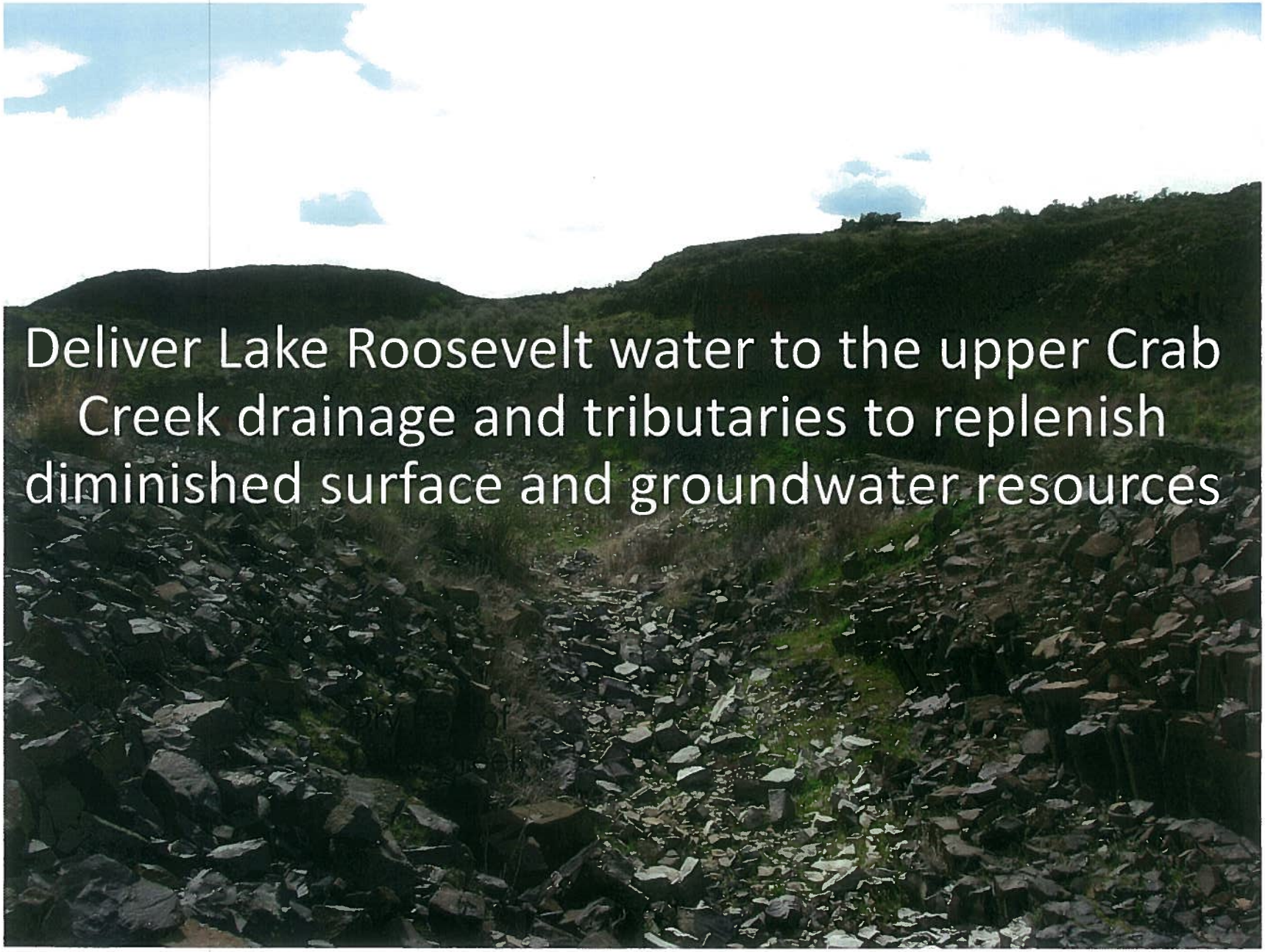
LINCOLN COUNTY
PASSIVE REHYDRATION PROJECT: PRE-FEASIBILITY REPORT

LINCOLN COUNTY CONSERVATION DISTRICT
With
GSI Water Solutions, Inc.
WNR Group, Inc.
HDR, Inc.

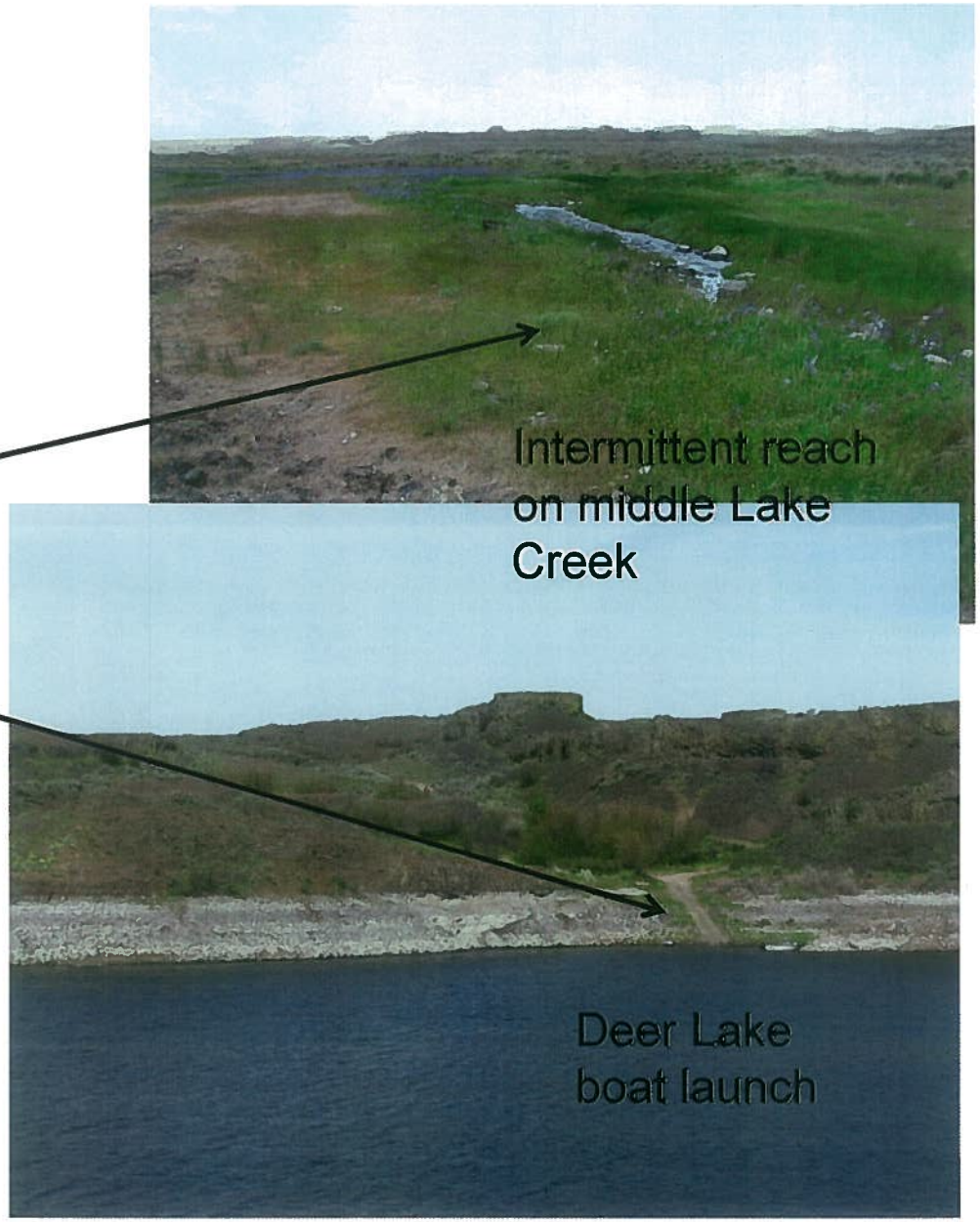
November-December, 2010

REHYDRATION PROJECT



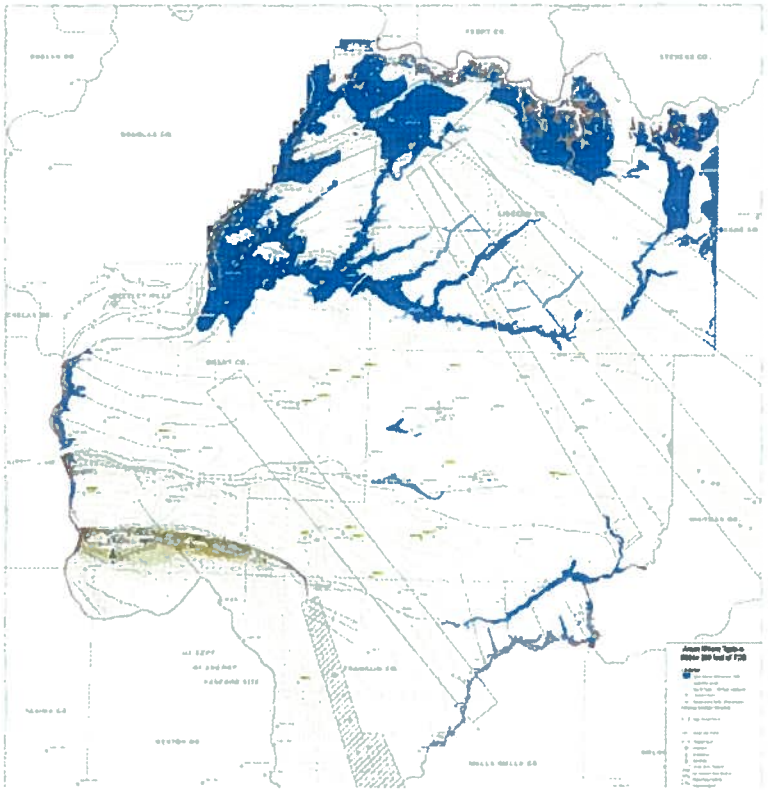
REHYDRATION PROJECT: Benefits

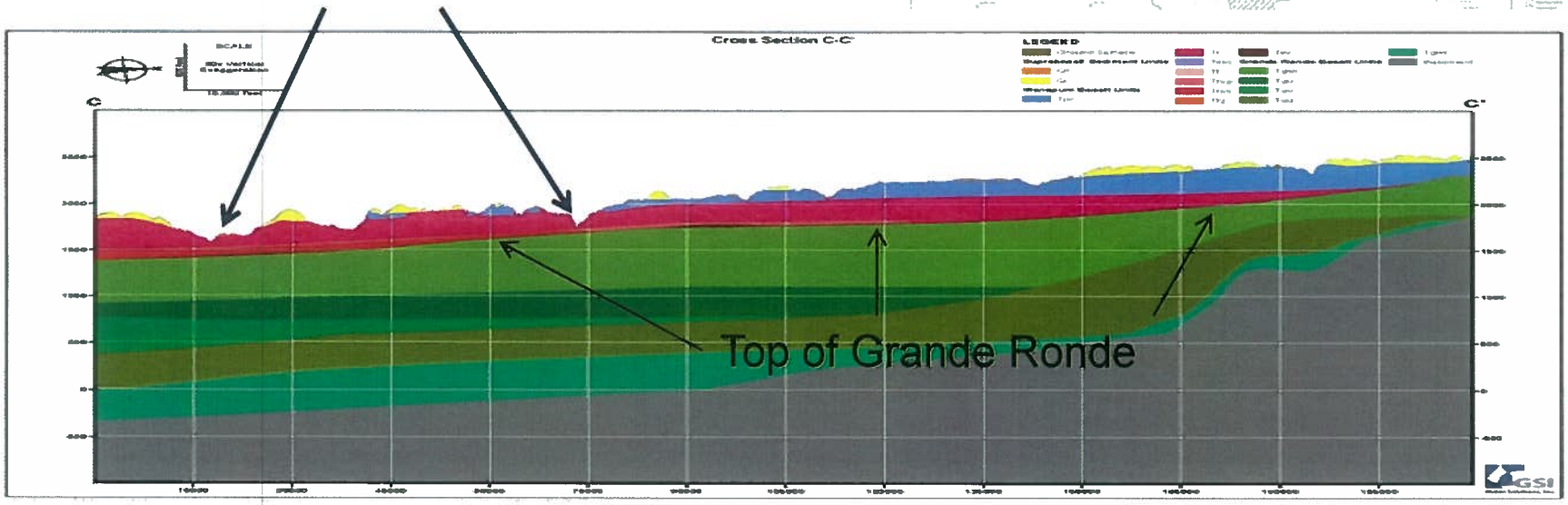
- Return water to dry lakes and streams:
  - Revitalize habitat
  - Improve recreation



REHYDRATION PROJECT: Benefits

- Return water to dry lakes and streams:
  - Water to NE Odessa SubArea
  - Aquifer recharge





REHYDRATION PROJECT:
4 Phases

1. Prefeasibility – area wide, fatal flaws, water availability, year 1.
2. Feasibility – project plans, 10-20 cfs pilot, 1-3 drainages, year 2.
3. Pilot Project – delivers water, proof of concept, measures benefits, years 3 to 5?
4. Expansion – full operation

REHYDRATION PROJECT:
Prefeasibility Project Report

- LCCD leading, funded by Ecology, Columbia River Program
- For LCCD
  - GSI: Kevin Lindsey (PM-Hydrogeologist), Molly Reid
  - WNR: Gene St. Godard (Water Rights, Outreach, Hydrogeologist)
  - HDR: Steve Thurin (Routing, Governance, Hydrologist)
  - Lincoln County Planning (GIS)

SCOPE OF WORK
PREFEASIBILITY ANALYSIS

- Public Outreach and Involvement
- Water Right Availability Survey
- Governance and Management Evaluation
- Public/Private Benefit Analysis
- GIS Screening
  - Soils Survey
  - Land Ownership
  - Geology (bedrock and structural)
- Geology/Hydrogeology Viability
- Routing Viability Analysis
- Surface Water/Groundwater Distribution Viability (1/3 v. 2/3 requirements)
- Field Survey of Drainages
- Develop Conceptual Model
- Recommendation of Priority Drainages
- ANY FATAL FLAWS?

PREFEASIBILITY PROJECT:
Presentation Outline

- Common drainage issues
- Issues specific to drainages
- Rankings
- Recommendation, includes preliminary water budget and hydrologic model
- Path forward

COMMON ISSUES:
Water Availability

- Water rights will control availability
- Need:
  - Pilot project, 10-20 cfs per drainage
  - Long range operations, >100 cfs

COMMON ISSUES:
Water Availability – Pilot, 10-20 cfs

- Preliminary Permit (reservoir permit)
  - Conditioned, interruptible, multi-year
- Temporary Use Authorization
  - Instream flow and Bi-op conditions
- USBOR M&I Water
  - 13 cfs max, limited to no availability
- USBOR Existing Rights Lease/Agreement
  - Unlikely due to limitations
- Private Water Right Leases
  - Availability?

COMMON ISSUES: Water Availability

- Final Water Quantity Needed:
  - Unknown, >100 cfs?, >50,000 acre-ft?
- USBOR Water Rights:
  - May be negotiable
  - Current claims on water above Priest Rapids Dam
  - 1943 Crab Creek water ight
- Private Water Rights Big Effort:
  - High Cost
- Legislative Options (water banking/water trust)

COMMON ISSUES:
Water Availability

- Project Water Ownership:
  - PUD, LCWCB, other?
- Other Water Rights Impacts:
  - USBOR-Crab Creek
  - USBOR Ops at Moses Lake/Potholes Lake
- Alternative/Additive/Secondary Water Rights to Existing Groundwater Users

COMMON ISSUES:
Water Availability

- For Pilot: identify entity during feasibility
  - Will hold water rights/permits
  - Finalize water source during feasibility
- Long Term: TBD

COMMON ISSUES:
Governance

- Prefer Existing Entity – Pilot
- Needs to Contract, Plan, Design, Construct, Operate, Maintain, Hold Permits
- Authority to Distribute/Deliver Water
- Ownership of Stored Water?

COMMON ISSUES:
Governance

- Existing:
  - Lincoln PUD, USBOR, LCWCB?
- New:
  - ID, PUD?
- Finalize in Feasibility

COMMON ISSUES:
Routing on Private Land

- Infrastructure – construction/operations access agreements, rent/lease?
- Mitigating presence of water – farm land, grazing ground.
- Recreation easements, access control.
- Riparian zones – regulation, operations impacts

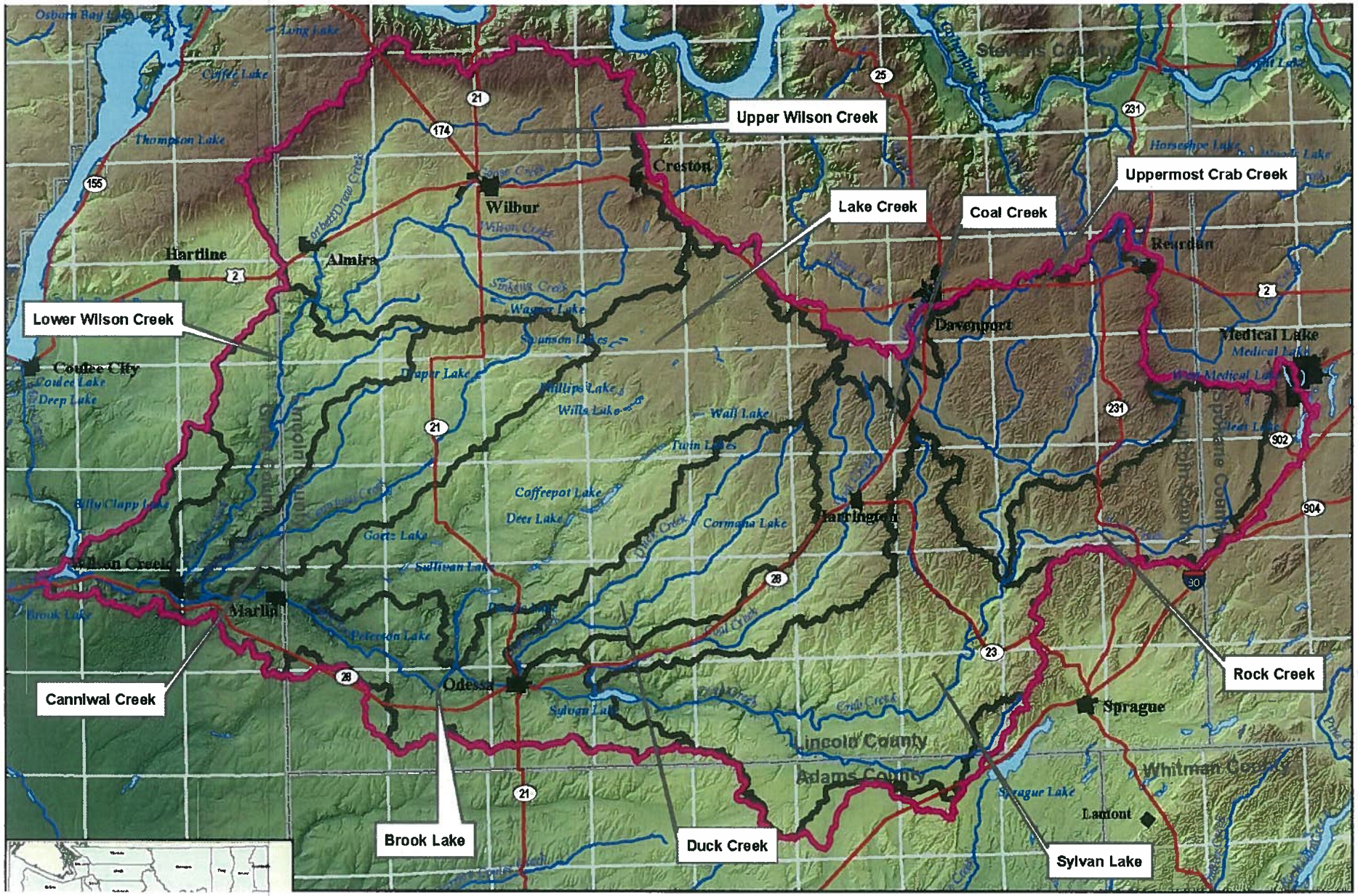
COMMON ISSUES:
Routing on Public Land

- Local – Floodways/Levees; Road Crossings; Construction Permitting; Use of County Rights-of-Way
- State – Road Crossings, SEPA on state ground?
- Federal – BLM NEPA; USNPS?

COMMON ISSUES:
Routing

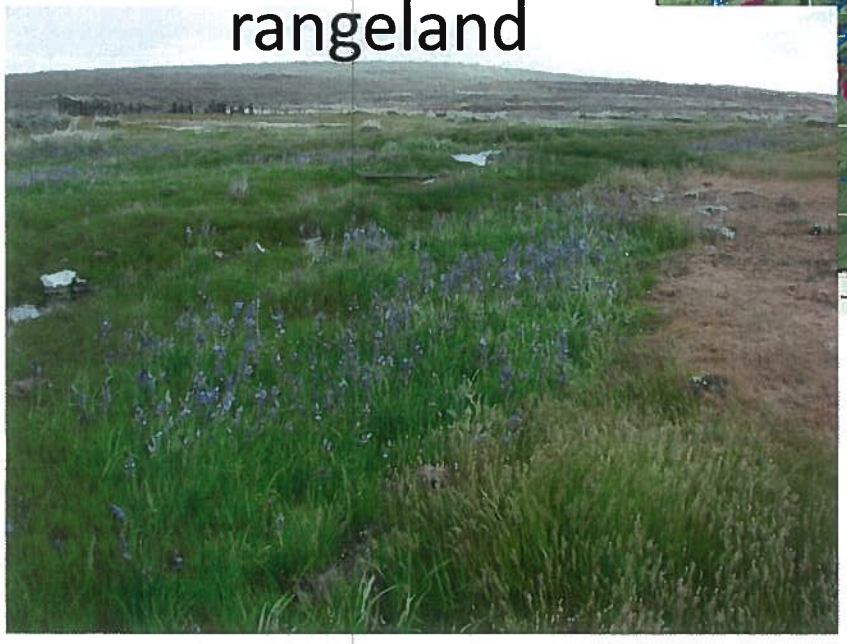
- Pick Primary and Secondary Routes in Feasibility
- Form/Engage Governance Entity
- Governance Entity, for Pilot:
  - Permit Applications
  - Route/Access Agreements

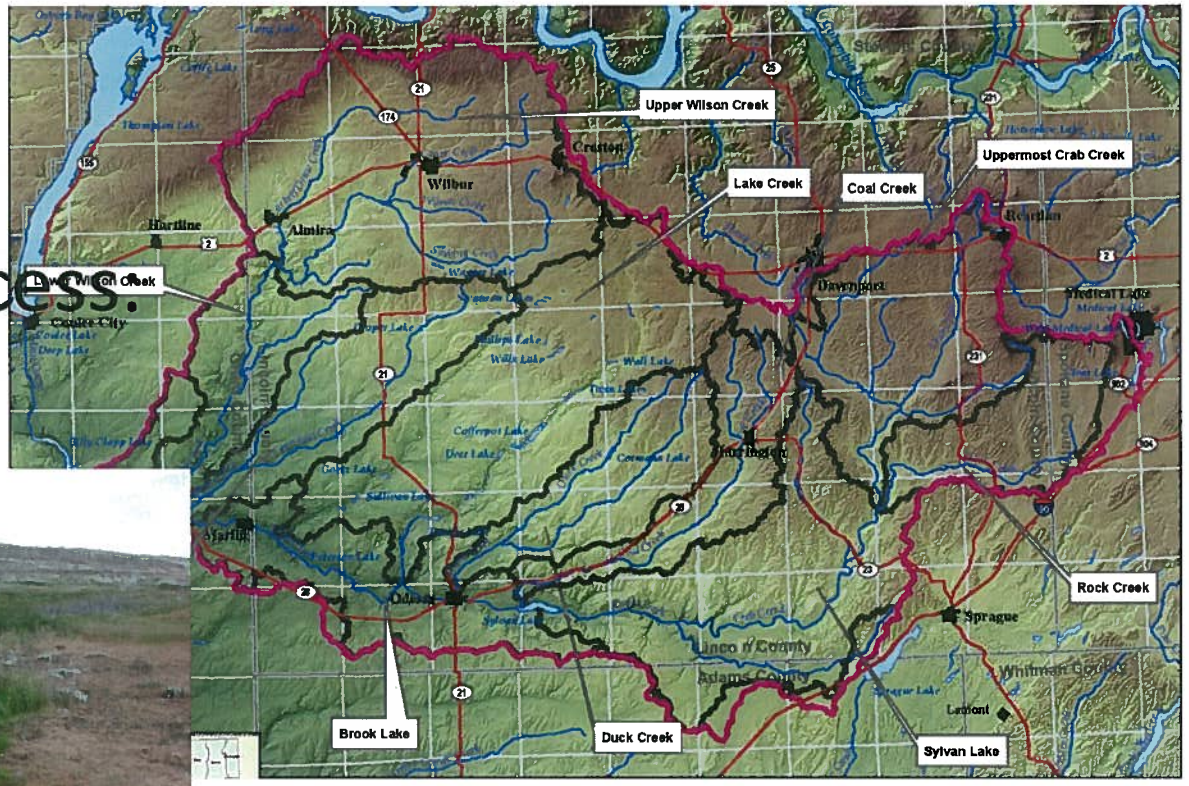
DRAINAGE SPECIFIC ISSUES



DRAINAGE SPECIFIC ISSUES: Bluestem, Upper Crab, Rock

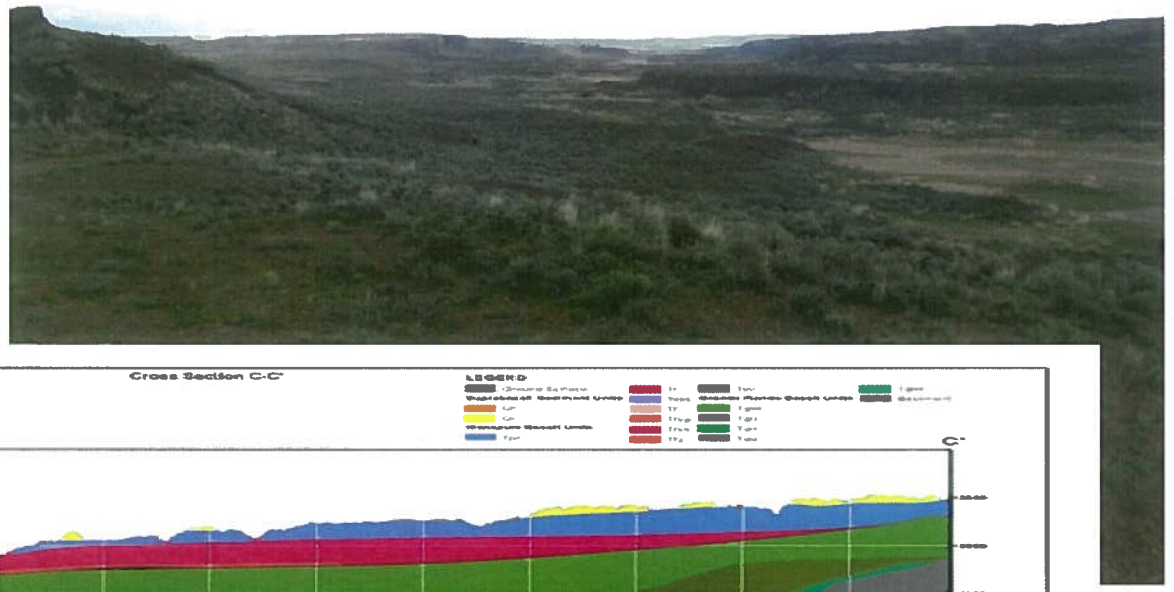
- Distance
- Channel size
- Headwater access:
  - meadows, rangeland

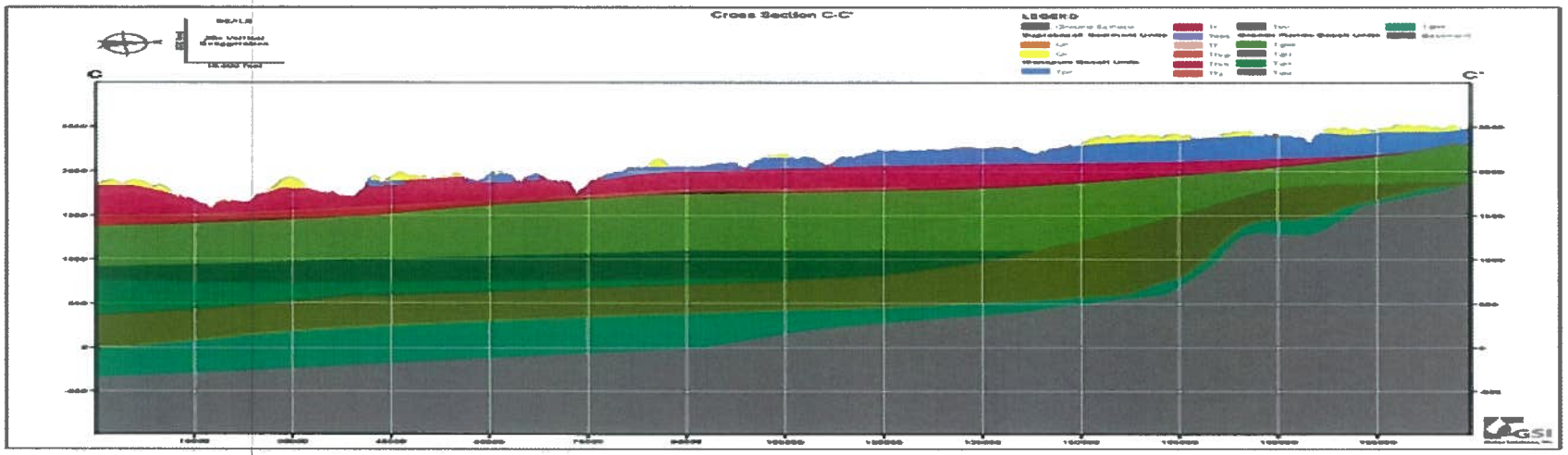




DRAINAGE SPECIFIC ISSUES:
Coal, Duck, Lake, Marlin, Canniwai

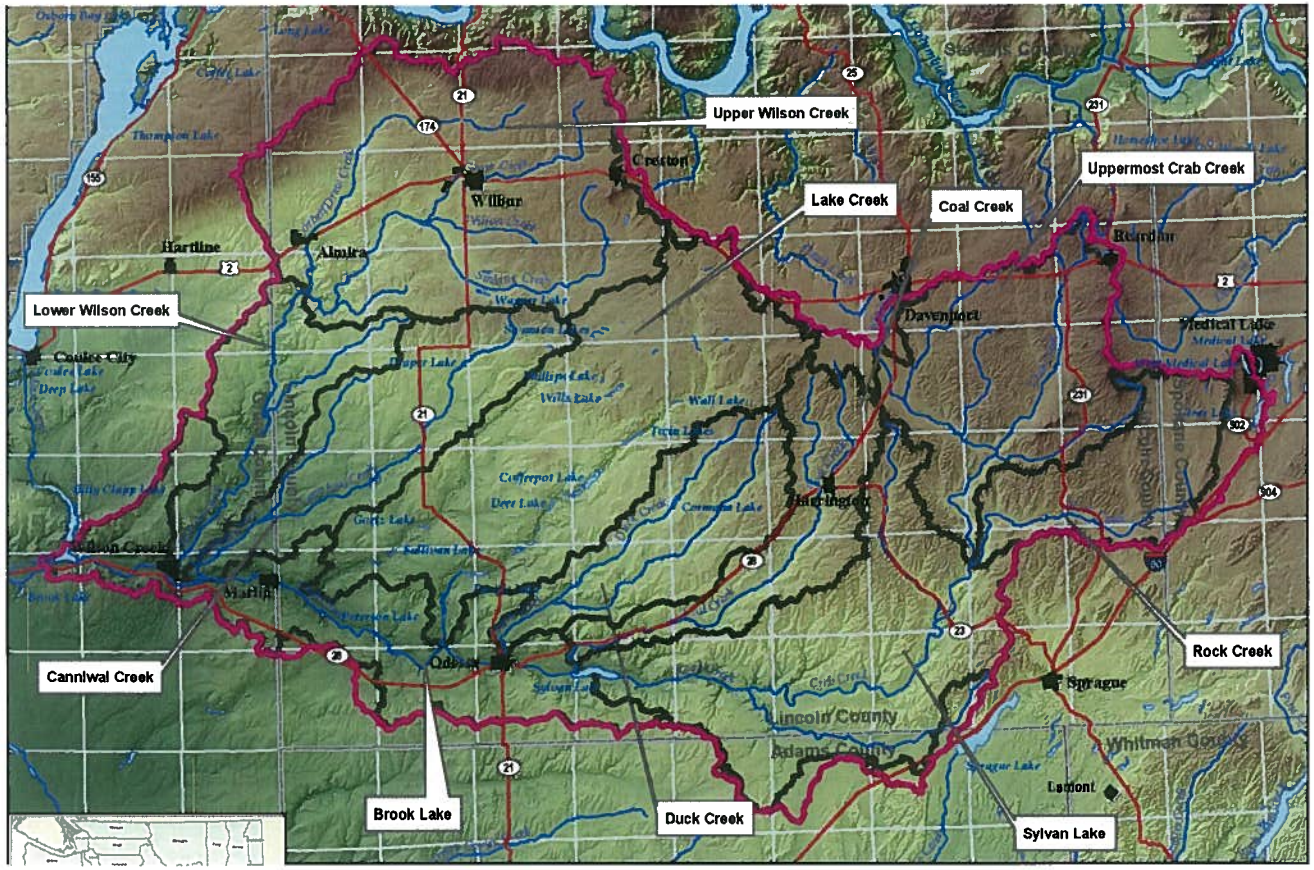
- Lake Creek:
  - Good channel
  - Infiltration history
  - Less distance





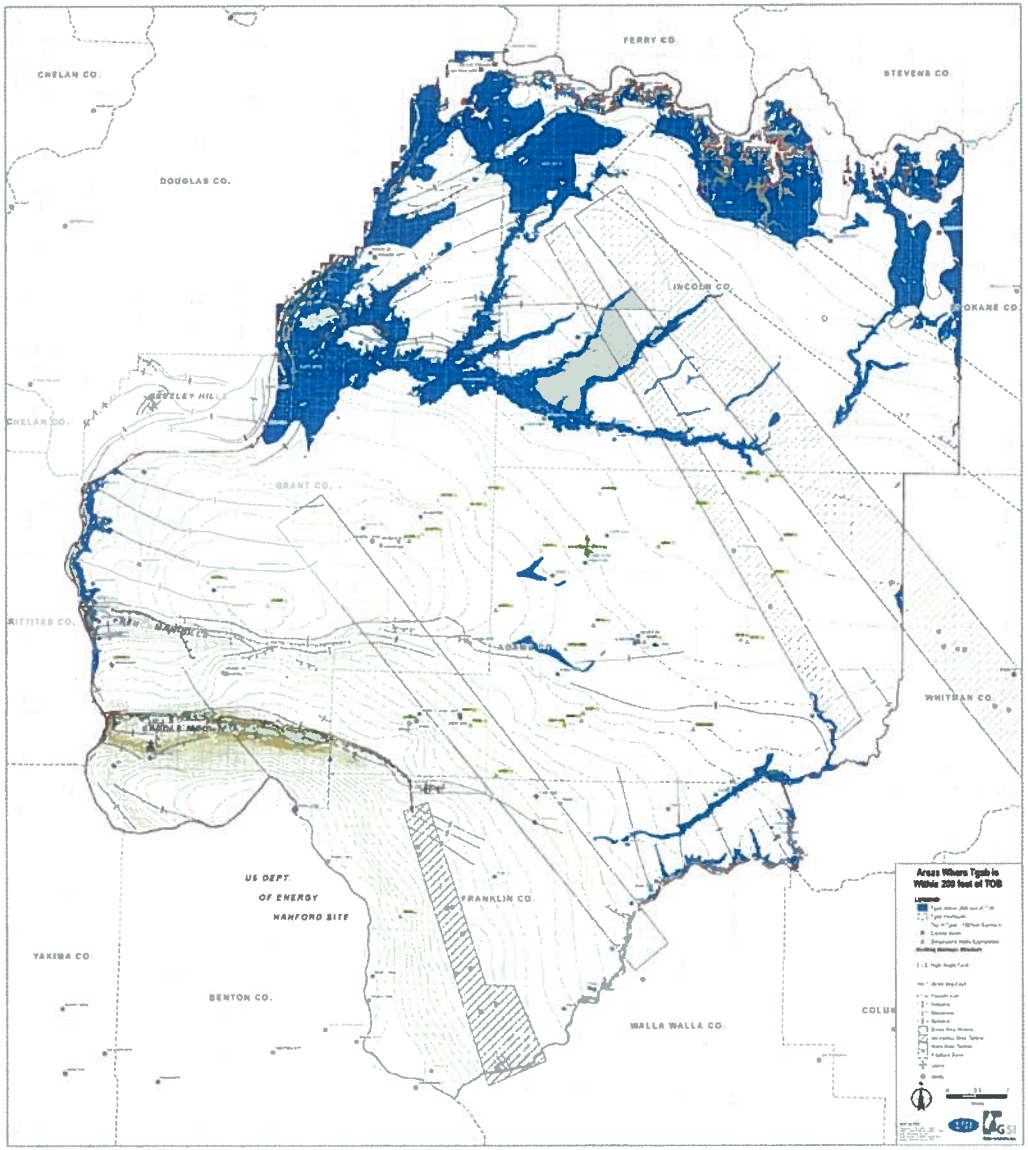
DRAINAGE SPECIFIC ISSUES:
Coal, Duck, Lake, Marlin, Canniwai

- Other Creeks
  - Longer distance
  - Chaotic headwaters
  - Infiltration less to east



DRAINAGE SPECIFIC ISSUES: Goose, Sinking, Wilson

- Water rights history
- Too far west



PREFEASIBILITY RANKING

Criteria	Rating Basis
Available Information	Relatively more (or less) is known about the stream based on the number of field visits and availability of prior studies.
Conveyance Distance /Issues	Distance from lake Roosevelt / Ability to convey water to head of stream along public rights of way. (<15 miles is Positive, > 25 miles is Negative)
Land Owners /Stream Channel Issues	Likelihood of issues associated with land owners along the stream and number of anticipated culvert issues along the re-watered channel.
Hydrogeology Benefits / Water Rights Issues	Likelihood of hydrologic benefit to the underlying aquifer and relative lack of issues concerning water rights or water use.
Likelihood of Recreation and Habitat Benefits	Likelihood of recreational and /or habitat benefits from routing water down the channel. Related to presence or absence of de-watered lakes, etc.

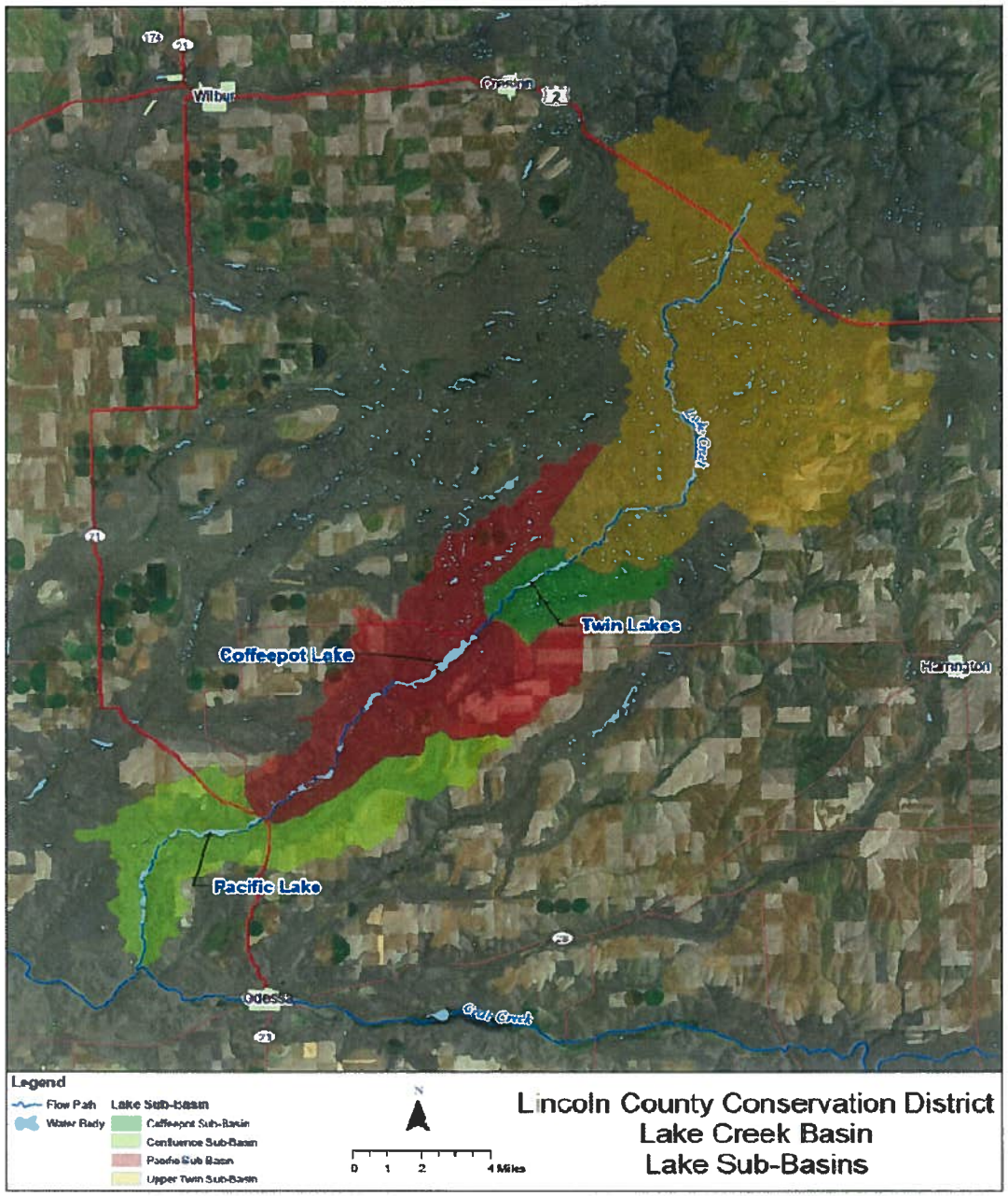
PREFEASIBILITY RANKING

Drainage	Available Info	Conveyance Distance/ Issues	Land Owner/ Stream Channel Issues	Hydrogeology /Water Rights	Recreation and Habitat (Lakes)
Bluestem Creek					
Canniwai Creek					
Coal Creek					
Crab Creek					
Duck Creek					
Goose Creek					
Lake Creek					
Marlin Hollow					
Rock Creek					
Sinking Creek					
Wilson Creek					

Bluestem, Lake, Marlin – select Lake Creek first

LAKE CREEK: SURFACE HYDROLOGY

- Preliminary Analysis
- 10 Month Spot Flows
- Estimated Runoff
- Estimated Losses:
  - Spot flow
  - Anecdotal

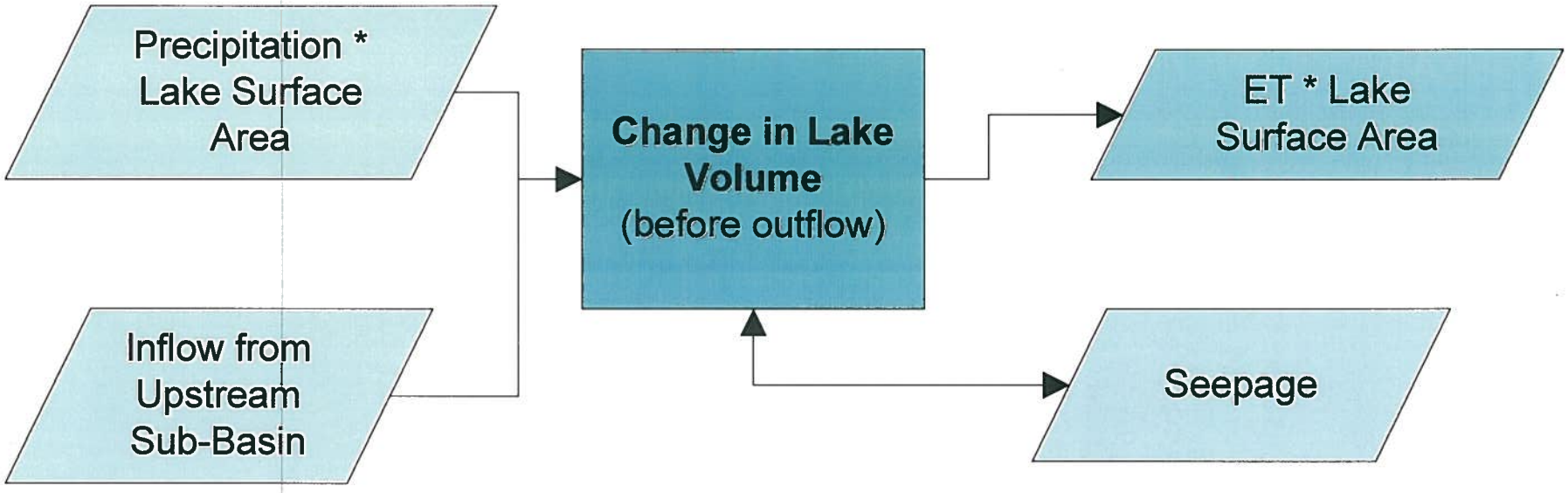


LAKE CREEK: SURFACE HYDROLOGY

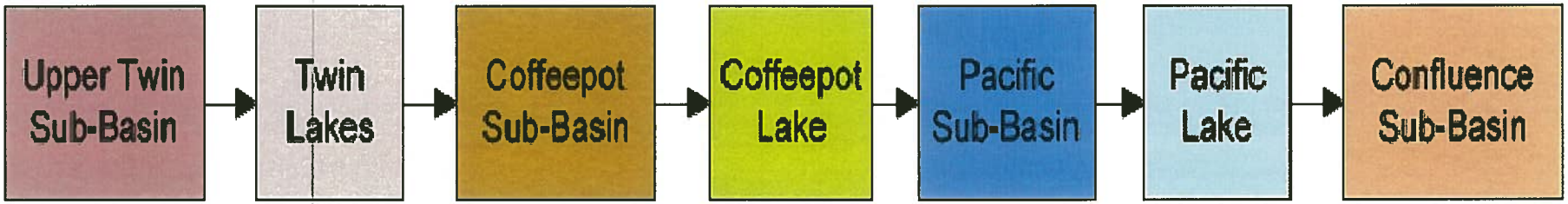
Table 2. Measured Flow of Lake Creek 1998-1999

	Inlet to Upper Twin Lake	Inlet to Coffeepot Lake	Hghwy 21 Crossing above Pacific Lake	Upstream of Confluence with Crab Creek
	Spot Gaged Flow Data (cfs)	Spot Gaged Flow Data (cfs)	Spot Gaged Flow Data (cfs)	Spot Gaged Flow Data (cfs)
Aug-98	0.5		0	0
Sep-98				
Oct-98	0.86		0	0
Nov-98	0.87	0.037	0	0
Dec-98	2.5			
Jan-99	14.4			
Feb-99		44.6	33.4	0
Mar-99	34			
Apr-99	13.7	16.6	17.2	18.1
May-99		6.61	8.56	5.36
Jun-99	2.24	0	0	0
Jul-99	0.639	0	0	0

LAKE CREEK: SURFACE HYDROLOGY

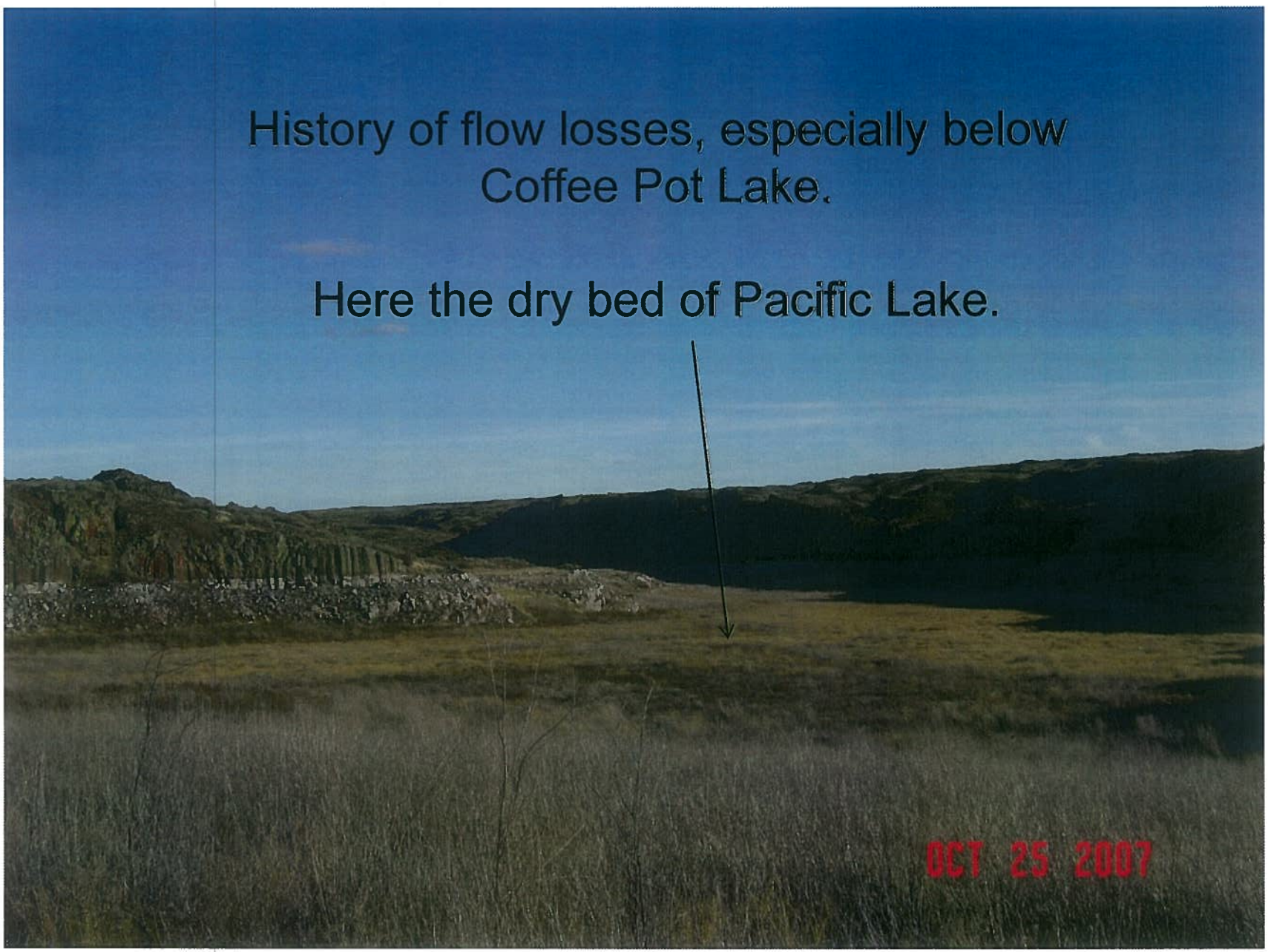


LAKE CREEK: SURFACE HYDROLOGY Water Balance

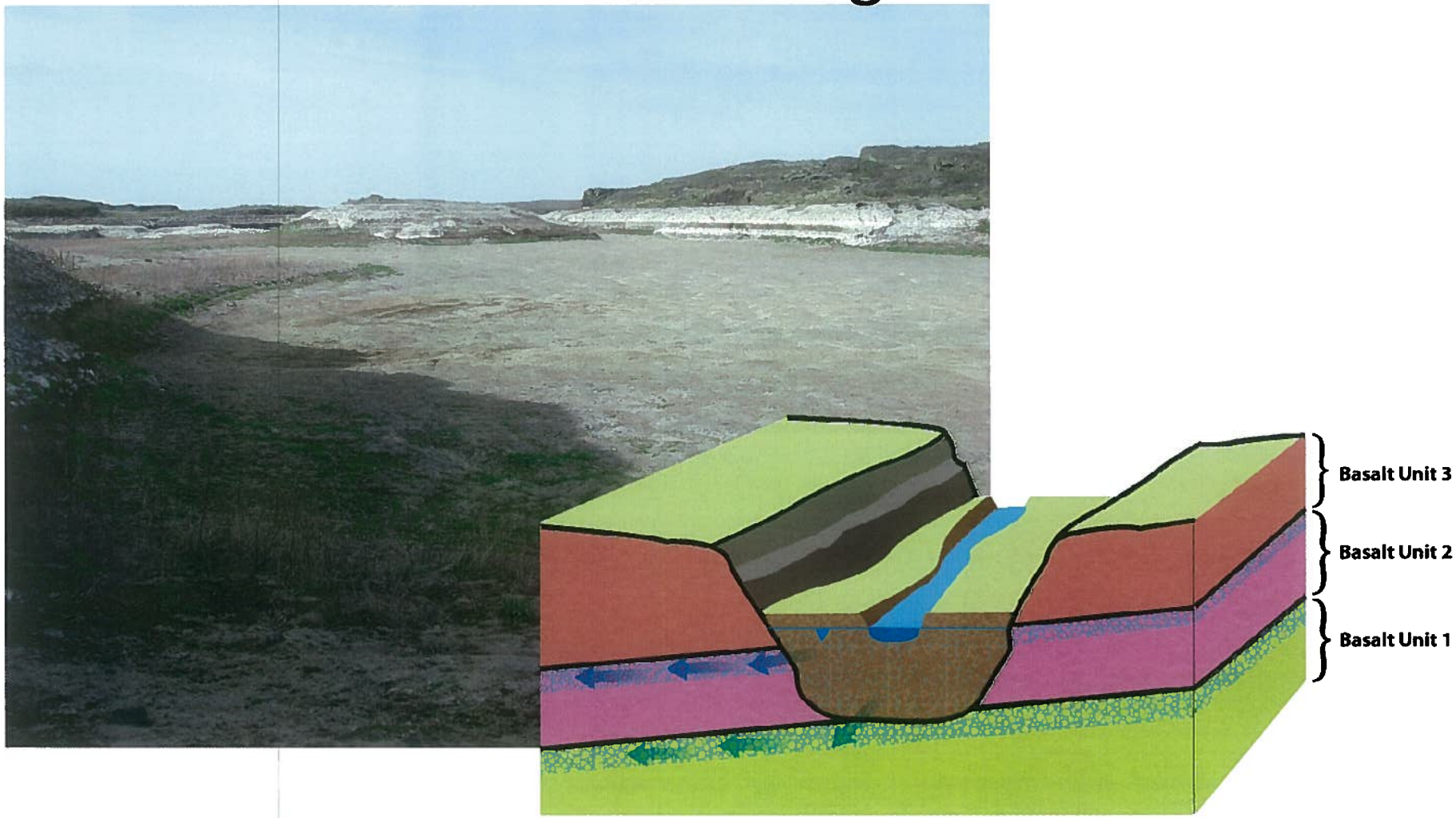


- 30 Year Historical Record
- Flow at Twin Lakes, Coffee Pot Lake, Pacific Lake
- 10 to 20 cfs is Feasible:
  - Surface Flows, Groundwater Recharge

LAKE CREEK: HYDROGEOLOGY



LAKE CREEK: Recharge - Coulees

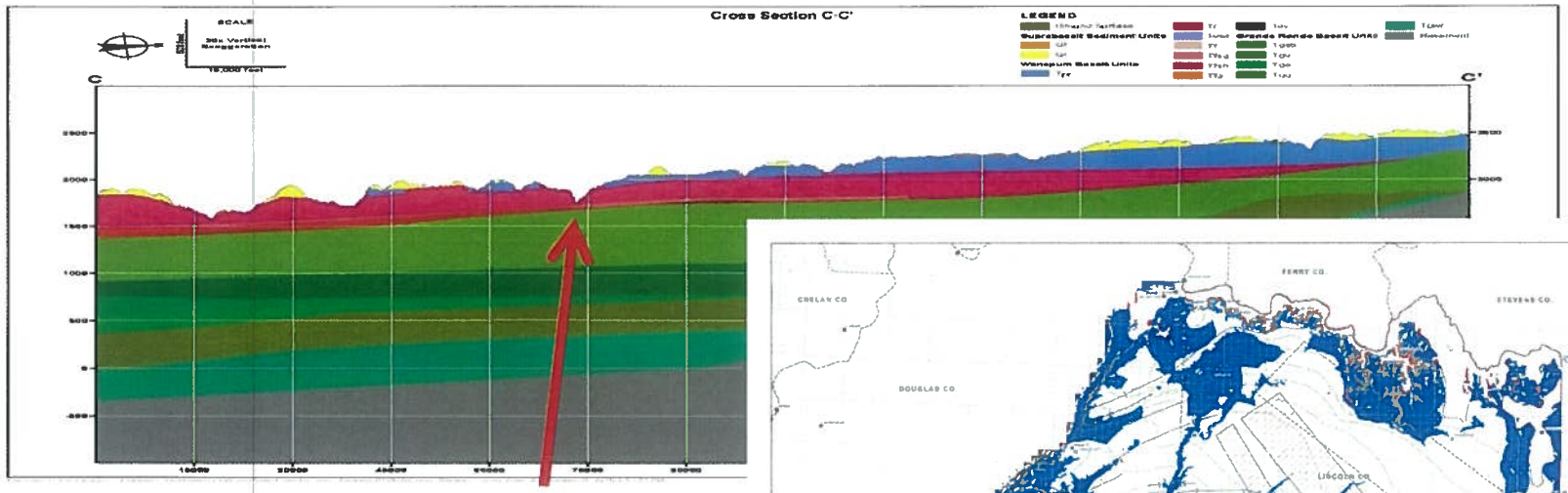


Groundwater in coulee fill gravel recharges interflow zones cross-cut by coulee.

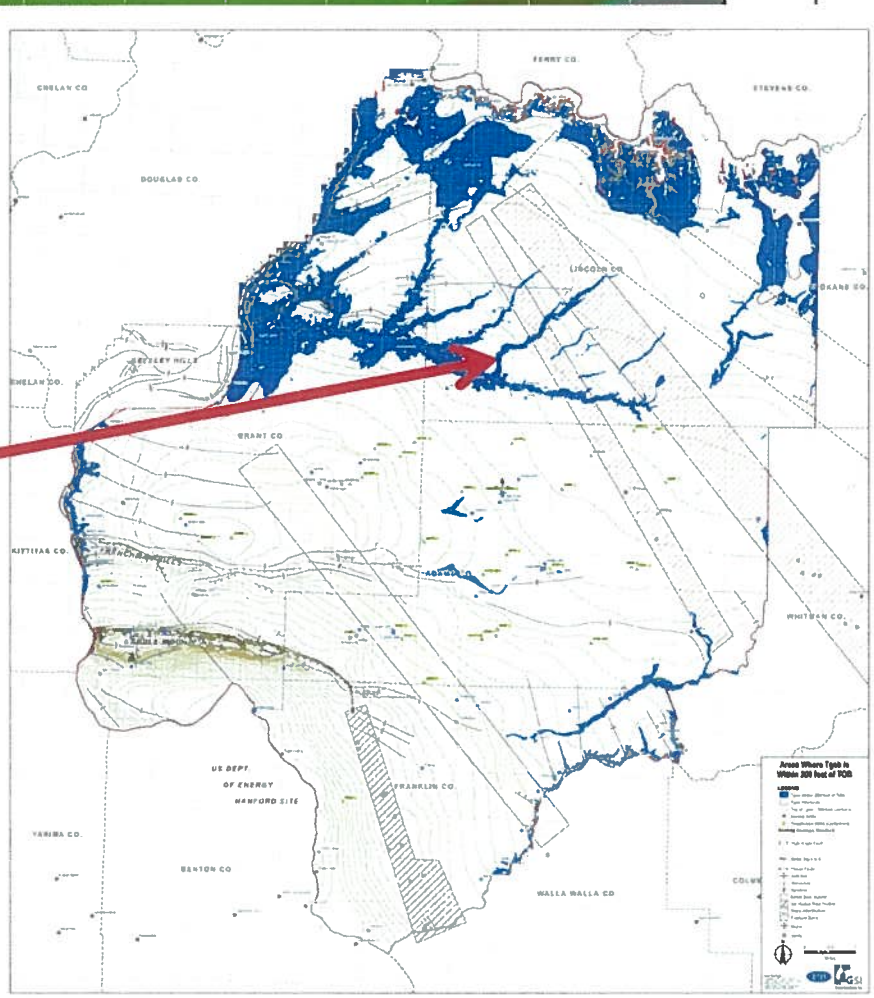
Blue arrows depict predominant groundwater movement.

Flow top area of basalt unit.

LAKE CREEK: HYDROGEOLOGY



Access to the Grande Ronde groundwater system



Who Will Benefit?

- Deep Well Irrigators in the Odessa Area
- Municipalities
- Domestic Groundwater Users
- Instream Flows
- Habitat
- Recreational Users
- Economy of eastern Washington

SUPPORTED BY MANY DIFFERENT ENTITIES

- WRIA 43 WRMG (Upper Crab Creek Watershed Plan)
  - Rehydration is specifically outlined in their Watershed Plan
  - Lincoln, Adams and Grant Counties added addendum to WRIA 43 Plan to address water storage and rehydration of Crab Creek
- WRIA 53 Planning Unit
- Lincoln, Adams, Grant and Franklin County Commissioners (GWMA)
- Lincoln County Conservation District
- Columbia Basin Development League
- Big Bend Resource Conservation & Development League
- Ecology Office of Columbia River (funding agency)

PATH FORWARD: FEASIBILITY

Feasibility Analysis (Conducted on 1 to 3 Priority Drainages in addition to Pilot Project)

- Governance (Pilot versus Full size)
  - Water Rights, Land Ownership Agreements, Construction, M&O
- Field Data Collection and Monitoring
- Collection of Groundwater Data and Stream Flow Measurements
- Field Characterization of Surface Soils and infiltration Testing
- Preliminary Engineering Design
  - Construction Analysis, Cost Analysis
- Future Pilot Project – moving water!