Restoration of Gravel Mined Floodplains Willamette Valley, Oregon

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Chris Budai, U.S. Army Corps of Engineers;

Leslie Bach, The Nature Conservancy

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- River Design Group
- Cramer Fish Sciences
- Oregon Watershed Enhancement Board
- Oregon Department of Fish and Wildlife
- Meyer Memorial Trust

Problems and Opportunities

- Disconnection of floodplains resulting from dams, revetments, levees, infrastructure, and development
- Historic legacy of gravel mining both within the rivers and floodplains – currently many gravel mined ponds/pits within floodplain
- Listed aquatic and floodplain dependent species
- Opportunities to reconnect and restore large-scale gravel mined floodplains without risk to infrastructure or other development

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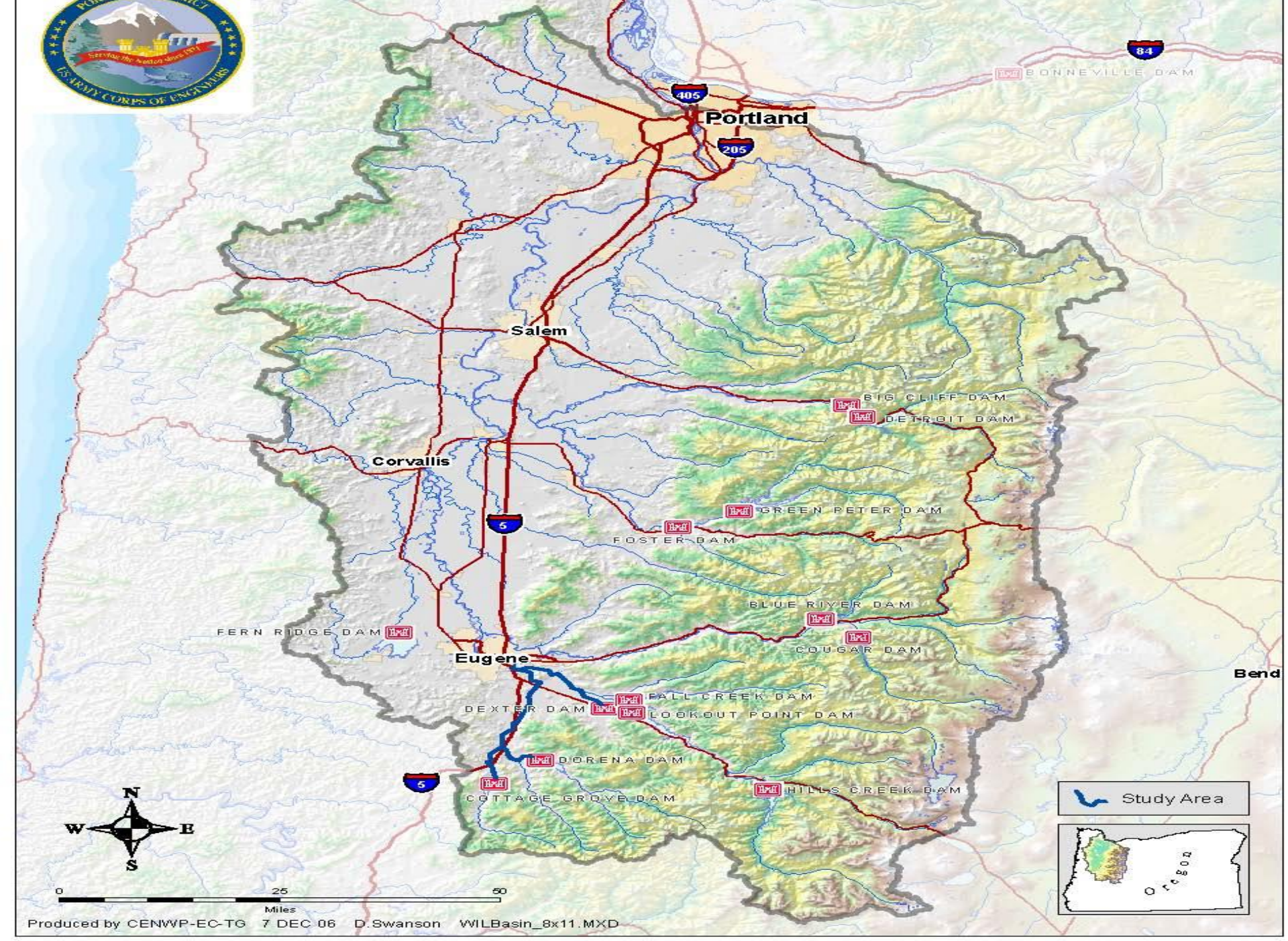
US ARMY CORPS OF ENGINEERS
Portland
Salem
Corvallis
Eugene
Bend
84
405
205
5
BONNEVILLE DAM
BIG CLIFF DAM
DETROIT DAM
GREEN PETER DAM
FOSTER DAM
BLUE RIVER DAM
COUGAR DAM
FERN RIDGE DAM
FALL CREEK DAM
DEXTER DAM
LOOKOUT POINT DAM
DORENA DAM
COTTAGE GROVE DAM
HILLS CREEK DAM
N
W
E
S
0
25
50
Miles
Study Area
Oregon
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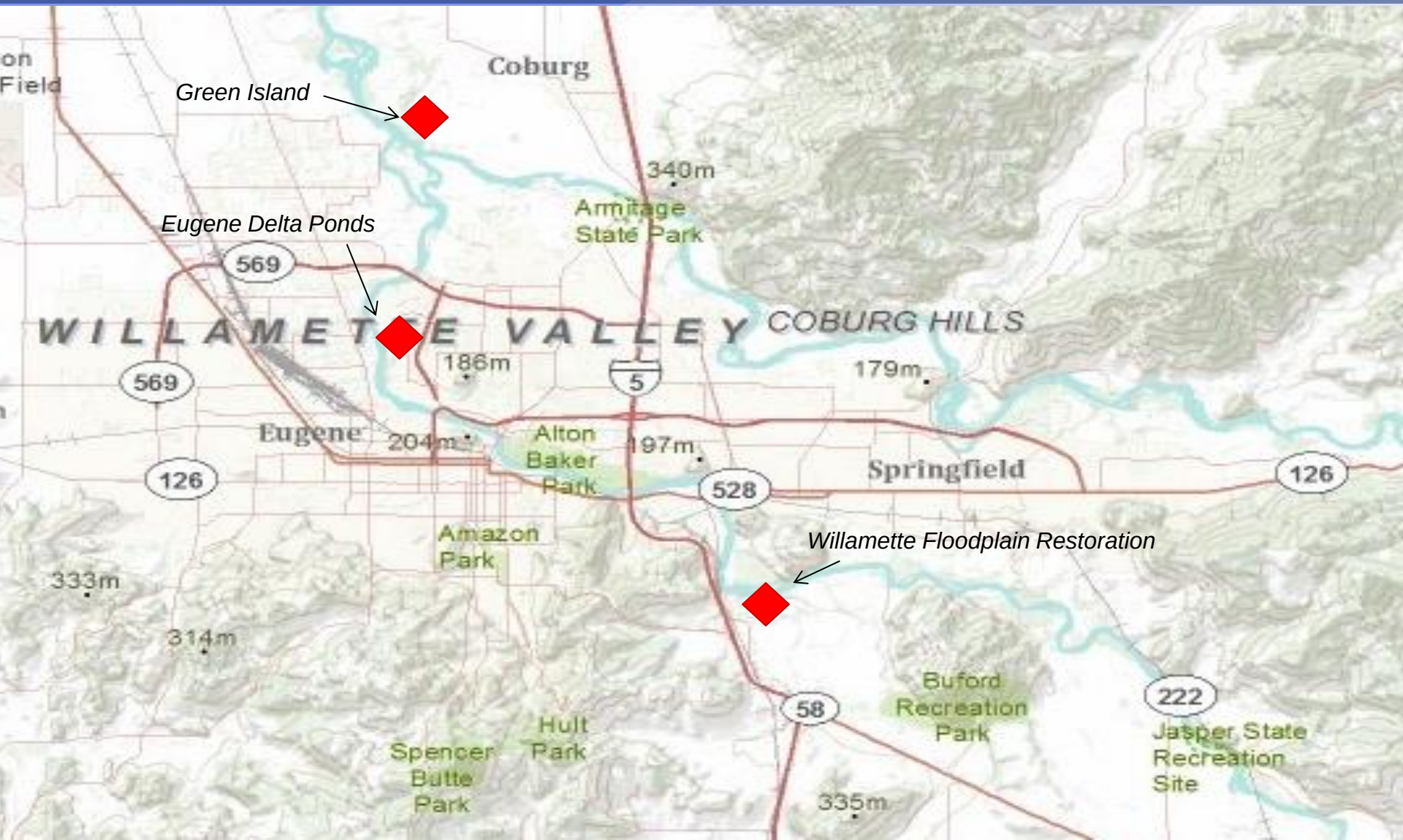
Focus Area


Green Island
Eugene Delta Ponds
Willamette Floodplain Restoration
Coburg
340m
Armitage State Park
569
WILLAMETTE VALLEY
COBURG HILLS
186m
179m
5
569
Eugene
204m
Alton Baker Park
197m
126
528
Springfield
126
Amazon Park
333m
314m
58
Buford Recreation Park
222
Jasper State Recreation Site
Hult Park
Spencer Butte Park
335m

Case Study: Eugene Delta Ponds

- USACE and City of Eugene partnership
- Constraints due to surrounding infrastructure and development – flood risk
- Shallow, all less than 6 feet deep
- Constructed in phases, 2005, 2007, 2010-2012

Eugene Delta Ponds Project Map

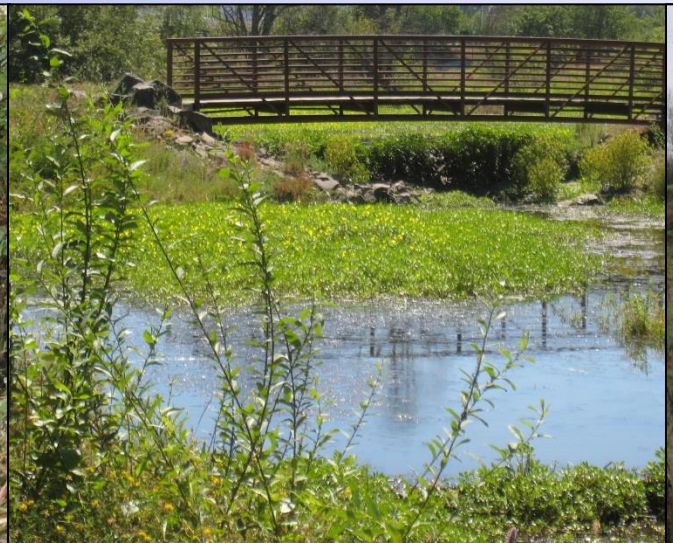
Map Provided by City of Eugene

Case Study: Eugene Delta Ponds

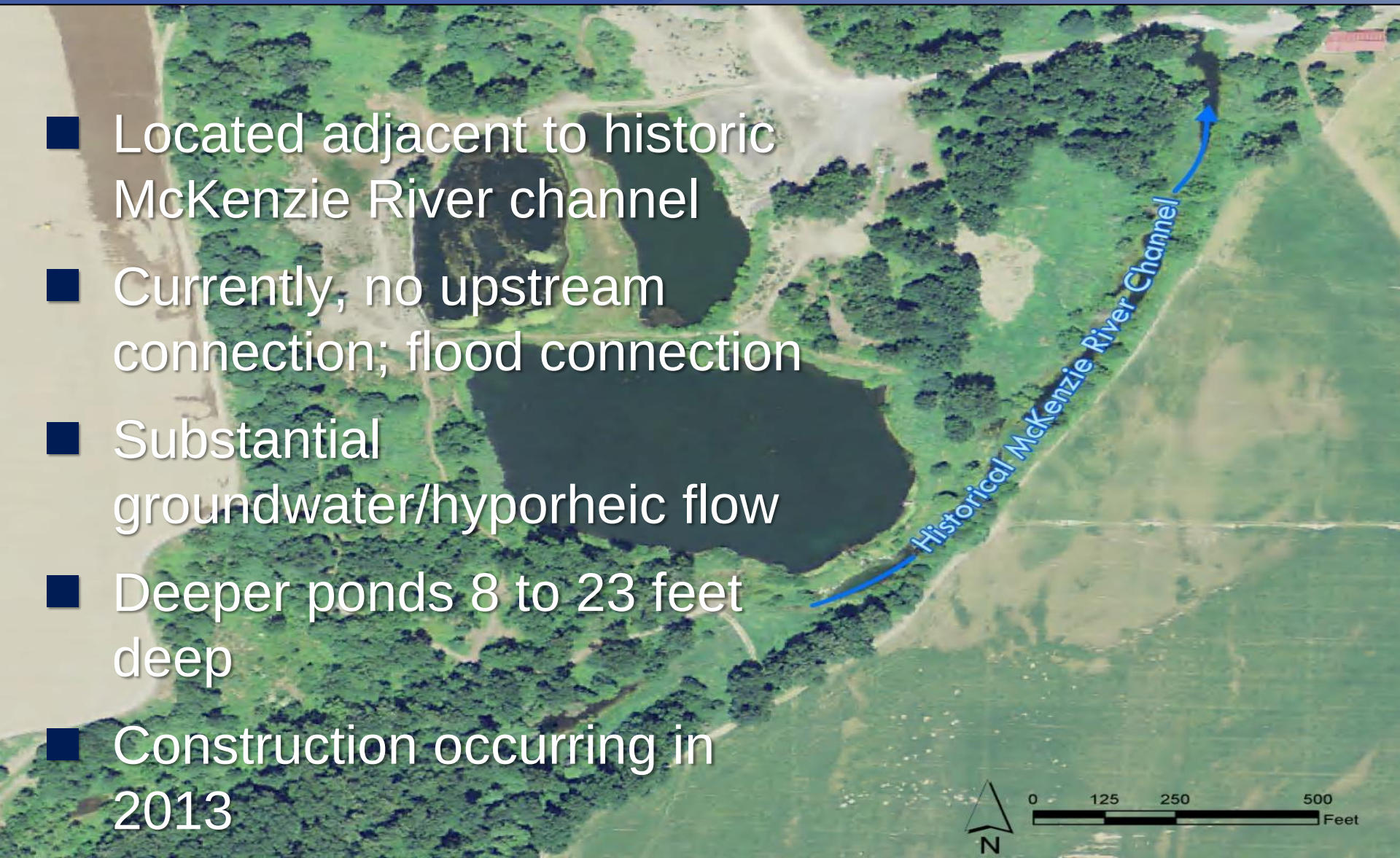
- Monitoring results 2004-2007
  - Juvenile Chinook and lamprey captured in first set of ponds as early as Jan 2006
  - Connected ponds showed much greater diversity of native species; disconnected ponds almost entirely non-native
- Monitoring results 2011-2012
  - Juvenile Chinook, rainbow/steelhead trout, cutthroat trout captured at upstream end; not all the way through system
  - Non-native species dominant in warm months, but expect salmonids to be gone at that time of year

Lessons Learned: Eugene Delta Ponds

- Control of flows for flood risk purposes is in conflict with fish passage goals
- Invasive species management is key
- Expect long-term evolution of habitats
- Human use can reduce habitat values

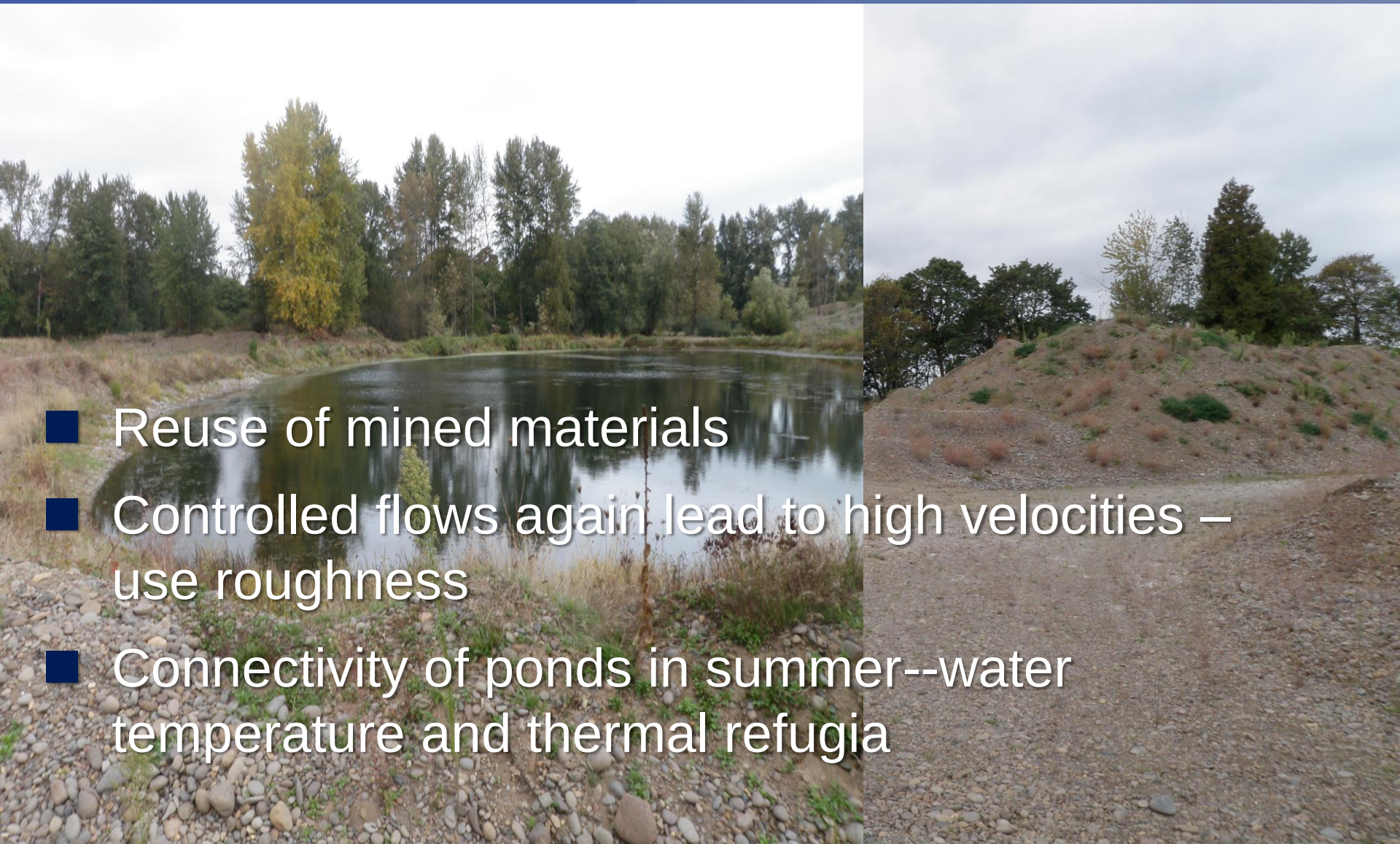


Case Study: Green Island/CARP Ponds



- Located adjacent to historic McKenzie River channel
- Currently, no upstream connection; flood connection
- Substantial groundwater/hyporheic flow
- Deeper ponds 8 to 23 feet deep
- Construction occurring in 2013

Lessons Learned: Green Island/CARP Ponds

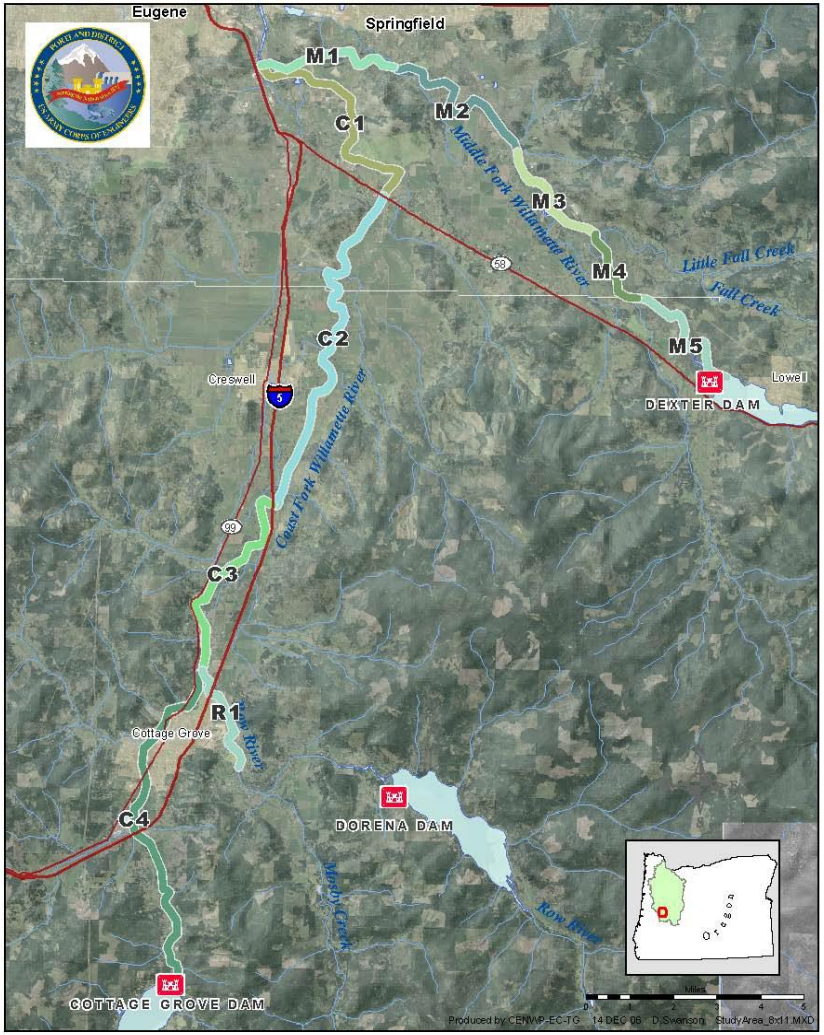


- Reuse of mined materials
- Controlled flows again lead to high velocities – use roughness
- Connectivity of ponds in summer--water temperature and thermal refugia

Willamette Floodplain Restoration Study

Primary areas formerly gravel mined

- C1/M1, Confluence
- C3/R1, Row River Confluence
- M4, Fall Creek Confluence



Evaluated Potential Benefits with a Multi-species Habitat Model

- HEP/HSI model with 8 native species or assemblages
  - Western pond turtle
  - Oregon chub
  - Beaver
  - Wood duck
  - Yellow warbler
  - Native amphibians
  - Salmonids
  - American kestrel

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Alternatives Development

- Stakeholders identified key areas– provided local data and ideas
- Subsequently identified 43 potential restoration sites
- Field reconnaissance by project team
- Developed conceptual plans and costs for 43 project sites – restoration measures as appropriate based on conditions at each site
- Incorporated lessons learned from previous projects

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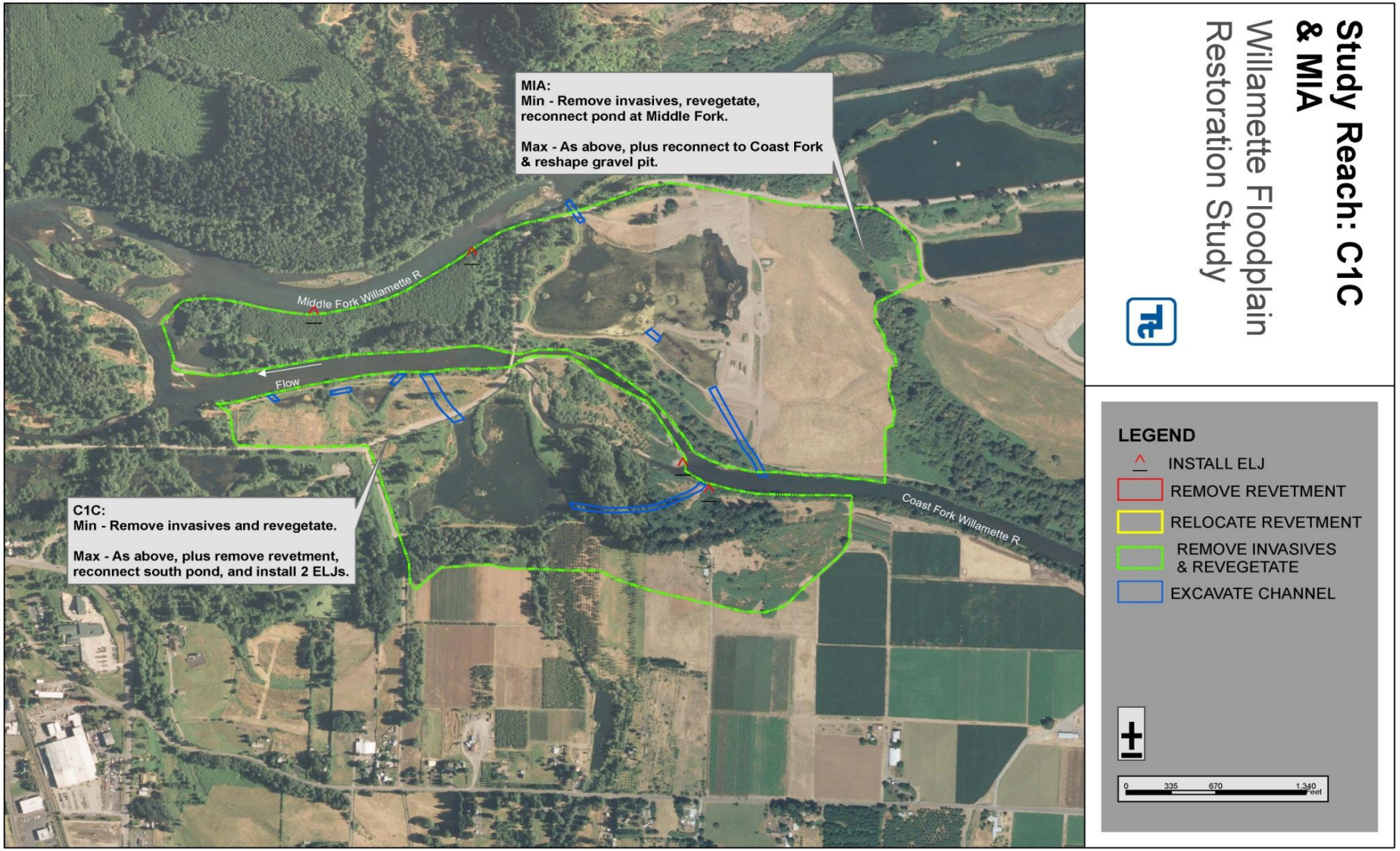
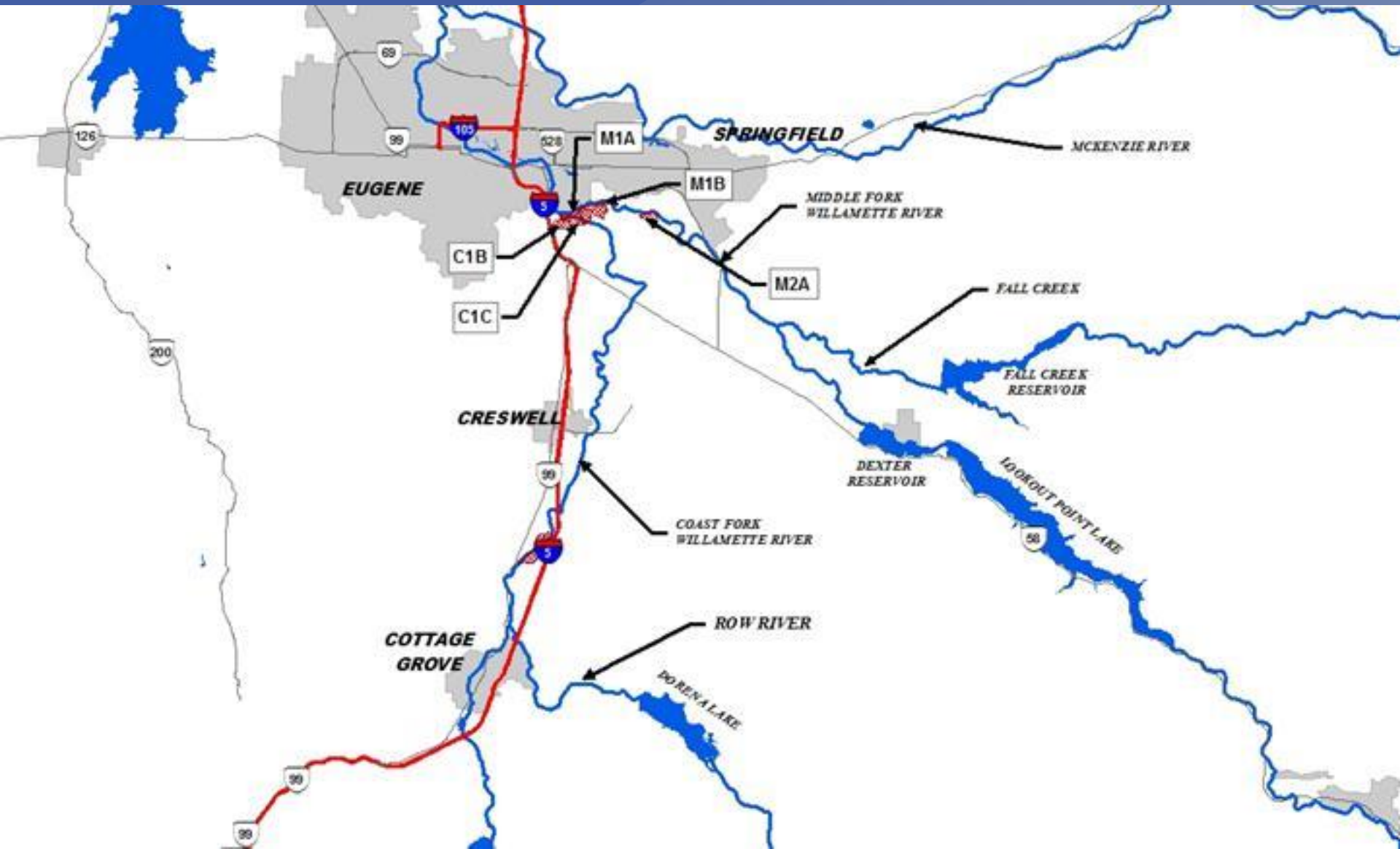
Example Conceptual Design



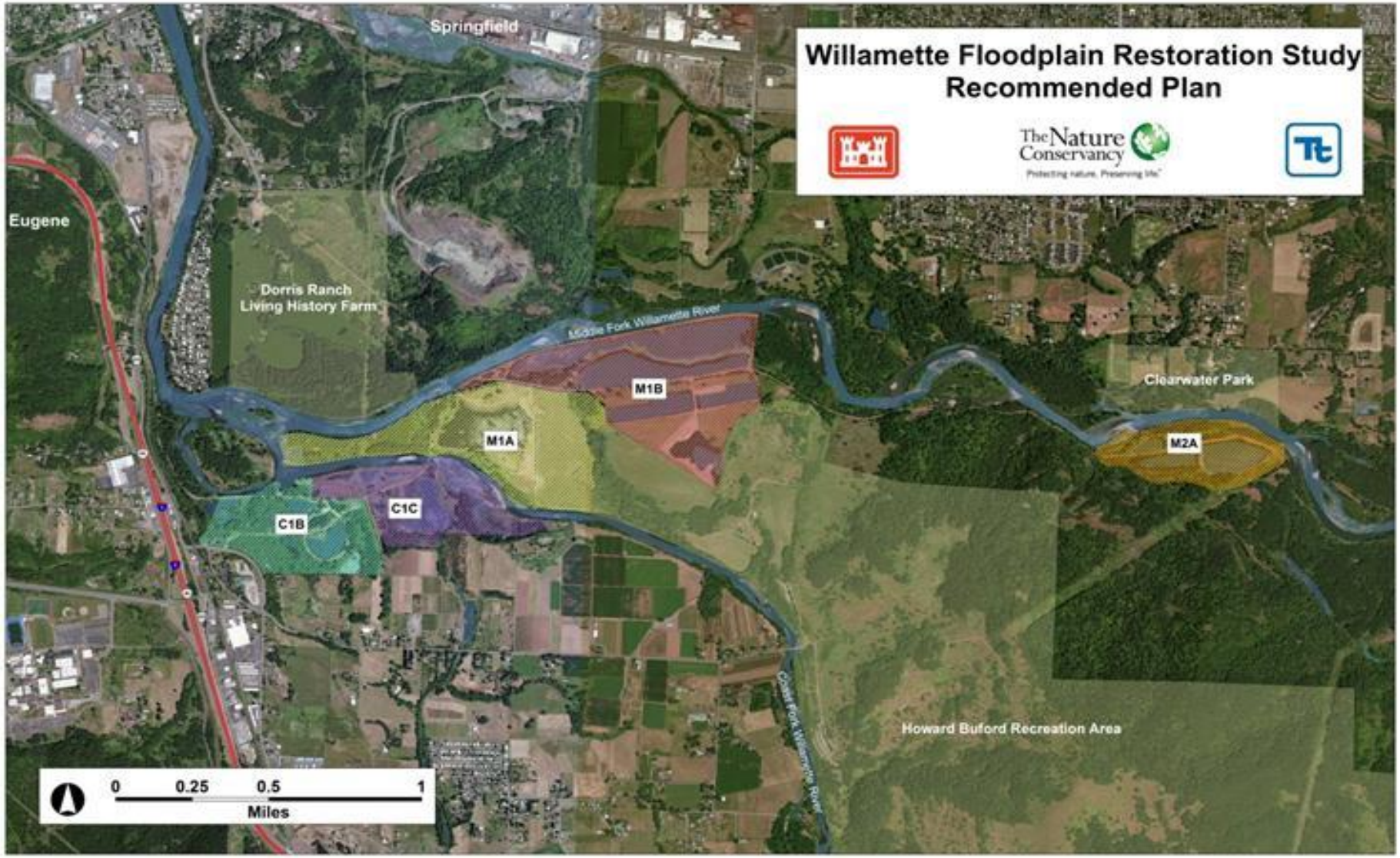
Cost Effectiveness and Incremental Analysis

- Developed scales of restoration for each site to evaluate via cost effectiveness and incremental analysis
  - Minimum Scale – passive restoration features such as removal of invasive species, riparian/floodplain revegetation, placement of large wood,
  - Maximum Scale – may include channel excavation, engineered log jams, levee or revetment modifications, gravel mined pond restoration to create shallow off-channel habitat

Vicinity Map of Recommended Plan



Aerial Map of Recommended Plan



Conclusions

- Primary connections via backwater channels
- Invasive species management
- Human access and management
- Extensive reuse of mined materials – reduces costs and provides shallow water habitat
- ELJs and riparian restoration to promote long-term sustainability
- Work in concert with other actions in watersheds

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