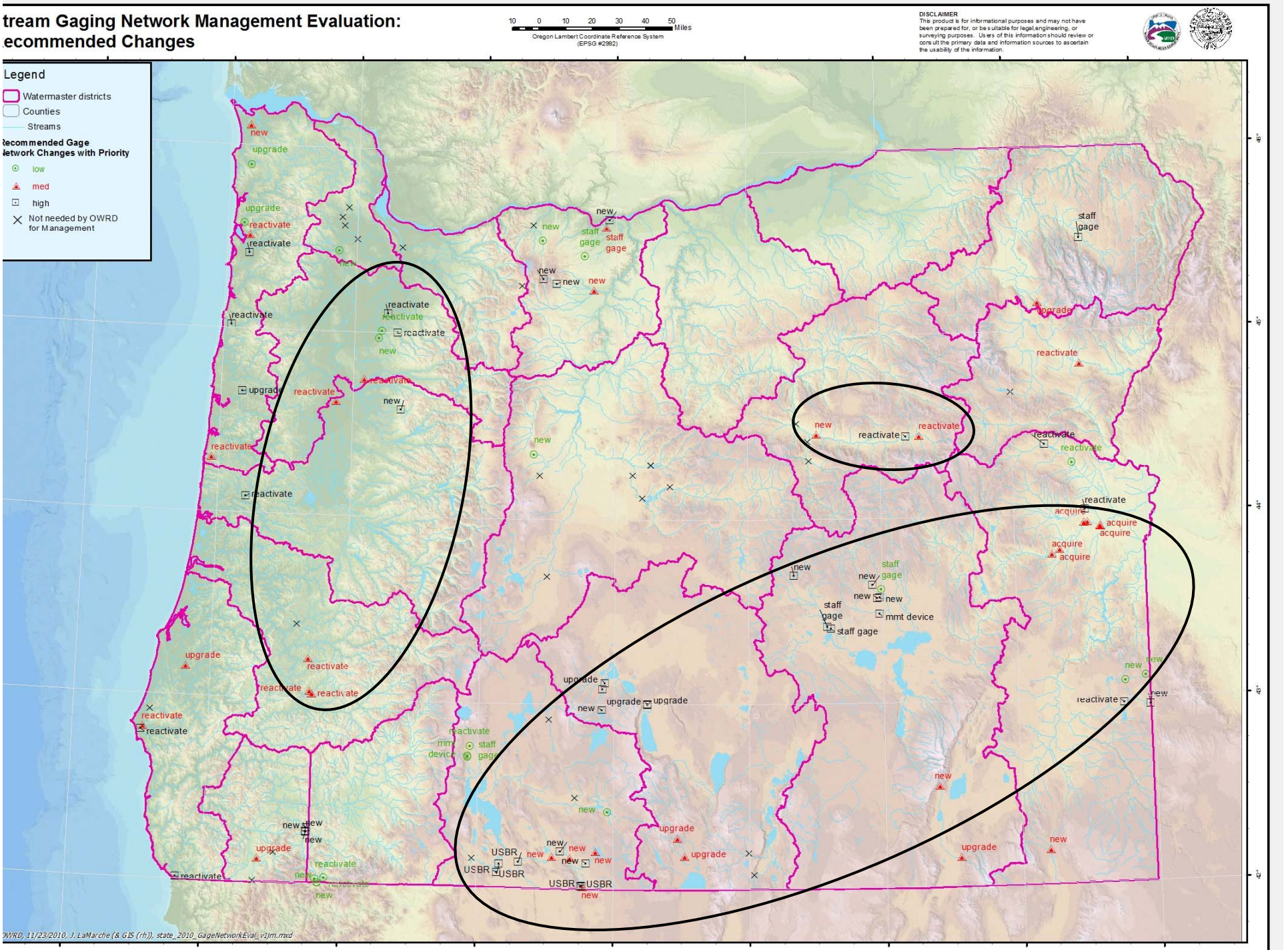


Results

Stream Gaging for Surface Water Distribution

- General hydrologic and regulatory setting narrative written for each watermaster district.
- Over 900 watersheds, stream reaches, storage facilities and diversions were examined.
- 225 gaging locations identified to meet OWRD surface water distribution goal. 155 of these locations currently have gages.
- 70 new stream gages needed. 31 of these were deemed high priority due to regulatory, environmental, and logistical setting.


tream Gaging Network Management Evaluation:
ecommended Changes
10 0 10 20 30 40 50 Miles
Oregon Lambert Coordinate Reference System
(EPSG #2992)
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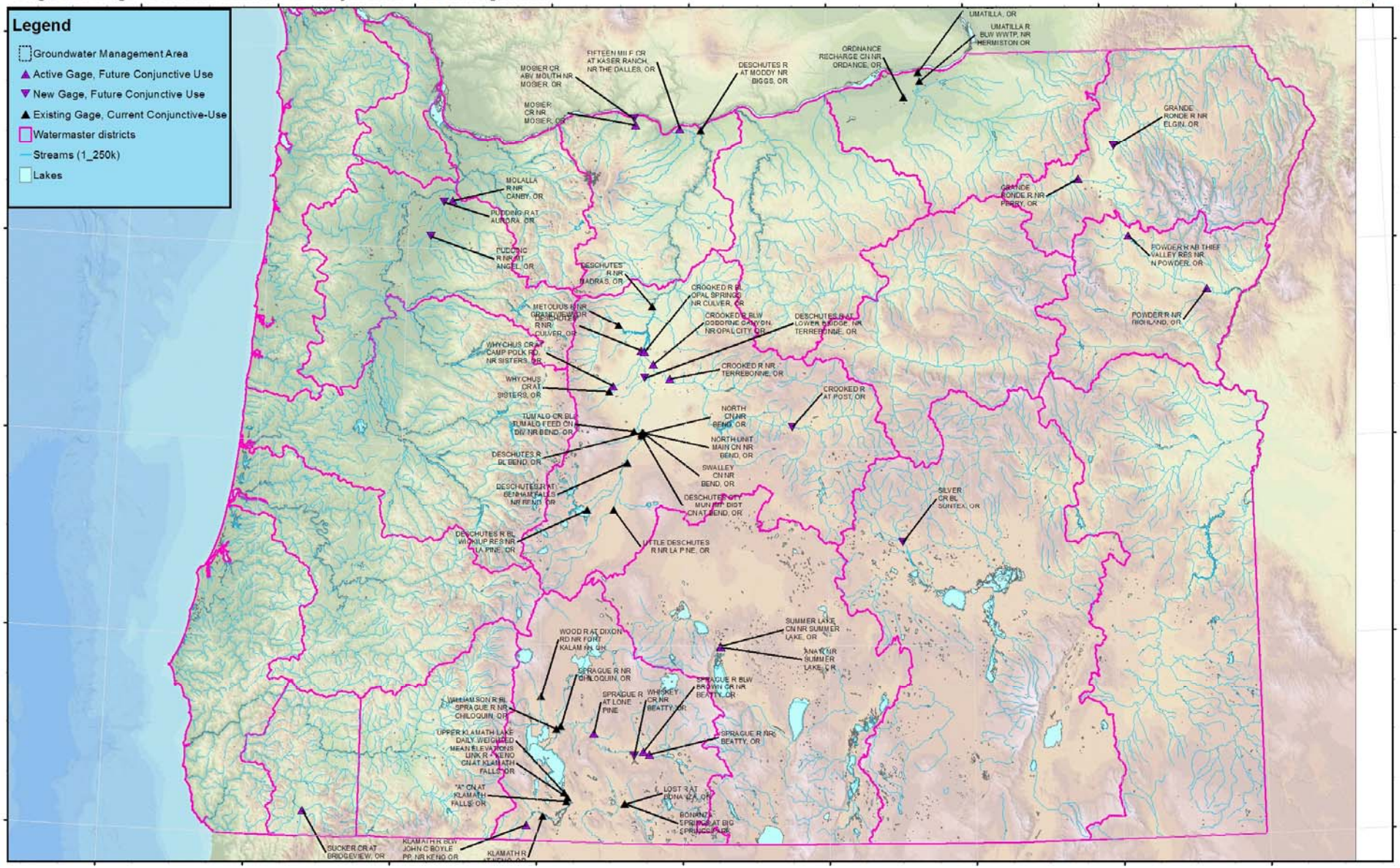
Legend
Watermaster districts
Counties
Streams
ecommended Gage
letwork Changes with Priority
low
med
high
Not needed by OWRD for Management
new
upgrade
reactivate
staff gage
acquire
mmt device
USBR
OWRD, 11/23/2010, J.LaMarche (& GIS (rh)), state_2010_GageNetworkEval_v1jm.mxd

Results

Stream Gaging for Conjunctive-Use Distribution

- Most locations needing stream gages for conjunctive use management are located in the Klamath and Deschutes basins. (Gannett et al., 2001 & 2007)
- Other conjunctive use related stream gaging locations are associated with direct tributaries to the Columbia River (CRBG related aquifers).
- Gage network is meeting current conjunctive use management needs (25 active stream gages).
- Near future conjunctive use needs will require 26 additional stream gages. Currently have gages at 19 of these sites.

Stream Gaging Network Distribution Evaluation:
Gage and Gage Locations Related to Conjunctive-Use Management



Conclusions

- The OWRD water distribution goal entails timely and accurate flow monitoring, and moving away from complaint based flow distribution.
- The evaluation for water distribution provides a summary of how OWRD monitors water for regulation and distribution in each watermaster district.
- The evaluation identified 70 locations needing new stream gages to meet surface water distribution needs.
- Of these new sites, 31 were deemed high priority locations.

Conclusions

- The existing gaging network is currently meeting conjunctive-use water distribution needs.
- 7 new stream gages will be required to meet projected future conjunctive-use data needs.
- OWRD's ability to expand the gaging network is limited by resource constraints.
- The stream gaging network evaluation for the other OWRD goals needs to be completed.

Related Actions in the IWRS

Recommended Action 1.B
Improve Interagency Natural Resource Data Collection

Recommended Action 5.A
Support Continued Basin-Scale Climate Change Research Efforts

Recommended Action 3.A
Determine Flows Needed (Quality and Quantity) to Support Instream Needs

Recommended Action 5.B
Assist with Climate Change Adaptation and Resiliency Strategies

Recommended Action 11.B
Develop Additional Instream Protections

Recommended Action 10.B
Improve Access to Built Storage

Photo: R. Cooper

Questions?

Detailed results for surface water distribution monitoring needs

Type	High Priority Gages	Medium Priority Gages	Low Priority Gages	Total
New	**31**	25	14	70
Upgrade	4	6	2	12
Alternative	4	1	4	9
Total	39	32	20	91