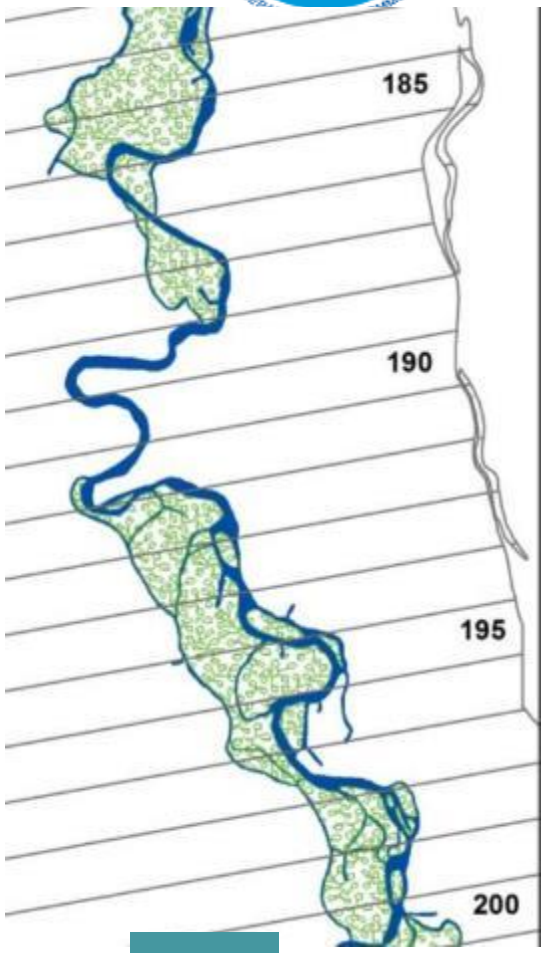
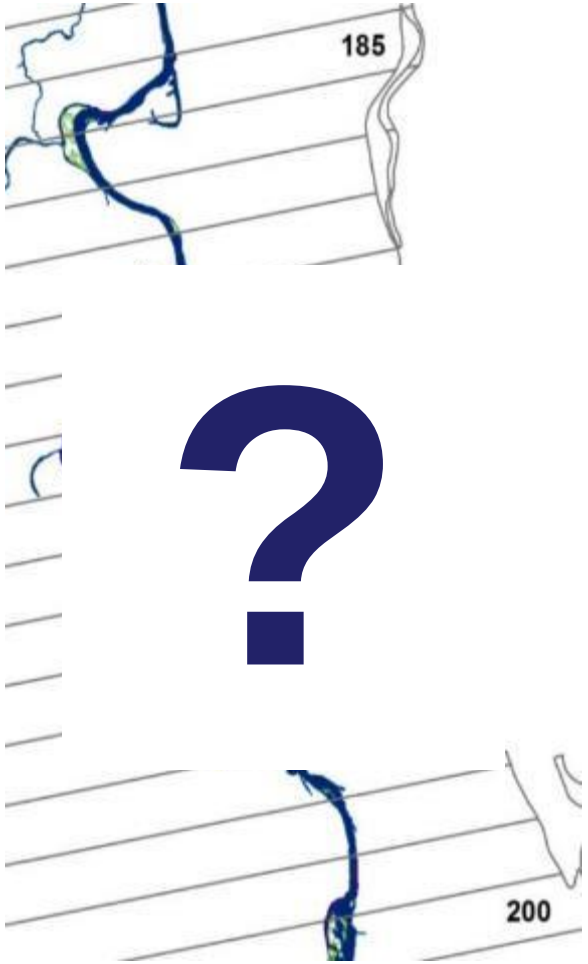
NOAA FISHERIES SERVICE

Gravel Mining & ESA Salmonid Recovery: Collaboration in the Willamette River

Anne Mullan, Ph.D.
National Marine Fisheries Service
West Coast Region



1850

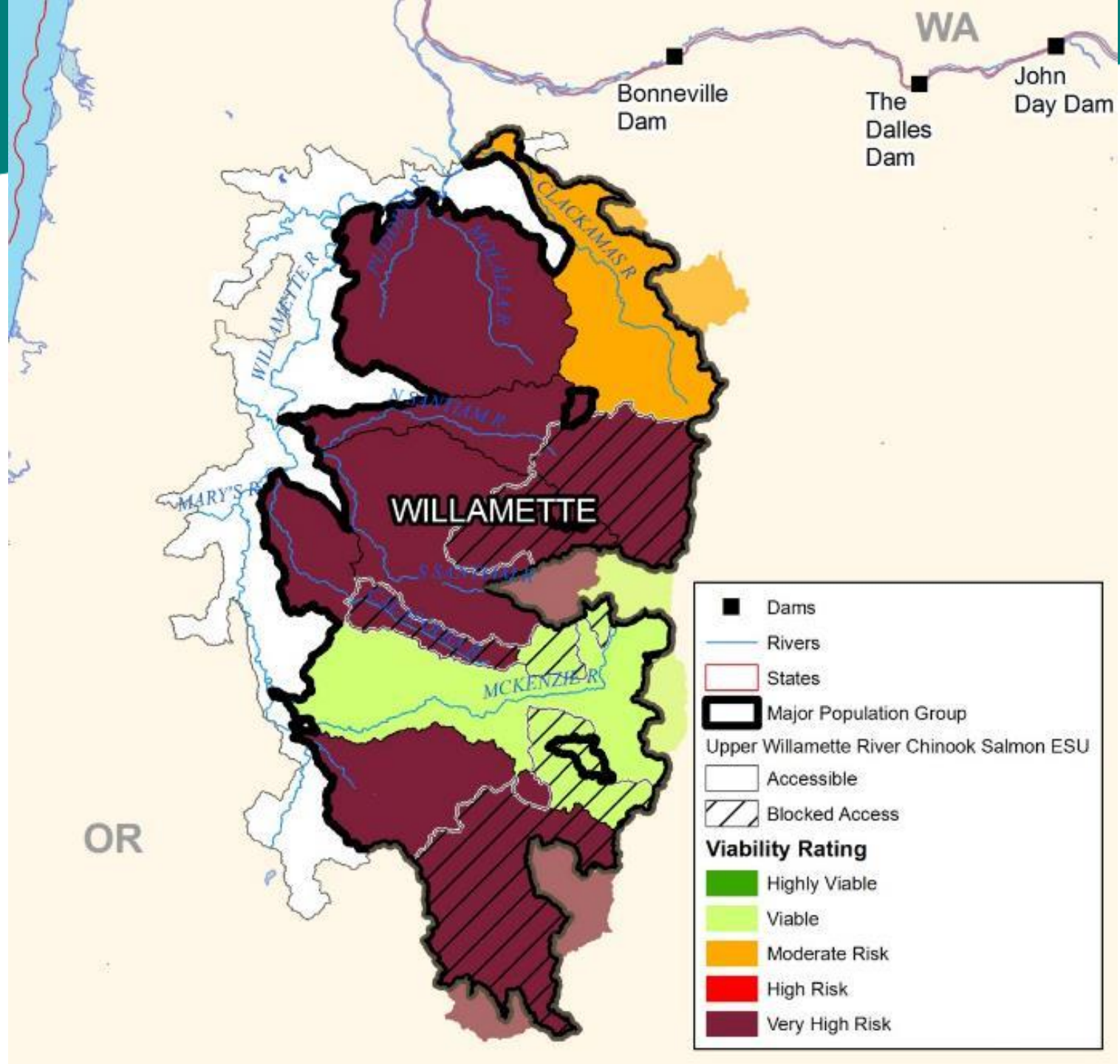


2050

Map sources: Willamette Planning Atlas; Hulse and others 2001

NOAA FISHERIES SERVICE

Upper Willamette River Chinook & Steelhead Populations



NOAA FISHERIES SERVICE

Juvenile habitat

Life cycle of salmonid species

Impacts: 4 big H's

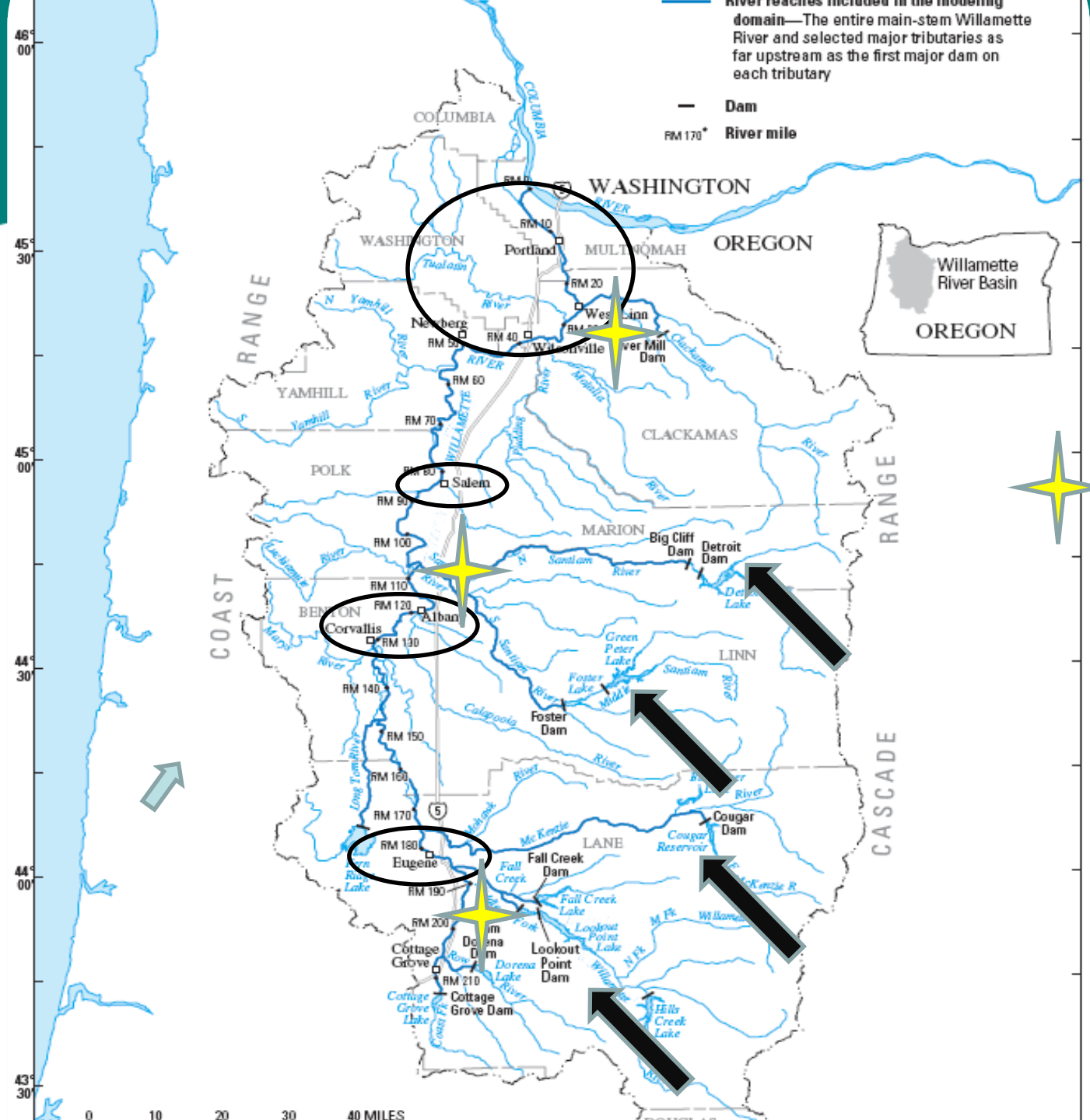
Habitat focus today

Floodplains affect all except ocean stages

NOAA FISHERIES SERVICE

Oregon Population
Doubled 1970-2015

Now 4 million; 70%
in the Willamette Basin

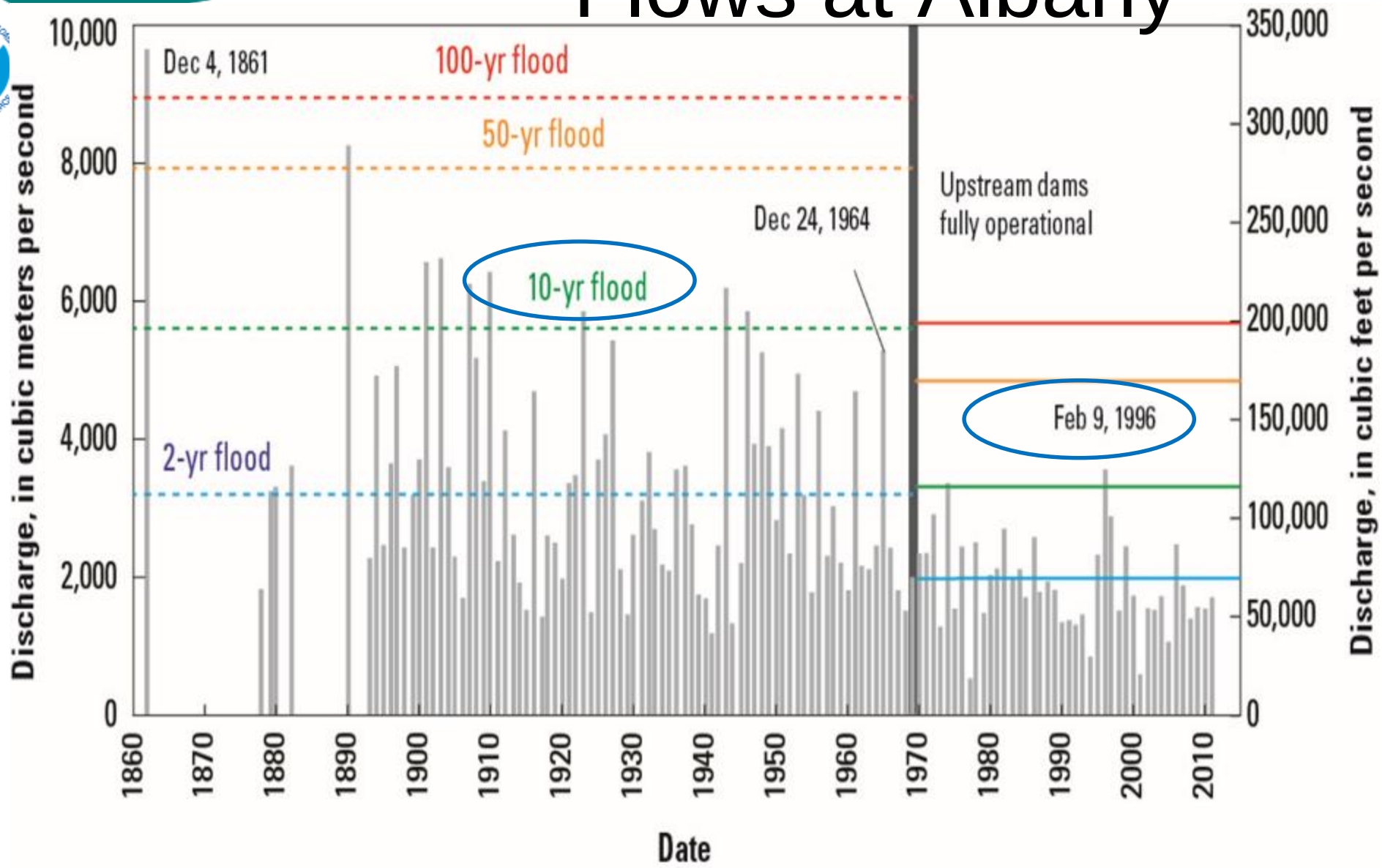


Sites discussed:
Clackamas,
Middle Fork,
Santiam tribs

- Upper basin Army Corps Flood & Irrigation Dams & BiOp[4]

NOAA FISHERIES SERVICE

Flows at Albany



Wallick et al 2013

NOAA FISHERIES SERVICE

Importance of Healthy Floodplains, I

- Allowing the river to naturally migrate and form a diversity of habitat types critical to the survival of different salmon species at various life stages
- Facilitating exchange of nutrients and organic material between land and water, thus increasing habitat complexity via food subsidies and large wood
- Providing off-channel areas & an abundance of terrestrial and aquatic food
- Creating shallow habitat & cover so small salmon can hide from predators

NOAA FISHERIES SERVICE

Importance of Healthy Floodplains, II

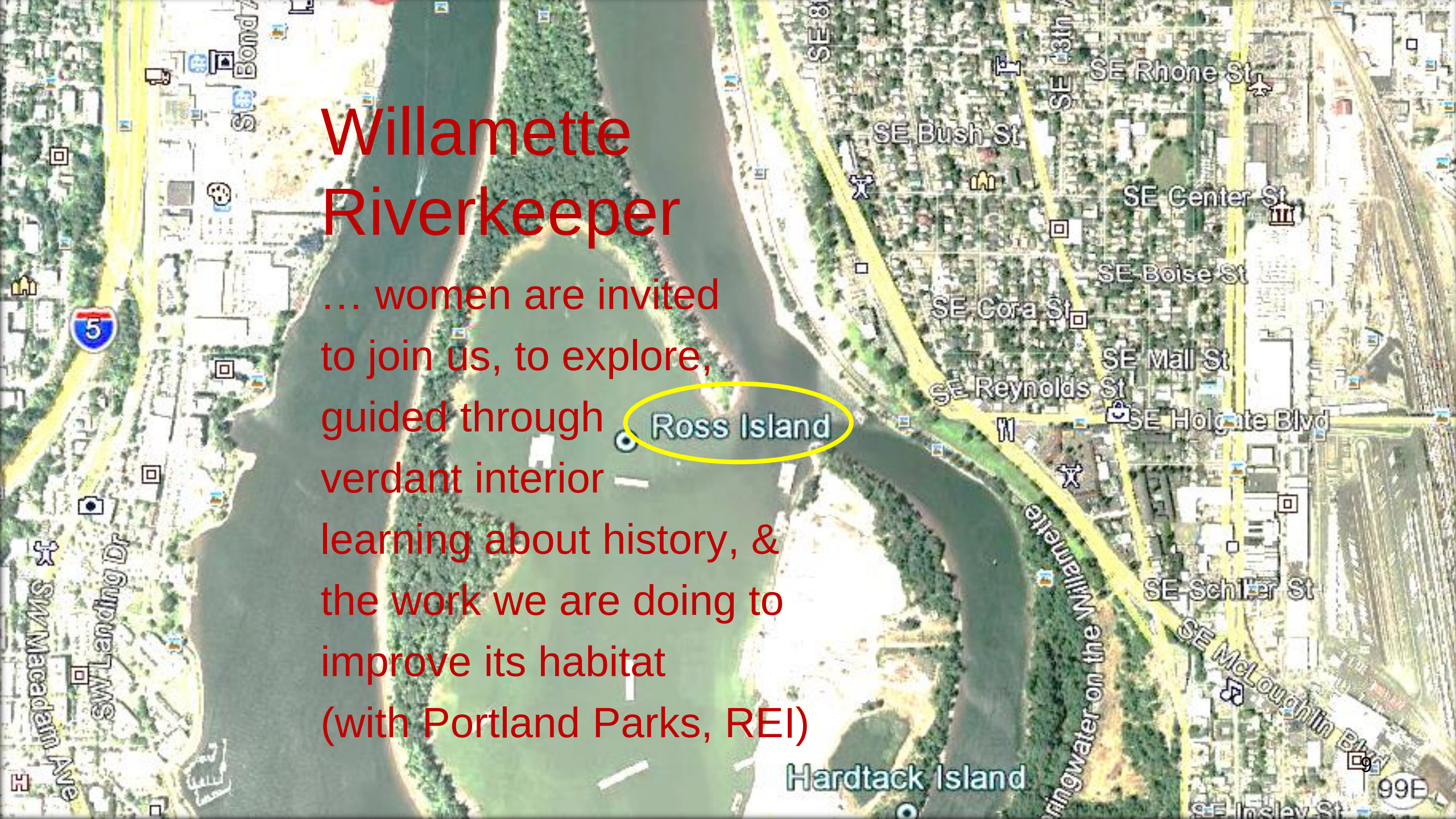
- Providing juvenile salmon refuge to avoid high river flow, to conserve energy for their entry to the ocean
- Providing coarse beds of sediment through which water filters excess nutrients and other chemicals to maintain high water quality
- Water storage and recharge ensures a source of cold water in summer months and warmer water during winter months. Water seeps into the groundwater table during floods, recharging wetlands, off-channel areas, and shallow aquifers.

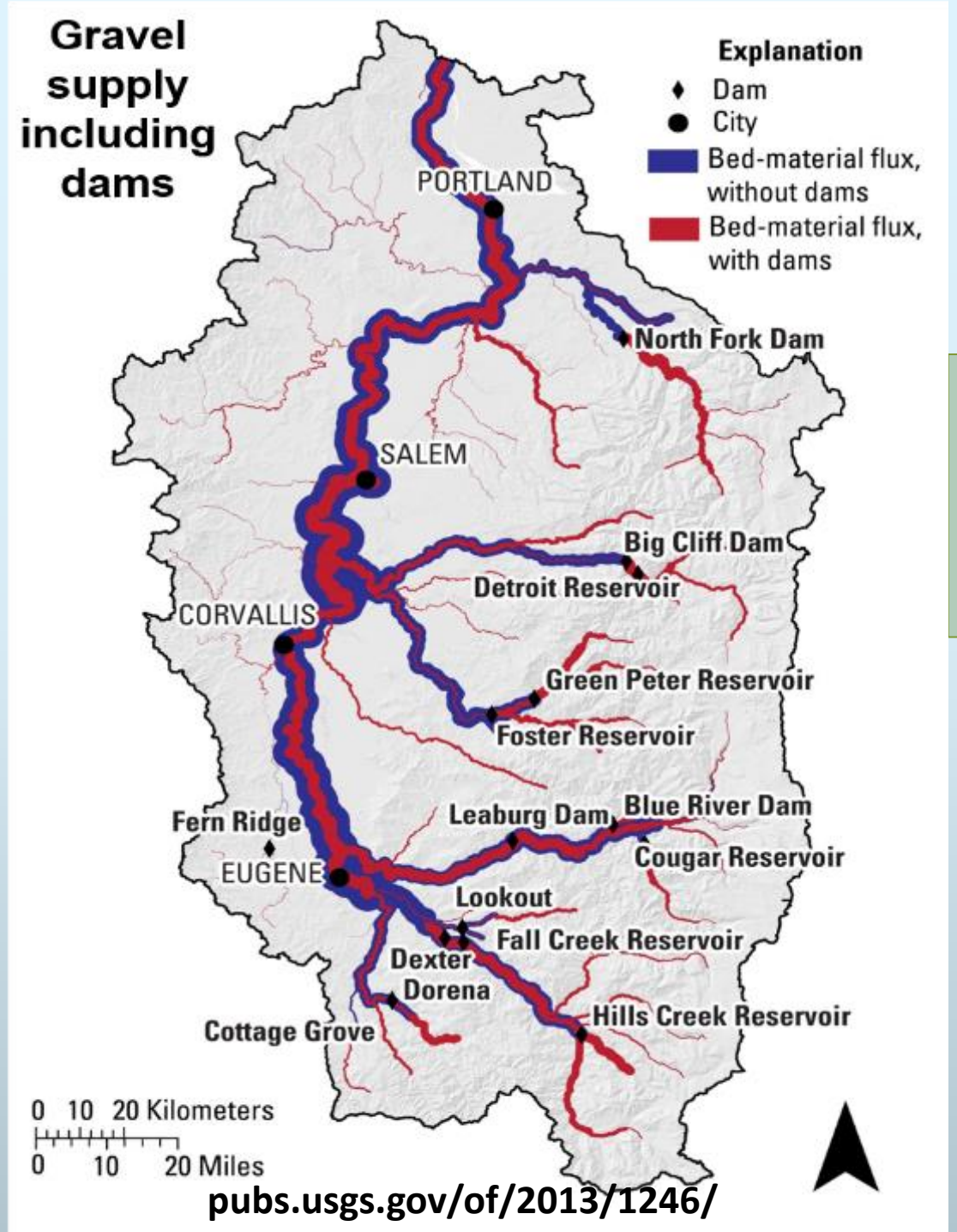
www.westcoast.fisheries.noaa.gov/publications/habitat/fact_sheets/floodplains_fact_sheet_031114.pdf

NOAA FISHERIES SERVICE

Willamette River Gravel sources and sinks

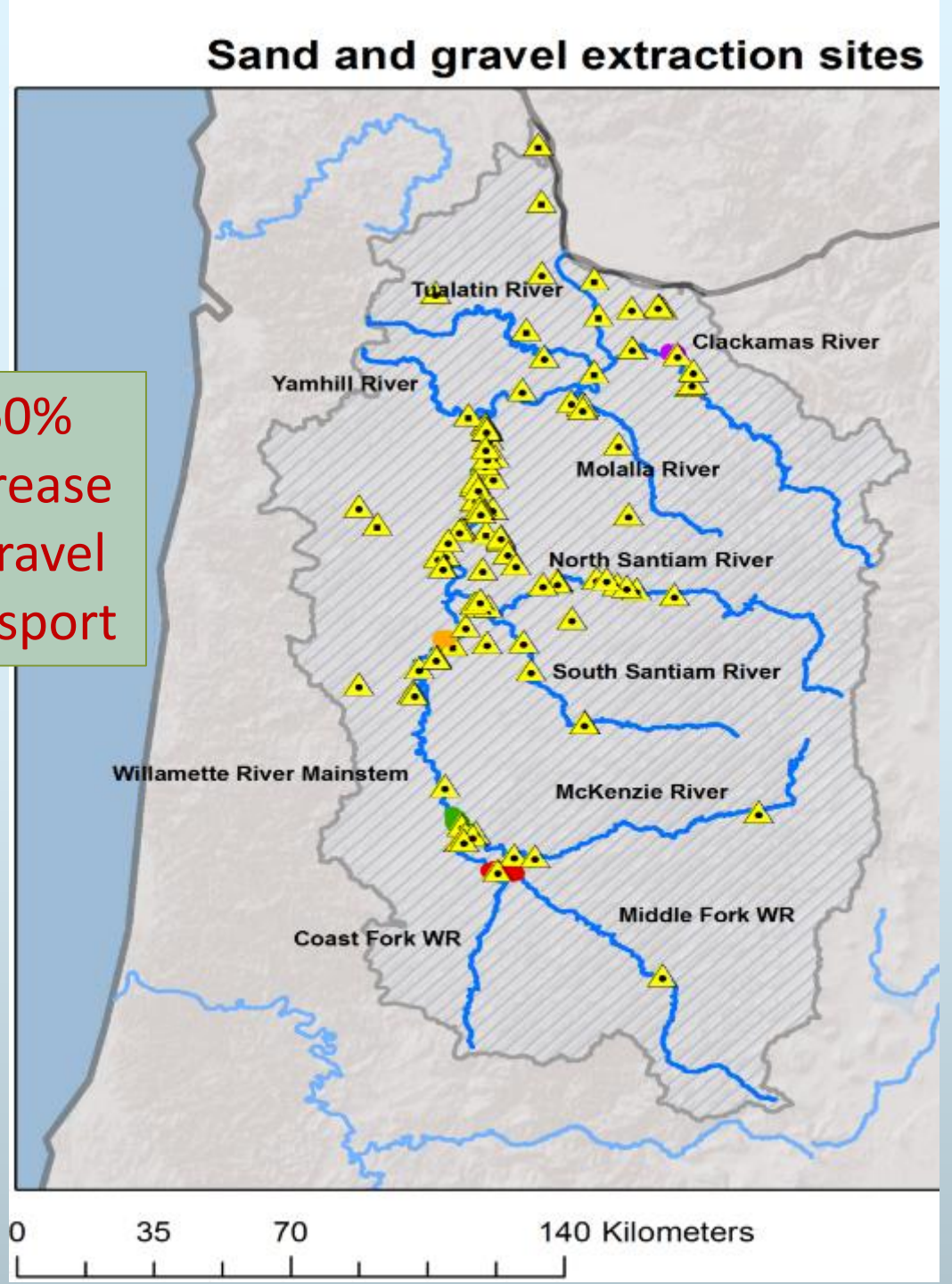
- Erosion and deposition: dams & revetments block
- Past mining: volumes in millions of cubic yards
- Instream pits…one (active) remaining
- Bar mining- less after 2006 BiOp, Guidance
- Transport capacity > bedload supply : Hungry River
- Floodplain pits– my focus today


Willamette Riverkeeper
… women are invited
to join us, to explore,
guided through
verdant interior
learning about history, &
the work we are doing to
improve its habitat
(with Portland Parks, REI)
Ross Island
Hardtack Island
SE Rhone St
SE Bush St
SE Center St
SE Boise St
SE Cora St
SE Mall St
SE Reynolds St
SE Holgate Blvd
SE Schiller St
SE McLoughlin Blvd
SW Landing Dr
SW Macadam Ave
Willamette
5
99E



pubs.usgs.gov/of/2013/1246/

~60% decrease in gravel transport



NOAA FISHERIES SERVICE

Risks and Uncertainty

- Avulsion & capture
- Fish trapping and mortality
  - Active machinery
  - Predation increase
  - Temperature changes
- Sediment budget & processes
  - Pit fills, downstream effect

Show of hands, please

- Others working on mining?
- Restoration near rivers?

NOAA FISHERIES SERVICE

For decades, an abandoned gravel mine on the Clackamas River has been a quagmire. On 11/1/2016, regional leaders tromped through a muddy former riverbed to see a rebirth.

Metro serves more than 1.5 million people who make their home in the 24 cities and 3 counties at the urban heart of Oregon. Voters have asked Metro to help with the challenges and opportunities that cross city and county lines.

NOAA FISHERIES SERVICE

At River Island, a former gravel mine returns to its wild roots

Passing a levy in 2013… region's voters made it possible for Metro to restore River Island, returning it to a more natural state. [Purchased in 1999]

http://www.oregonmetro.gov/news/river-island-former-gravel-mine-returns-its-wild-roots

NOAA FISHERIES SERVICE

Guidance… to come

- Mining to preserve floodplain habitat
  - Thalweg depth – lower avulsion risks
  - Buffer, maintain, or add vegetation
  - Mimic channel shapes /contours
  - Monitor & reclaim during mining
- Floodplain pits are sometimes upland …other times …instream extraction…depends on adjacency to the stream channel and the likelihood of a channel capture.

NOAA FISHERIES SERVICE

Guidance… past 2006

SEDIMENT REMOVAL FROM ACTIVE STREAM CHANNELS IN OREGON: Considerations for Federal Agencies for the Evaluation of Sediment Removal Actions from Oregon Streams.

Developed with support from:

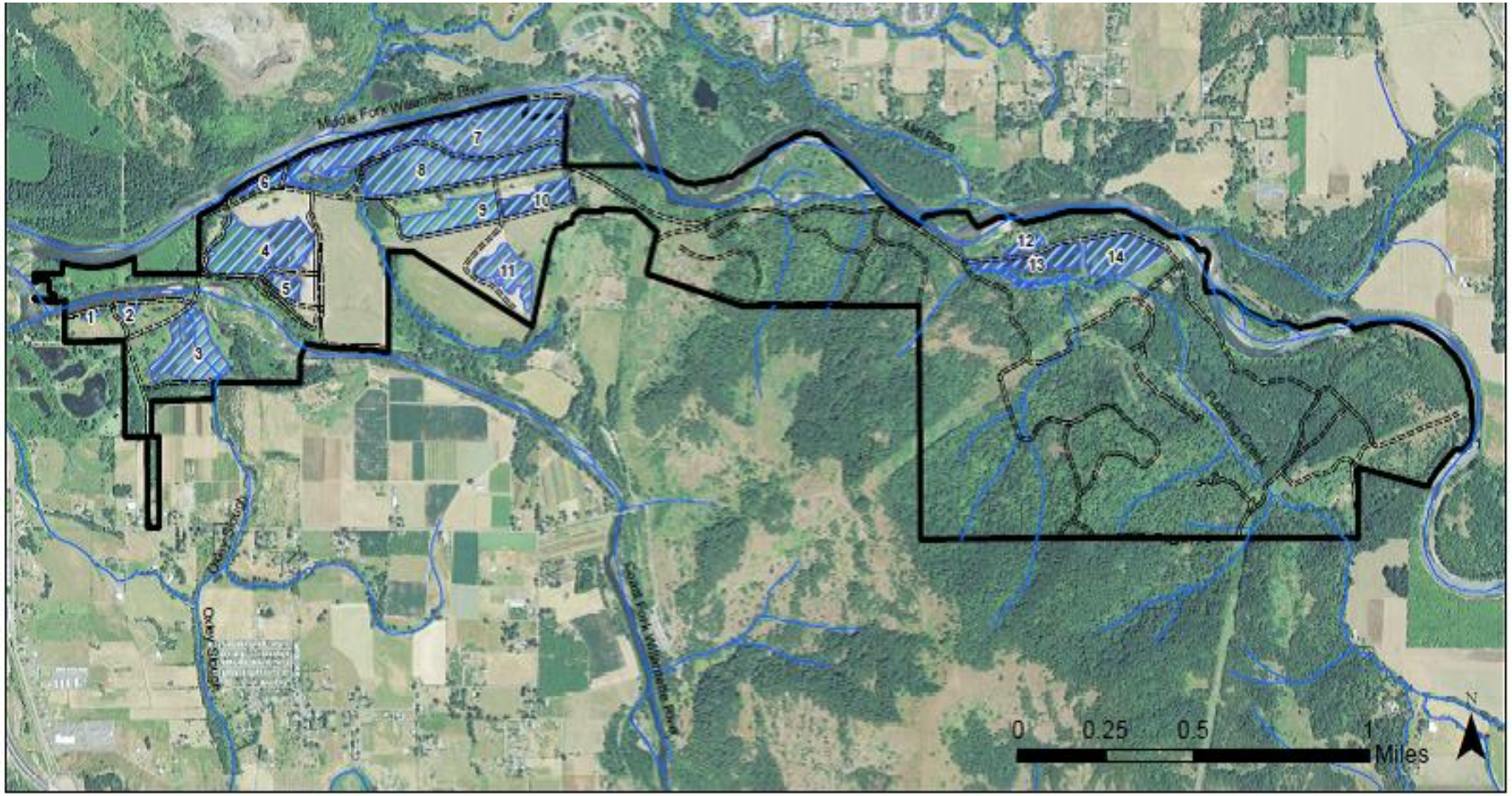
- US Fish and Wildlife Service
- National Marine Fisheries Service
- US Army Corps of Engineers
- US Environmental Protection Agency

NOAA FISHERIES SERVICE

Restoration efforts

Partners:

Bonneville Power-BiOp$
NOAA Restoration
Meyer Memorial Trust
Nature Conservancy
OWEB (state & fed $)
County Parks
Friends of Buford Park (neighbors)
Oregon Fish & Wildlife



Willamette Confluence Preserve Gravel Ponds

Roads
Rivers and streams
Gravel Ponds

NOAA FISHERIES SERVICE

Partner: decision support

- Prospect-R, provided by The Nature Conservancy for
  - land managers, conservation organizations, government agencies, and
  - any other group interested in floodplain restoration.

To help users determine the feasibility of floodplain restoration… specifically for the restoration of legacy gravel pit mines on the Willamette River

http://willametteinitiative.org/topic/floodplain-restoration

NOAA FISHERIES SERVICE

Oregon Fish & Wildlife, NOAA joint ESA Recovery Plan

Actions needed to repair habitat conditions in the Middle Fork Willamette watershed fall into six general categories:

1. Restoring riparian areas and vegetation communities,
2. Restoring floodplains and reconnecting side channels and wetlands,
3. Improving stream habitat complexity and stability,
4. Increasing stream flow,
5. Improving water quality,
6. Removing or replacing culverts and other structures that block fish passage.

Middle Fork Willamette Watershed Council

A tale of two confluences: one, restoration complete

Green Island, River Mile 174 (River Design Group)

North Santiam River, near Jefferson

NOAA FISHERIES SERVICE

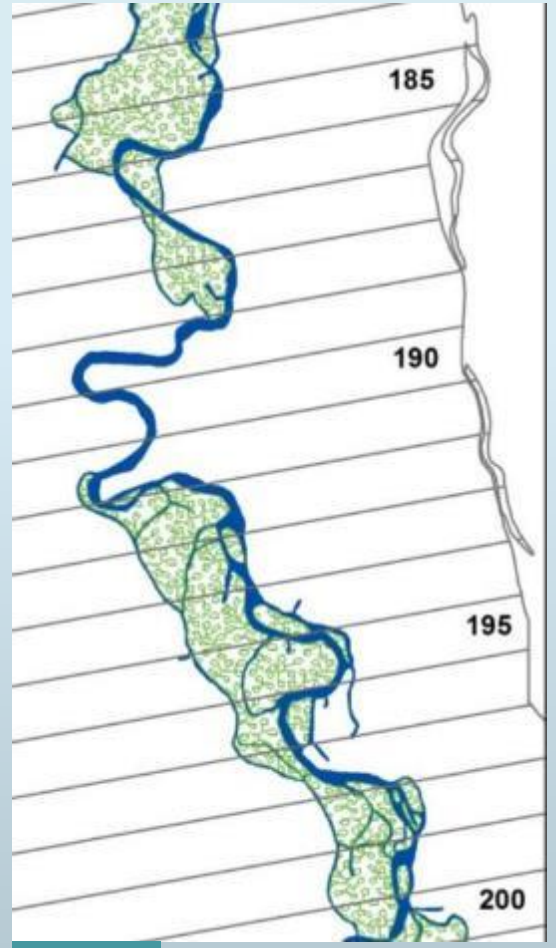
Share your experiences…

- Partners in restoration…?
- Cost sharing, advisory?

Successes, failures,
what would you do again?

[N]umerous habitat restoration projects … are expected to …provide benefit … however, the scale of improvements needed is greater than the scale of habitat actions implemented

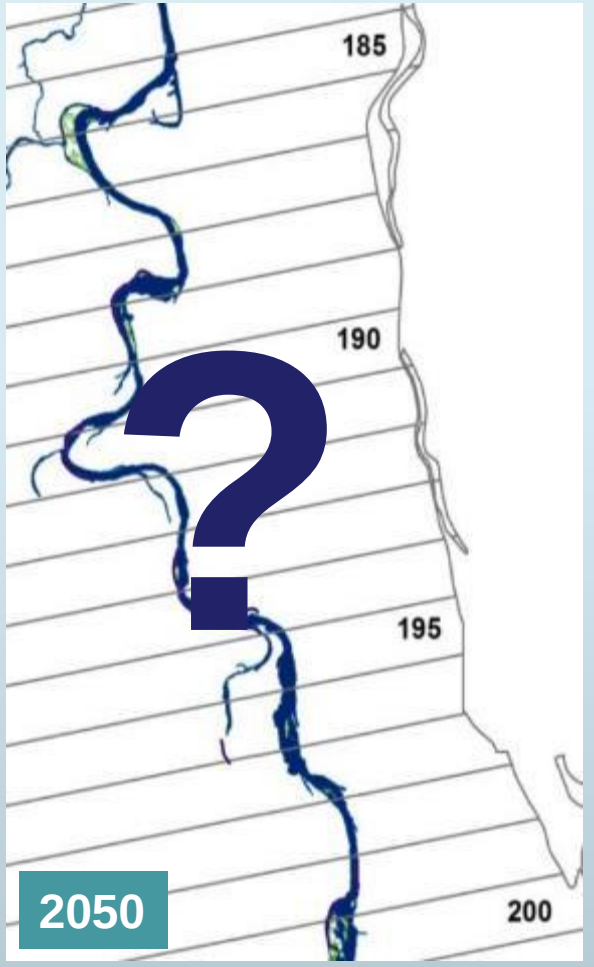
NMFS 2016 Status Review



1850

…We actually don't know very much about how the modern …floodplains are evolving …[this] hinders our ability to respond thoughtfully to pressing management challenges.

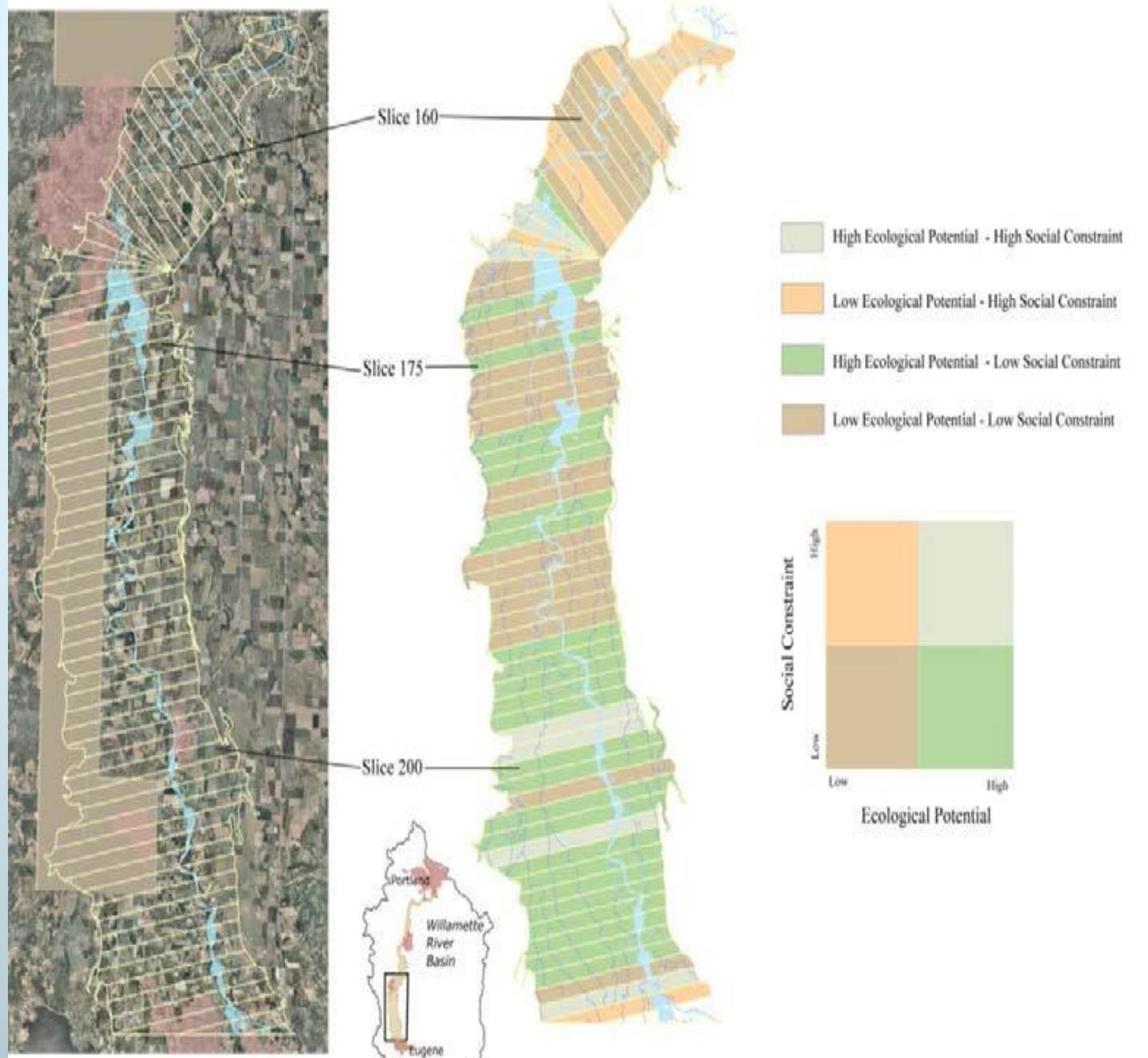
USGS 2013



2050

Map sources: Willamette Planning Atlas; Hulse and others 2001

Find the green corner: greatest benefits



Partners in floodplain habitat recovery:

Nature Conservancy, Meyer,McKenzie River Trust, Willamette Riverkeeper, USGS, USFWS, NOAA Restoration Center, Northwest Fisheries Science Center, UO, OSU, Metro Watershed Councils, Bonneville Power Admin, Army Corps, Farmers, Cities, Counties, Industry (as operators?)
Oregon: Departments of Geology and Mineral Industries, State Lands; Parks; Environmental Quality; Fish and Wildlife; Watershed Enhancement Board – Focused Investment Partnership

NOAA FISHERIES SERVICE

Next up: Advisory group?

- Members, expertise, and experience
  - Mining, Geology, Fish &Wildlife, Environmental Quality and State lands
- Tasks
  - Review existing actions, state of the river geomorphology
- Result
  - White Paper, Industry co-conference– ??
- New pathways to restoration

YOUR THOUGHTS WELCOME!