Improving WQ in northern Malheur County

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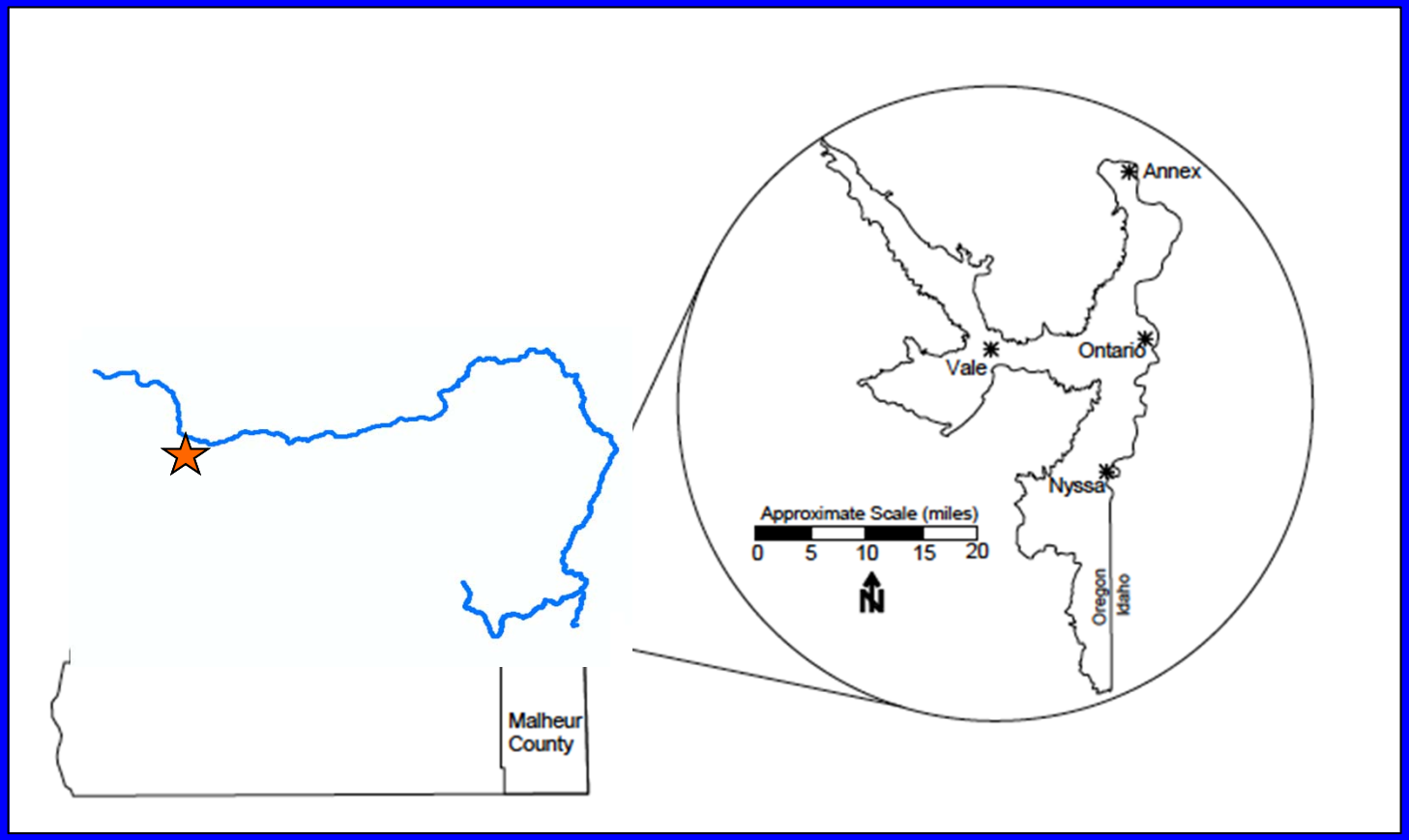
&

Terry Finnerty, Malheur County SWCD

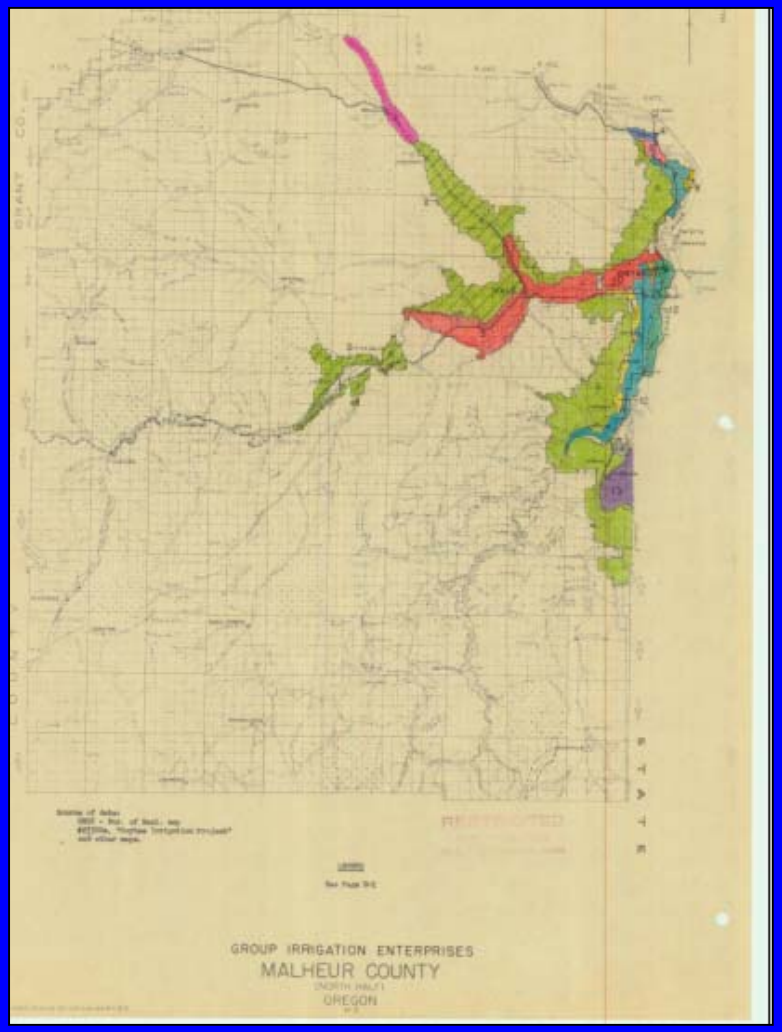
Oregon's Malheur County



Lifeblood

Project Area

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*

Above = OID

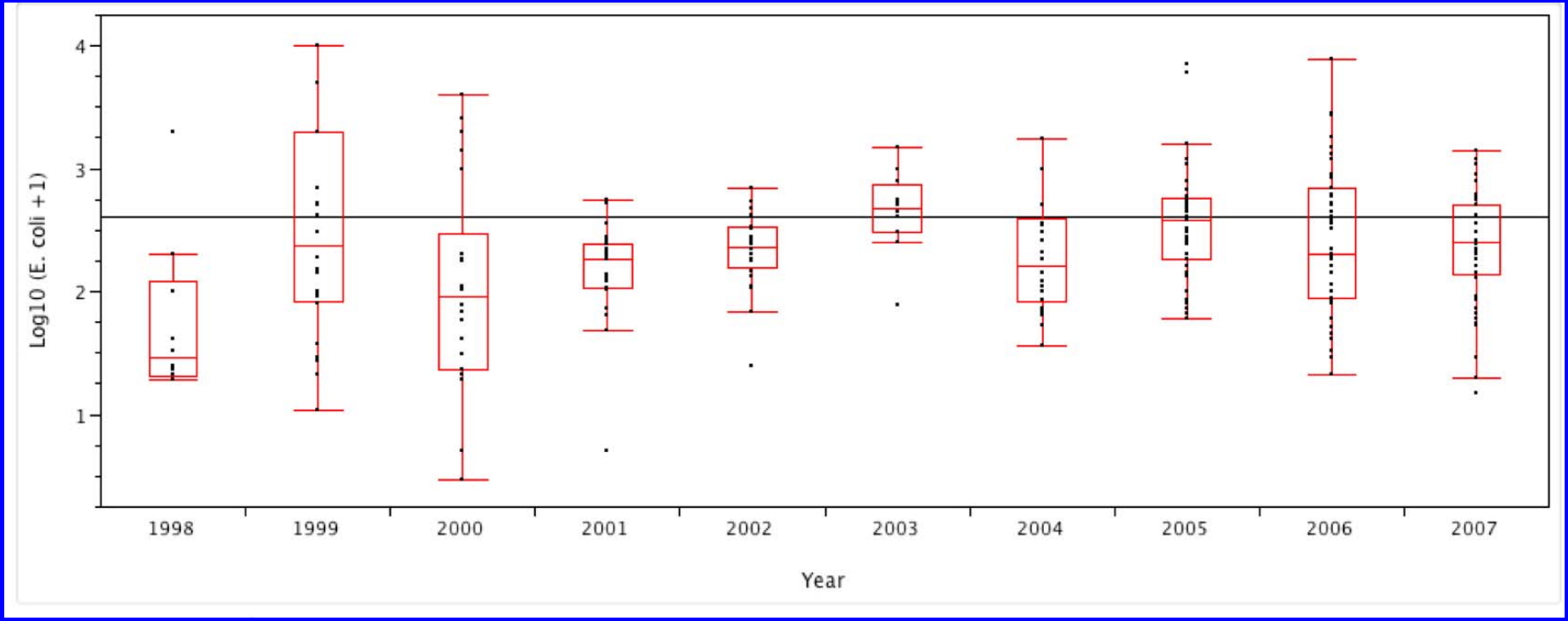
Below = WID

Pollutant Inputs

- Livestock access
- Irrigation-induced erosion

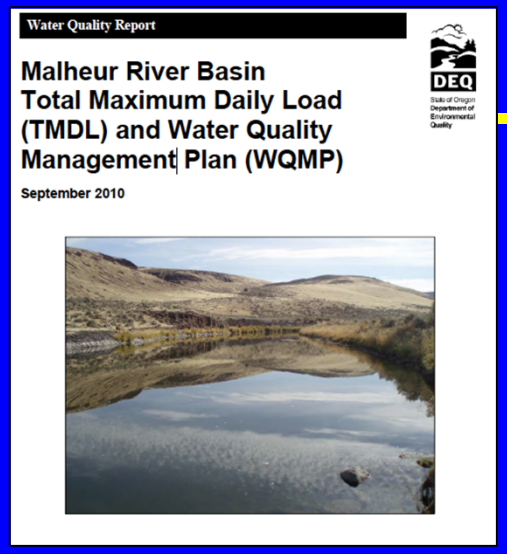
Efforts Up-to-Date

- Implement projects
- Monitor selected sites



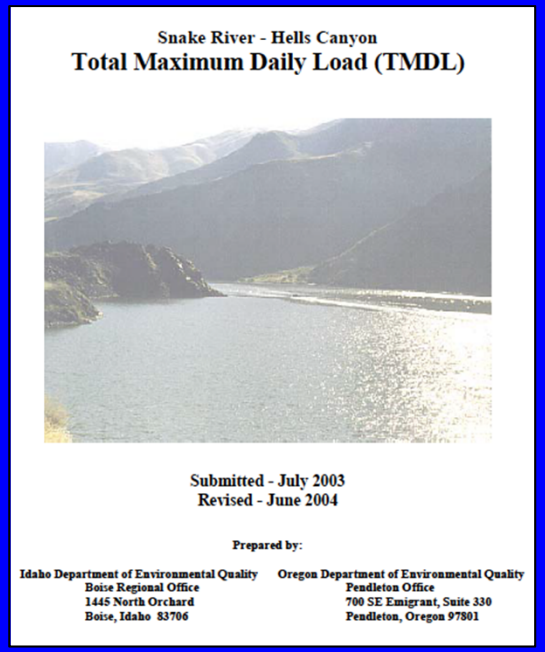
Hard to show improvements

TMDLs


Water Quality Report

Malheur River Basin
Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP)

September 2010


Snake River - Hells Canyon
Total Maximum Daily Load (TMDL)

Submitted - July 2003
Revised - June 2004

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- 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

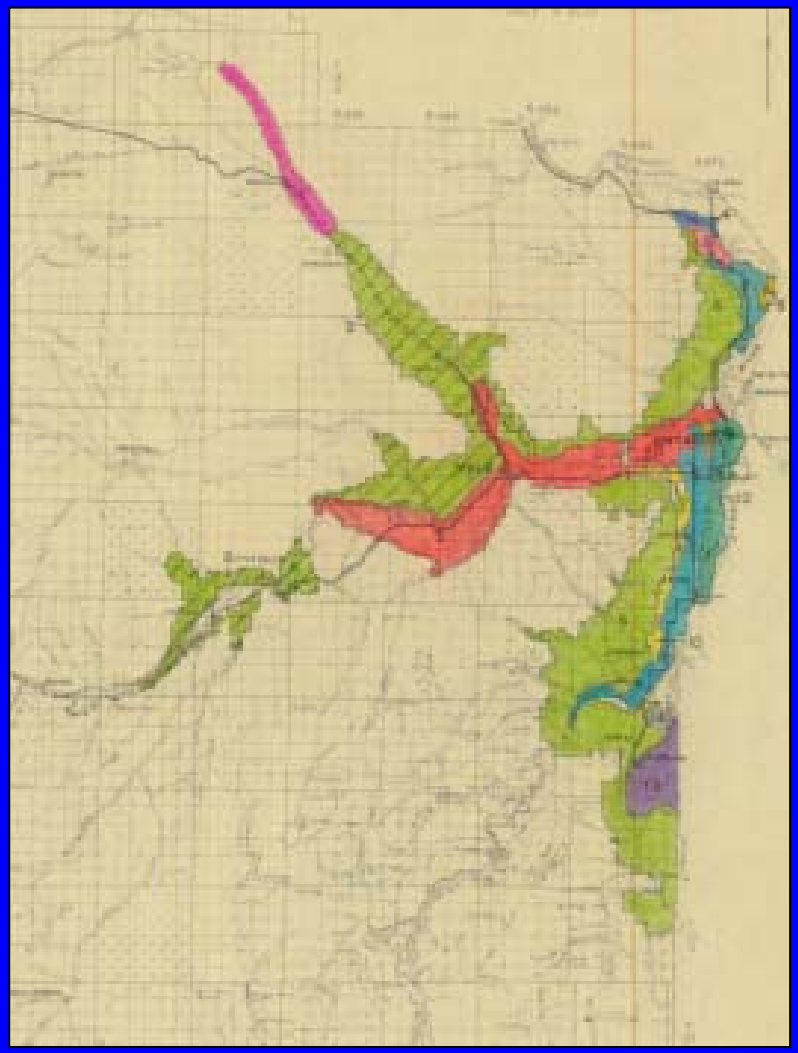
B. Address WQ

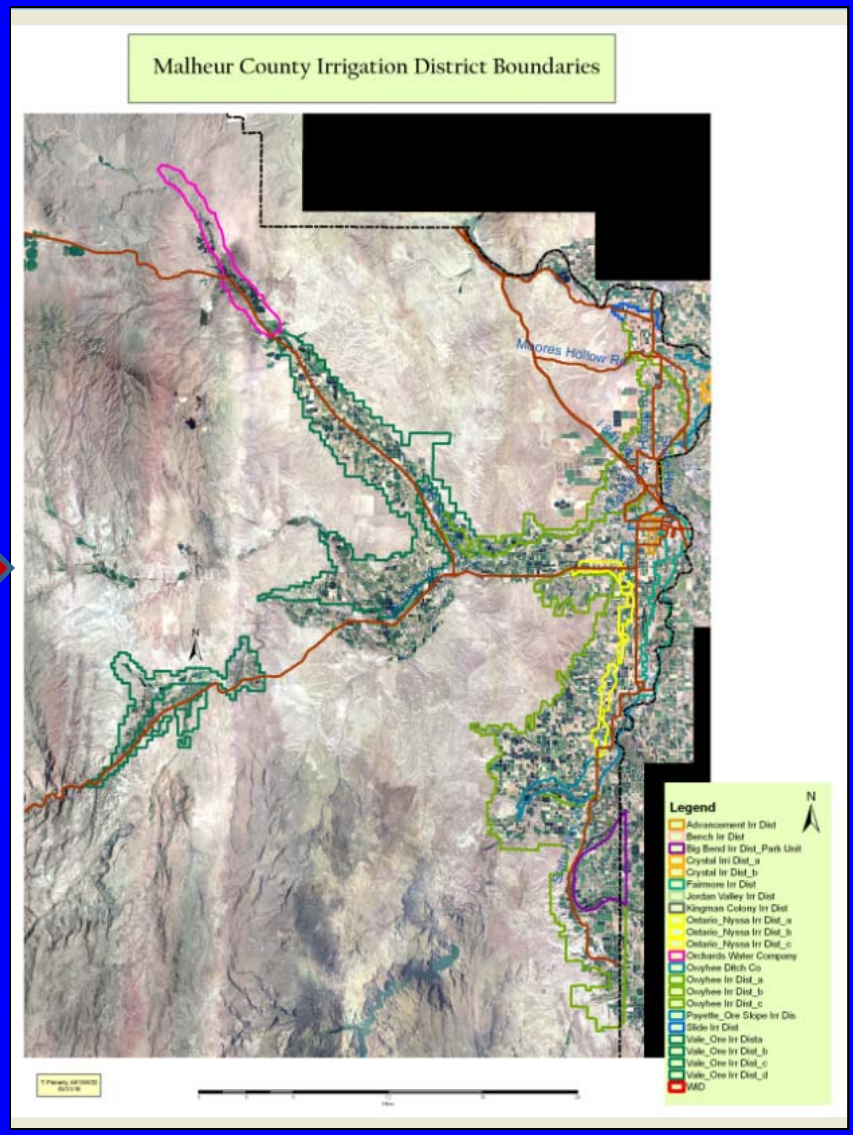
1. Identify drains
2. Delineate ‘drainsheds’
3. Focused WQ monitoring
4. Analyze
5. Prioritize
6. Projects
7. Monitor WQ over time

A. Mapping

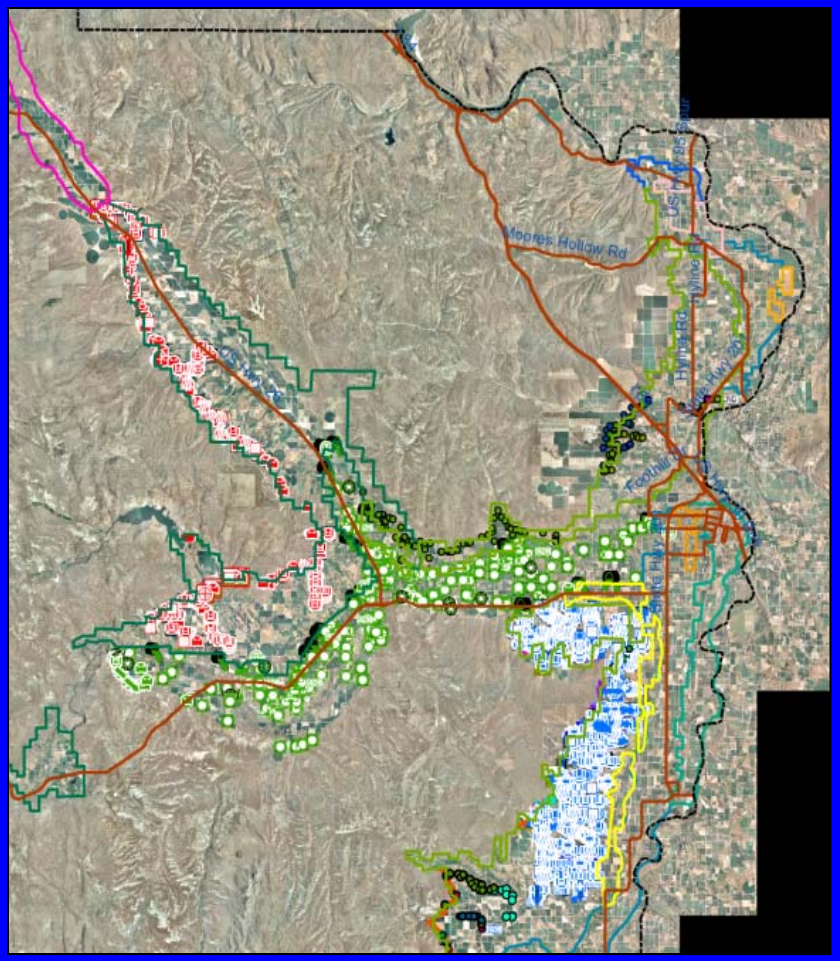
- *Use GIS cartography & advanced technology*
- *Map irrigation systems*
- *Develop an assessment/action plan*
  - *Improve water quality*
  - *Decrease water use*
  - *Reduce soil loss*
  - *Motivate landowners*

A. Mapping





A. Mapping

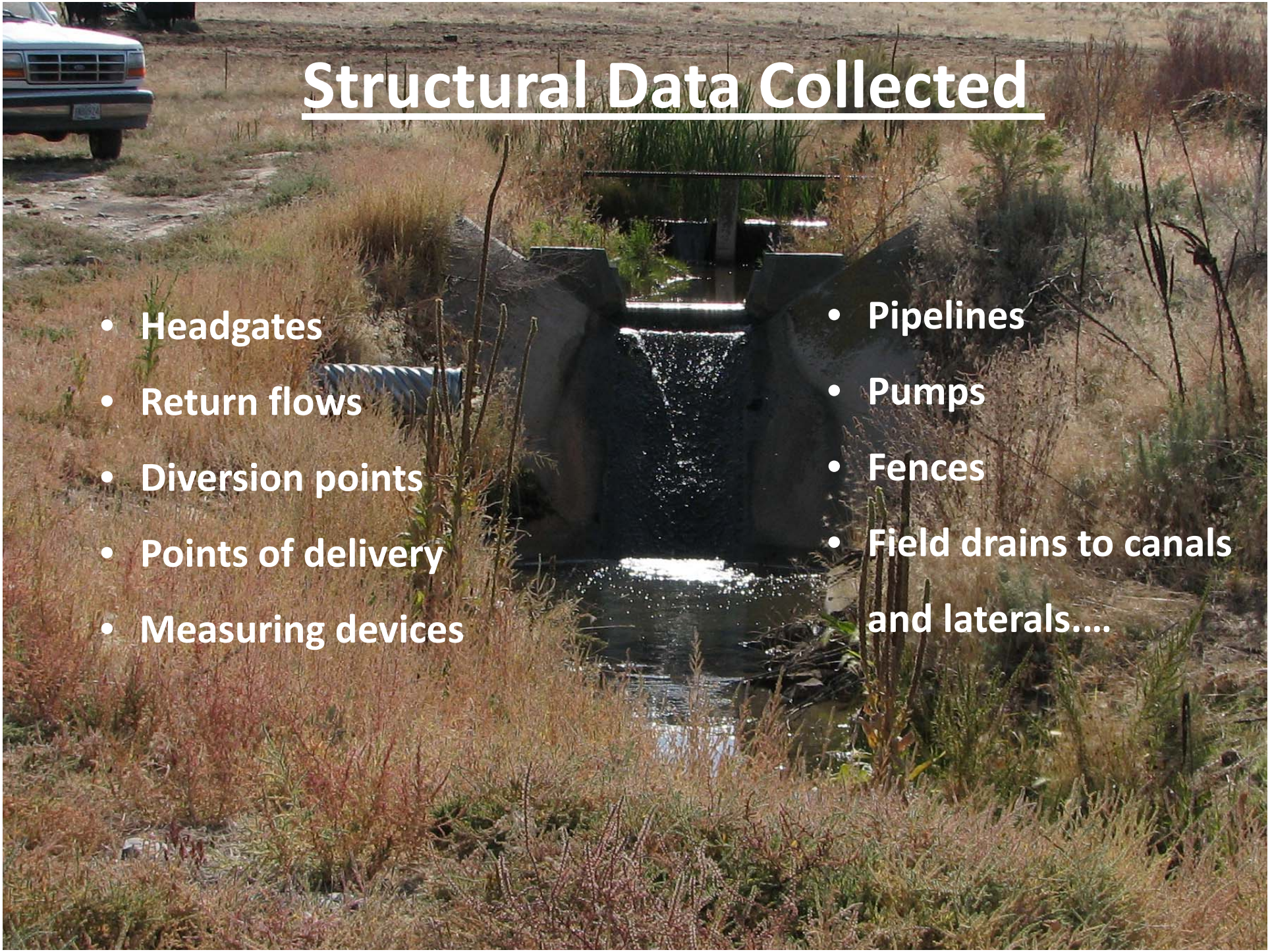


- Waterways & structures
- Condition of structures
- Water rights
- Soils
- LiDAR data

13,000+ datapoints

3 Irrigation Districts

Structural Data Collected



- Headgates
- Return flows
- Diversion points
- Points of delivery
- Measuring devices

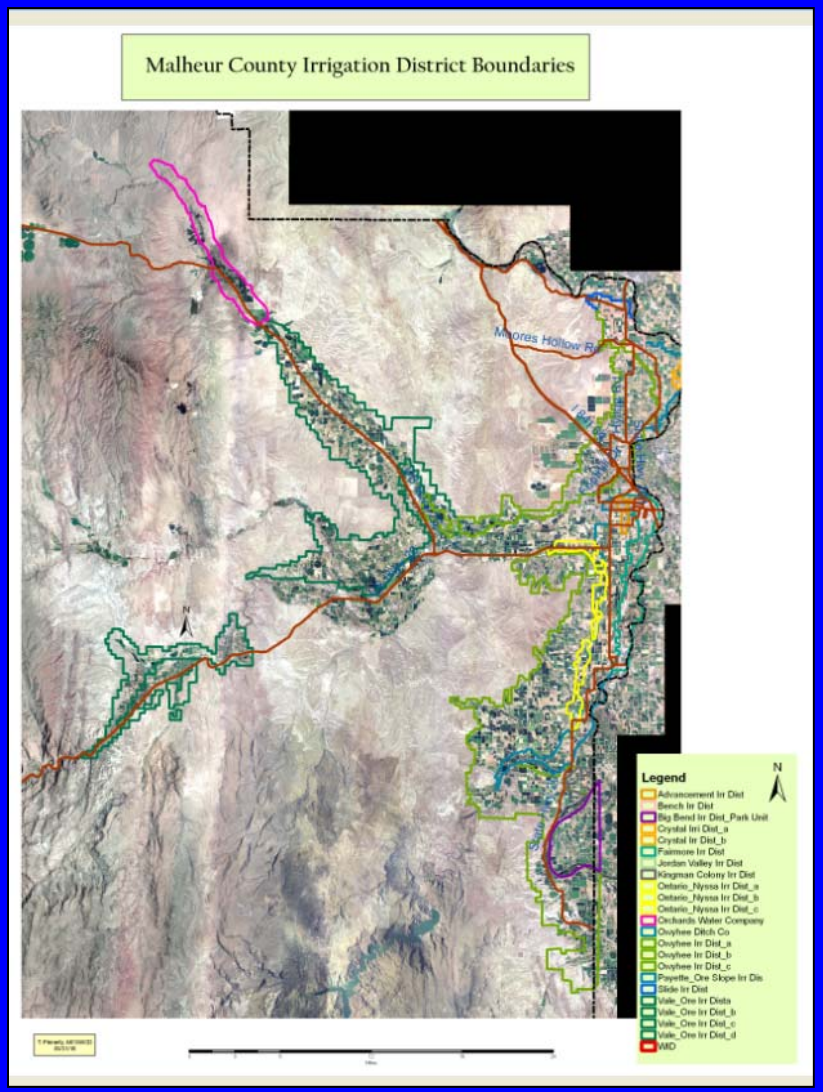
- Pipelines
- Pumps
- Fences
- Field drains to canals and laterals….

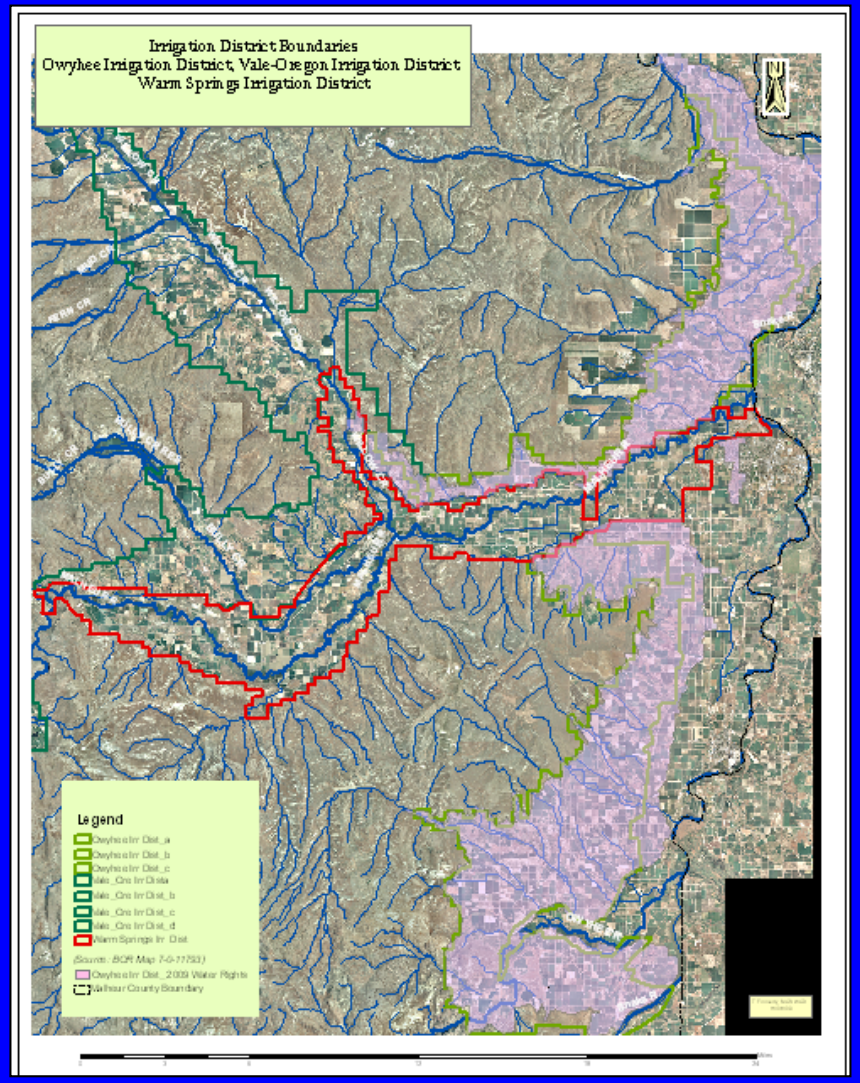
Example of GIS data….

Attributes of HG

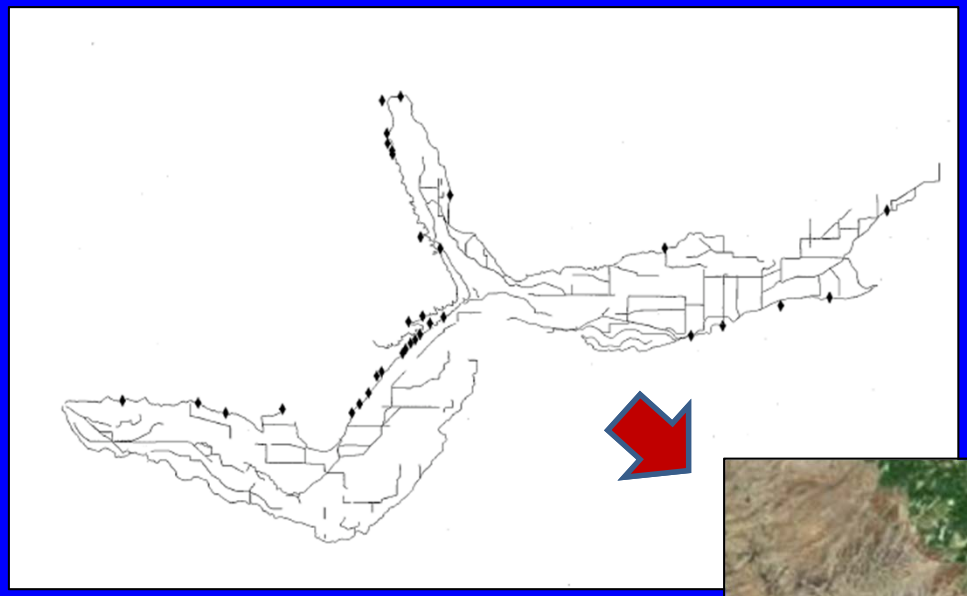
FID	Shape	OBJNAME	Category	Size	Irrigated_	Gate_Numbe	Land_Owner	Condition
0	Point ZM	703	Field	12	0	V-15		Fair
1	Point ZM	705	Field	16	0	V-1		Fair
2	Point ZM	706	Field	12	0	V-2		Fair
3	Point ZM	707	Field	15	0	V-3		Fair
4	Point ZM	709	Field	16	0	V-4		Fair
5	Point ZM	712	Field	16	0	V-5		Fair
6	Point ZM	714	Field	12	0	V-6		Fair
7	Point ZM	715	Field	15	0	V-7		Fair
8	Point ZM	716	Field	13	0	V-8		Fair
9	Point ZM	721	Field	12	0	V-9		Fair
10	Point ZM	722	Field	16	0	V-10		Fair
11	Point ZM	724	Field	12	0	V-11		Fair
12	Point ZM	725	Field	12	0	V-12		Fair
13	Point ZM	726	Field	12	0	V-13		Fair

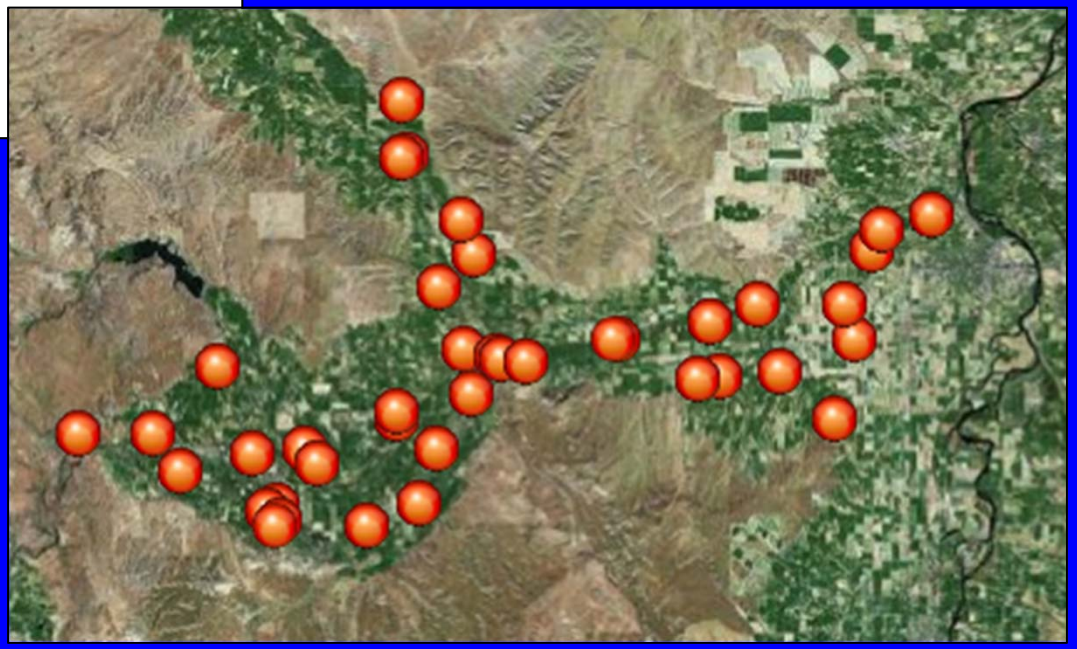
B. WQ Small Bite (WID)





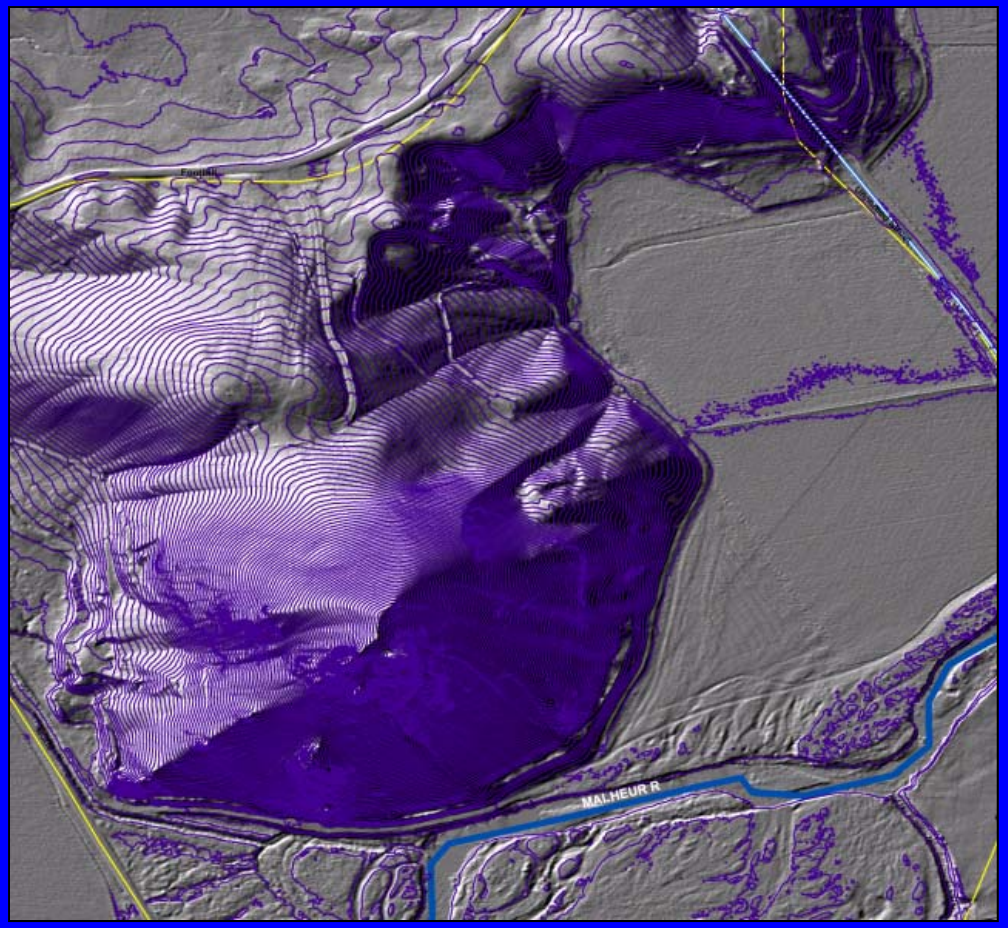
1. Identify in and outflows

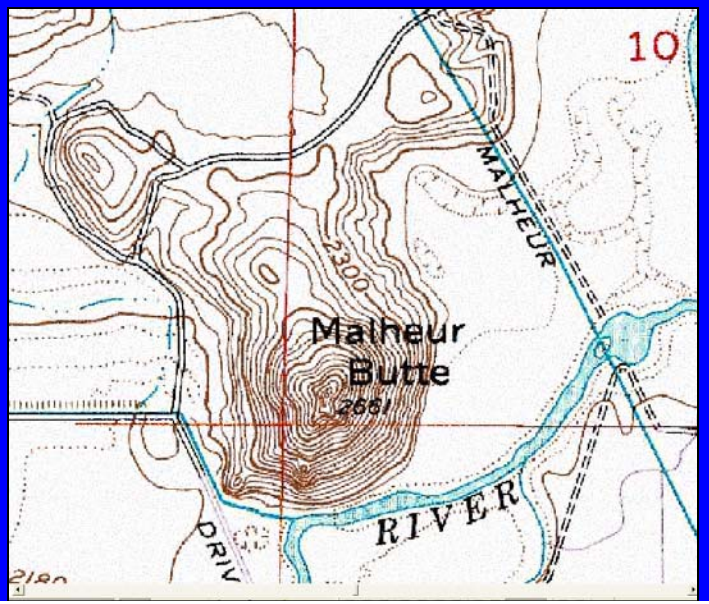




2. Delineate ‘drainsheds’

Benefit of LiDAR vs.
Conventional Mapping





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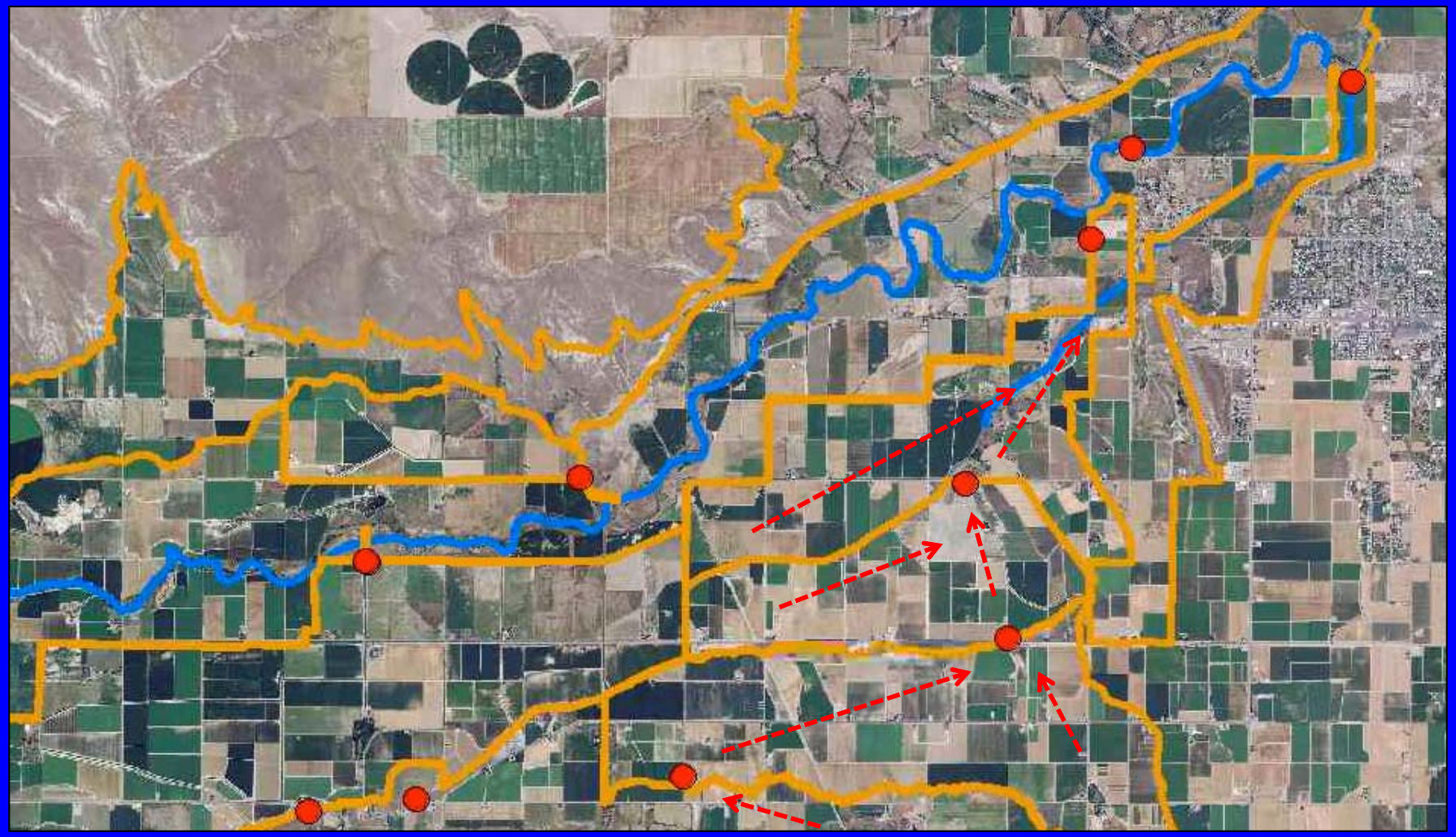
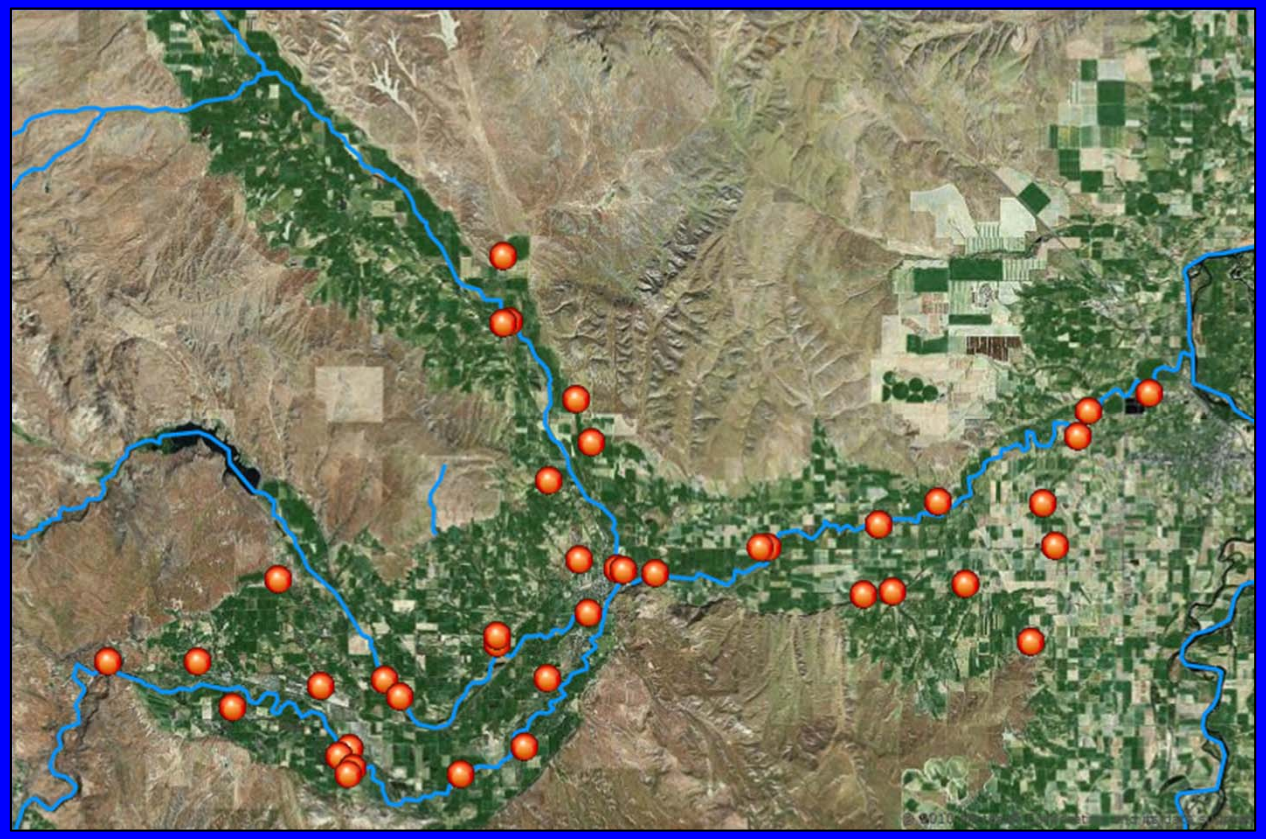


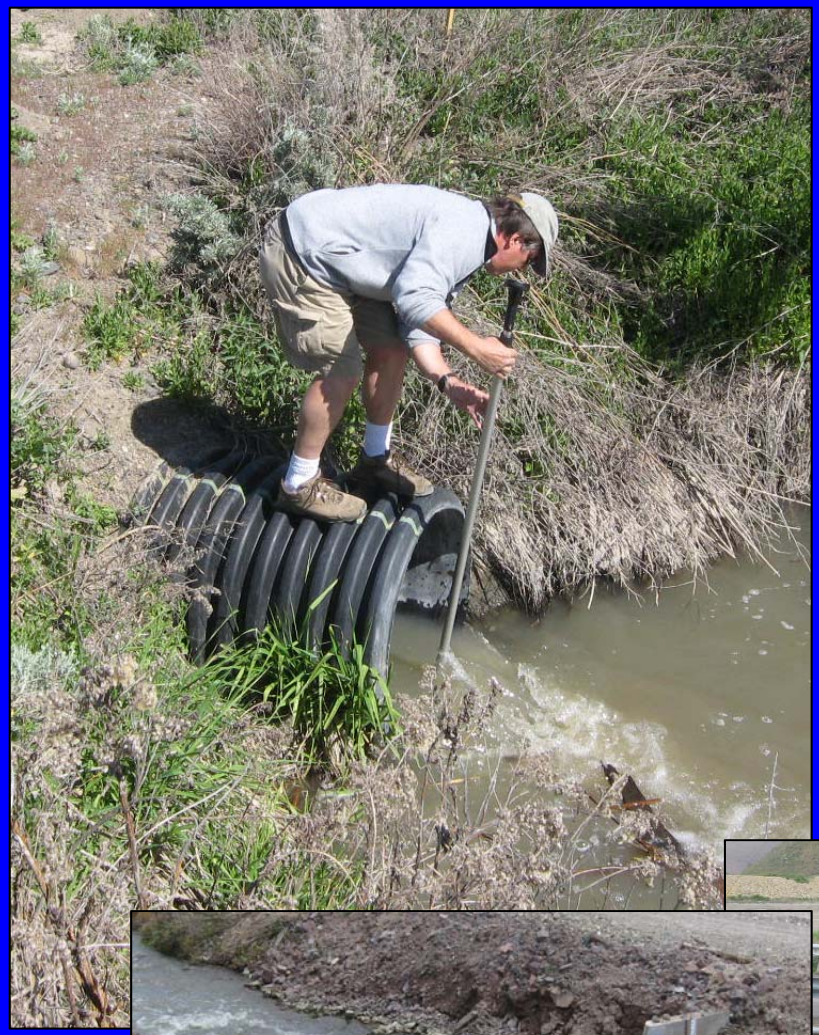
3. Focused WQ monitoring



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

_Site ID	Flow	Date_Sampled	Ortho	TPhos	Load_TP..
VOID5	3.0	9/20/2011	0.2	0.91	15
WID4	10	7/20/2011	0.350	0.930	50
WID4	10	7/20/2011	0.350	0.940	51
WID4	2	8/2/2011	0.340	0.970	10
WID18	66	7/6/2011	0.270	1.00	356
WID16	20.8	7/20/2011	0.230	1.00	112
WID18	124	7/19/2011	0.224	1.1	735
WID16	5.43	7/6/2011	.26	1.4	41

mg/L

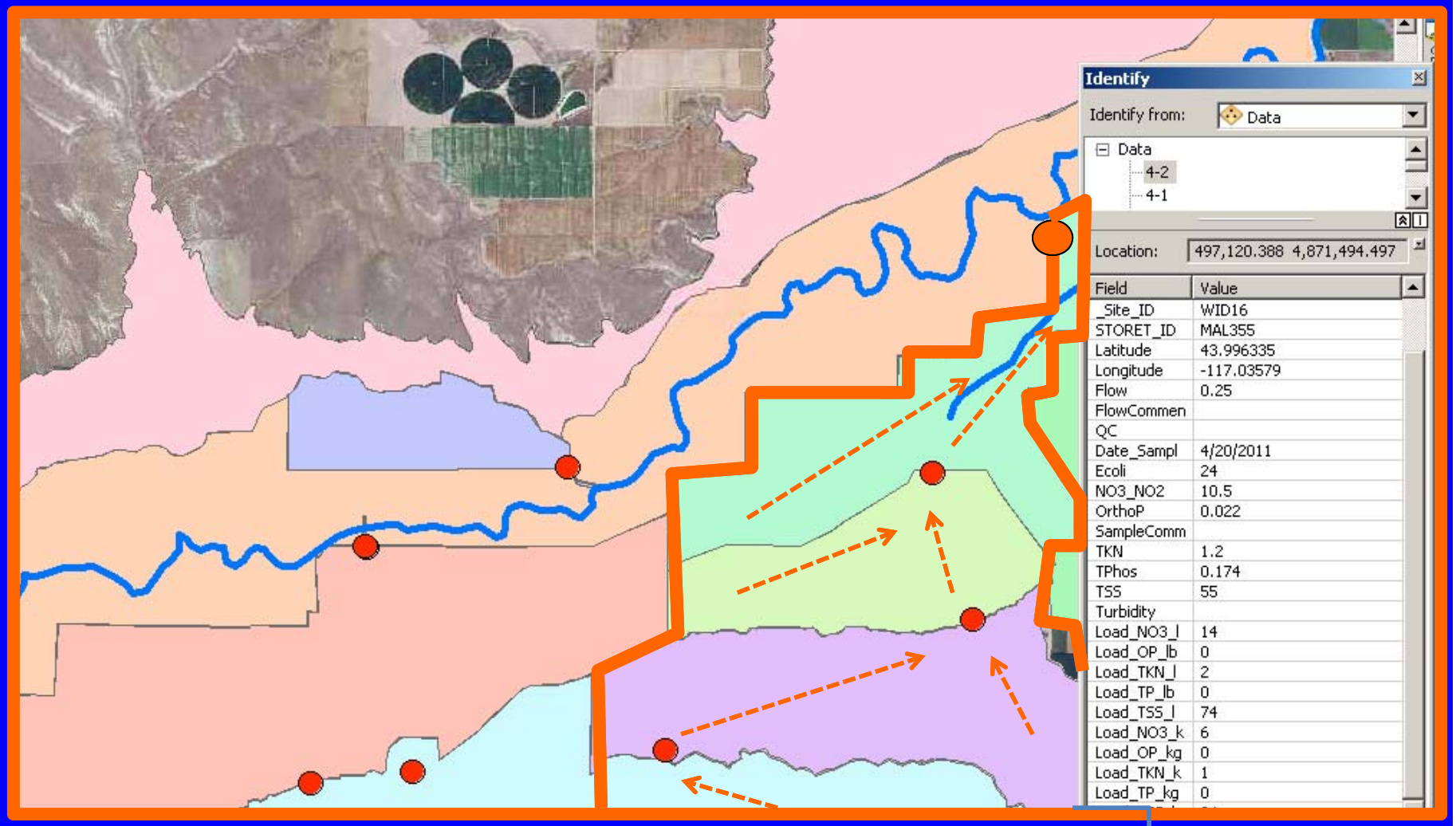
_Site ID	Flow	Date_Sampled	OrthoP	TPho	Load_TP
WID18	66	7/6/2011	0.270	0.890	317
VOID1	329	7/18/2011	0.130	0.190	337
WID18	66	7/6/2011	0.270	1.00	356
VOID1	318	7/5/2011	0.131	0.210	360
WID11	228	9/21/2011	0.26	0.36	442
WID11	236	6/22/2011	0.230	0.496	631
VOID1	470	6/21/2011	0.110	0.250	633
WID18	124	7/19/2011	0.224	1.1	735

lb/day

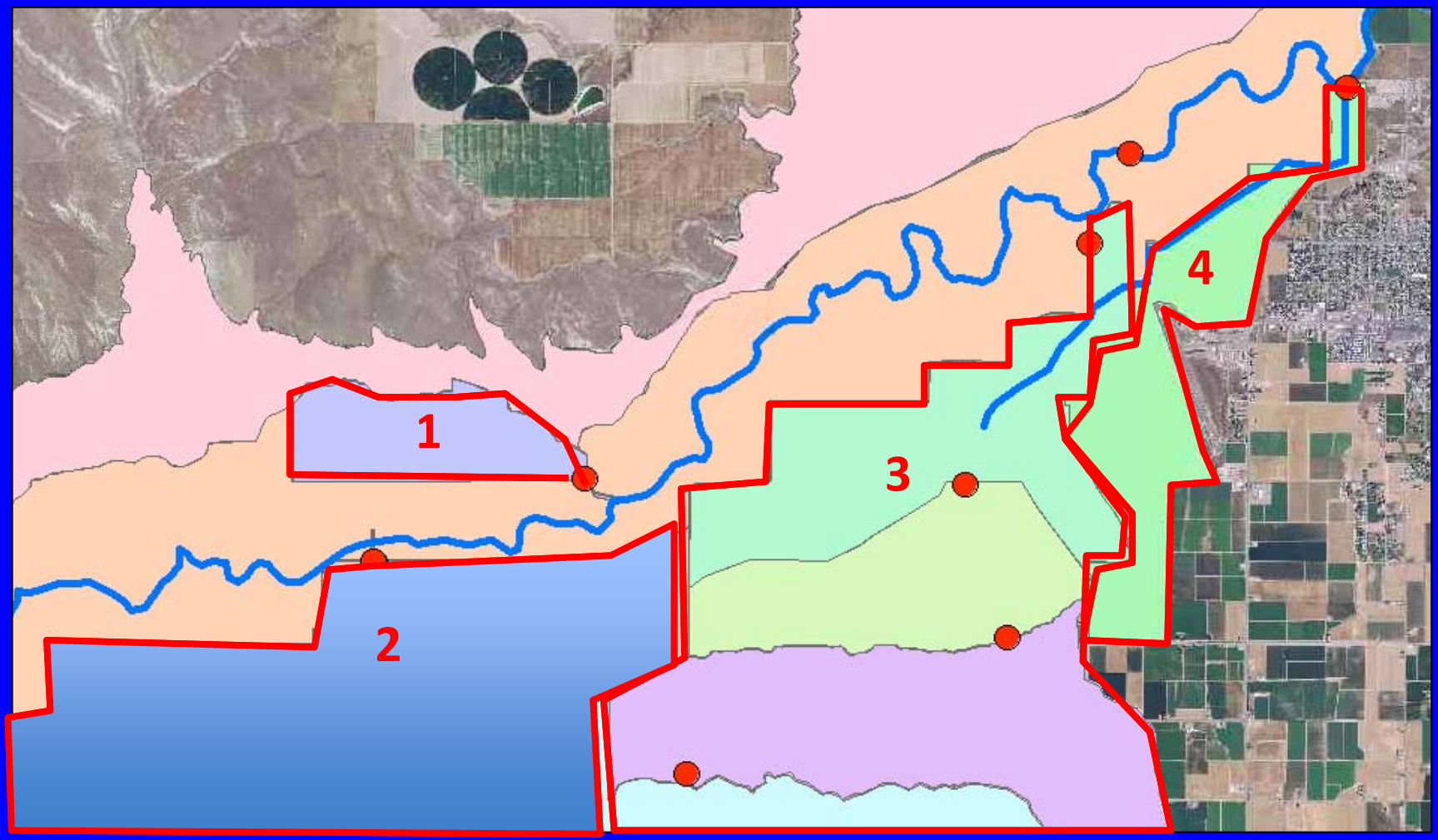
Sediment: Load

_Site ID	Flow	Date_Sampled	TSS	Load_TSS_lbp...
VOID1	470	6/21/2011	36.	91199
WID11	83	7/19/2011	240.	107369
WID17	60	6/7/2011	339	109633
WID11	228	9/21/2011	90	110603
VOID8	85	6/21/2011	264.	120952
WID17	67	5/18/2011	340	122784
WID18	70	5/2/2011	416	156957
WID18	66	7/6/2011	627.	223049
WID18	107	6/6/2011	393.	226655
WID18	66	7/6/2011	649.	230875
WID18	124	7/19/2011	481	321481
WID11	236	6/22/2011	274.	348539

4. Analyze


Identify
Identify from:
Data
Data
4-2
4-1
Location:
497,120.388 4,871,494.497
Field
Value
_Site_ID
WID16
STORET_ID
MAL355
Latitude
43.996335
Longitude
-117.03579
Flow
0.25
FlowCommen
QC
Date_Sampl
4/20/2011
Ecoli
24
NO3_NO2
10.5
OrthoP
0.022
SampleComm
TKN
1.2
TPhos
0.174
TSS
55
Turbidity
Load_NO3_l
14
Load_OP_lb
0
Load_TKN_l
2
Load_TP_lb
0
Load_TSS_l
74
Load_NO3_k
6
Load_OP_kg
0
Load_TKN_k
1
Load_TP_kg
0

5. Prioritize

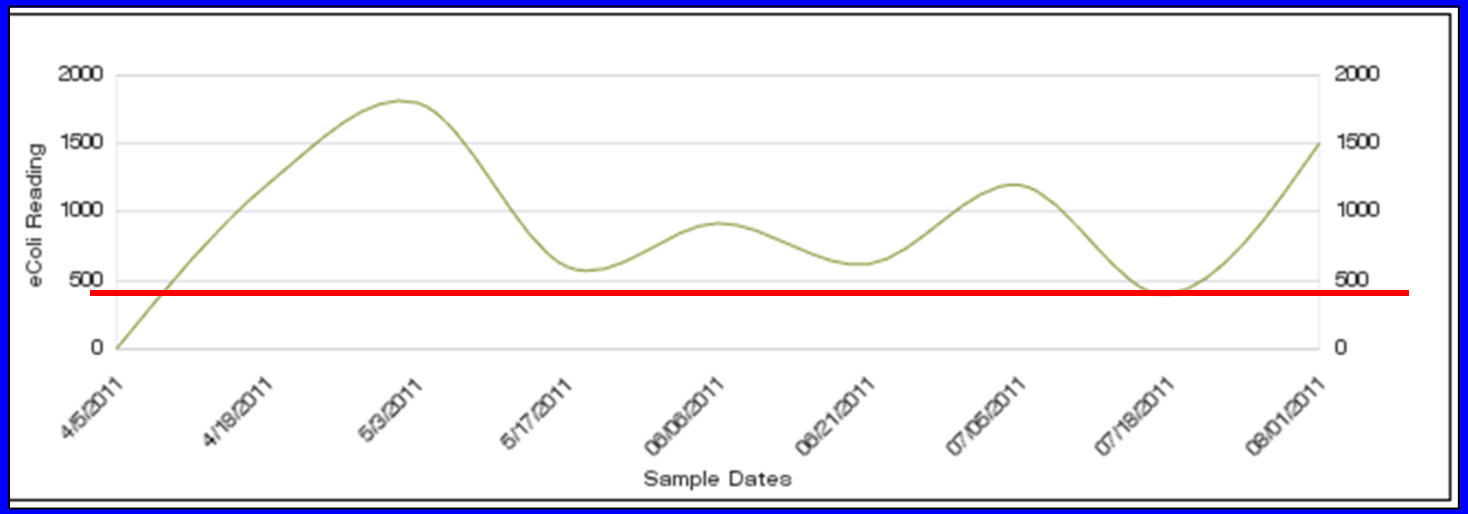


6. Projects

On-farm &
ID infrastructure

7. Show progress

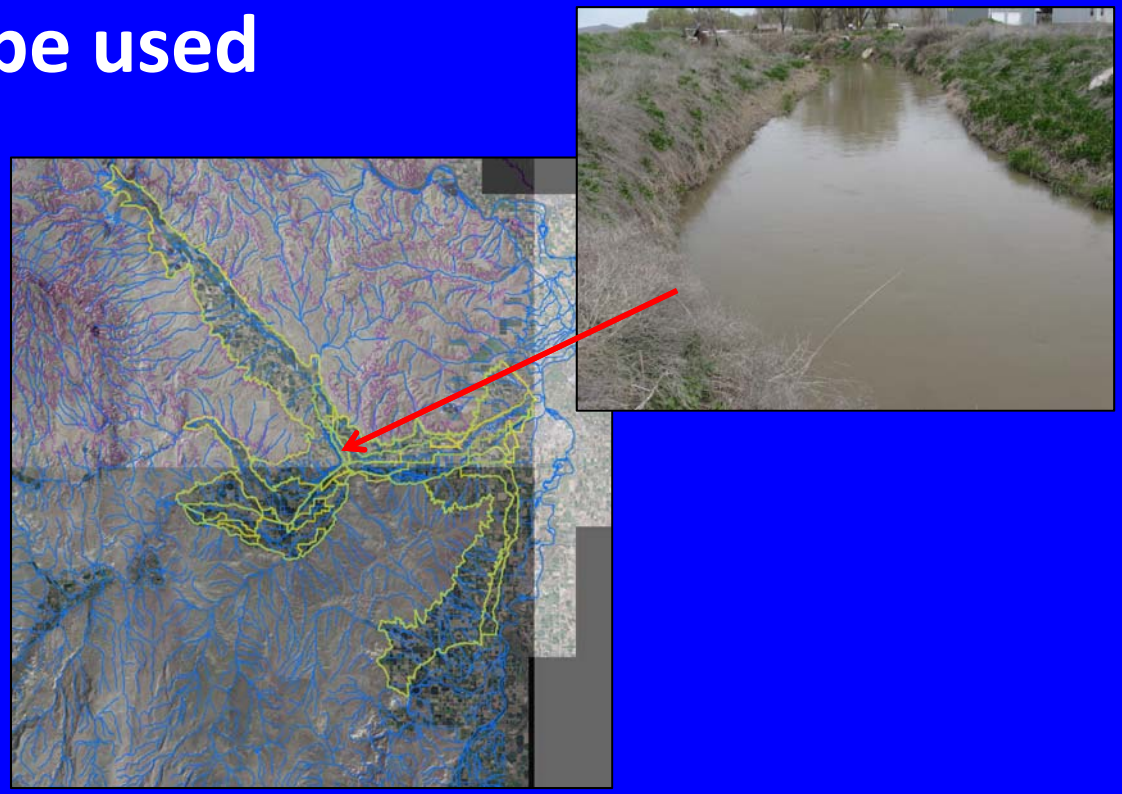
2011



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