Improving WQ in northern Malheur County

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&
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Oregon’s Malheur County
Lifeblood
Project Area

- 143,000 irrigated acres (225 square miles)
- Rowcrops, pasture, livestock
Irrigation

- Four main irrigation districts
- 100 years old
- Malheur & Snake Rivers
- 2350 miles of canals
- 375 miles of drains
- Depend on reuse of field runoff
View as System

Below = WID

Above = OID
Pollutant Inputs

- Livestock access
- Irrigation-induced erosion
Efforts Up-to-Date

- Implement projects
- Monitor selected sites

Hard to show improvements
TMDLs

- Reduce phosphorus in rivers by >80%
- Focus on irrigation-induced erosion

Bottom line: keep soil out of water
Partners

- Landowners
- **Irrigation Districts:** Owyhee, Vale-Oregon, Warmsprings
- Malheur County SWCD
- Malheur & Owyhee Watershed Councils
- OSU Extension Service
- State agencies:
  - Agriculture
  - Environmental Quality
  - Watershed Enhancement
- Federal agencies
  - Bureau of Reclamation
  - Natural Resources Conservation Service
  - Bureau of Land Management
Current Efforts

A. Map Irrigation Districts

B. Address WQ
   1. Identify drains
   2. Delineate ‘drainsheds’
   3. Focused WQ monitoring
   4. Analyze
   5. Prioritize
   6. Projects
   7. Monitor WQ over time
A. Mapping

- Use GIS cartography & advanced technology
- Map irrigation systems
- Develop an assessment/action plan
  - Improve water quality
  - Decrease water use
  - Reduce soil loss
  - Motivate landowners
A. Mapping
A. Mapping

- Waterways & structures
- Condition of structures
- Water rights
- Soils
- LiDAR data

13,000+ datapoints
3 Irrigation Districts
Structural Data Collected

- Headgates
- Return flows
- Diversion points
- Points of delivery
- Measuring devices
- Pipelines
- Pumps
- Fences
- Field drains to canals and laterals....
Example of GIS data....
B. WQ Small Bite (WID)
1. Identify in and outflows
2. Delineate ‘drainsheds’

Benefit of LiDAR vs. Conventional Mapping
2. Delineate ‘drainsheds’
3. Focused WQ monitoring

- 43 sites
- 3 irrigation districts
- 1 irrigation season
- 2 x/month
- 15 sampling events
- 5 samplers
- 1 lab
- 675 data records
- 3 GIS persons
Sampling WQ

- Nitrate
- Phosphorus (total & ortho)
- TSS
- *E. coli*
Measuring Flows

**Types**
- Culverts
  - Round
  - Box
- Weirs
  - Ramp
  - Cipoletti
  - Rectangular
- Open ditches
- Rivers

**Methods**
- Flow meters
- Channel X-sections
- Weir meters
- Gauges
- Water depths
- Flow tables
- NRCS calculations
Training irrigation district staff
4. Analyze

Total P: Concentration vs. Load

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Sediment: Load

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mg/L

lb/day
4. Analyze
5. Prioritize
6. Projects

On-farm & ID infrastructure
7. Show progress

2011

2021 = ??
Challenges

• People
  - Data privacy concerns/land use
  - Varying perceptions of how water can and should be used

• Too much info

• Naivety
  - Expense
  - Time
  - Expertise
Benefits

• People
  - System-thinking
  - Coordination amongst districts
  - Awareness of issues

• Expertise

• Cleaner water