

## CASE STUDY

### City of La Grande's Reuse Wetlands (Ladd Marsh) 18 Years Later

2011 Idaho DEQ Water Reuse Conference

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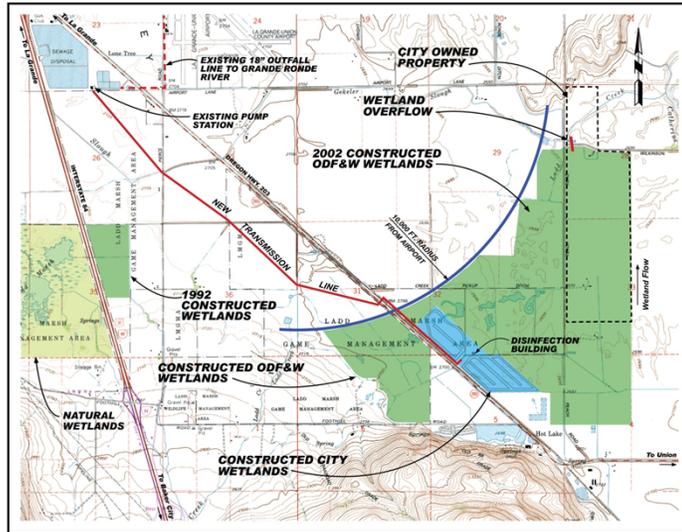
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## Background

- City of La Grande and ODFW
- Ladd Marsh Restoration
- 1992 Reuse Wetlands
- 2002 Reuse Wetlands



# Ladd Marsh Restoration



# 1992 Reuse Wetlands



## Ladd Marsh Aerial Photo



## Wetlands Types

- Free-water-surface (FWS) constructed wetlands (Ladd Marsh)
- Subsurface-flow (SF) constructed wetlands
- Floating aquatic plant systems



## Wetland Purpose

- What is the main purpose of a wetland?
  - Water disposal (City of La Grande)
  - Nutrient removal
  - Pathogen control (City of La Grande)
  - Wildlife enhancement (ODFW)
  - Water quality improvement
  - Dechlorination
- Design changes based on purpose
- Multiple purposes can be achieved



## Water Disposal

- Evapotranspiration
  - Evaporation vs. crop consumptive use
- Controlled seepage
  - Liners add large costs to project
  - Geology and soil types
- Indirect discharge
  - Location, location, location



## Water Quality

- Natural wetland vs. Reuse wetland
- BOD, TSS, pH, e-coli, nutrients, salinity
- Industrial users:
- Appropriate water quality?
  - ▣ Water quality determination
  - ▣ Natural wetlands have large range of water quality



## Groundwater Quality

- Soluble BOD
- Nutrients
- Cations/anions
- Ground filtration
- Water quality improvement in certain agricultural areas

## Mosquitoes

- Ladd Marsh studies
- Vector control
- Predators
- Political perception



## Wildlife Enhancement

- Duck brood numbers increased and nesting times increased
- Migratory bird numbers increased
- Shore bird species and numbers increased
- Annual birdathon
- Amphibians increased
- Vegetation species increased
  - Westside clover
  - Large wood was not planted to limit raptors

## Wildlife Enhancement



## Other Wetland Projects

- Athena
  - ▣ Water disposal
  - ▣ Indirect discharge
- Prineville
  - ▣ Selenium
- Oregon Department of Agriculture
  - ▣ Nutrient reduction for irrigation return flows
- Others
  - ▣ Roseburg, Arcadia, Oregon Gardens, EPA 1993 Case Studies



## Your Project

- Wetland purpose
- Location
- Geology, soil types
- Treated water quality
- Groundwater quality
- Permit methodology



## Questions and Answers

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