

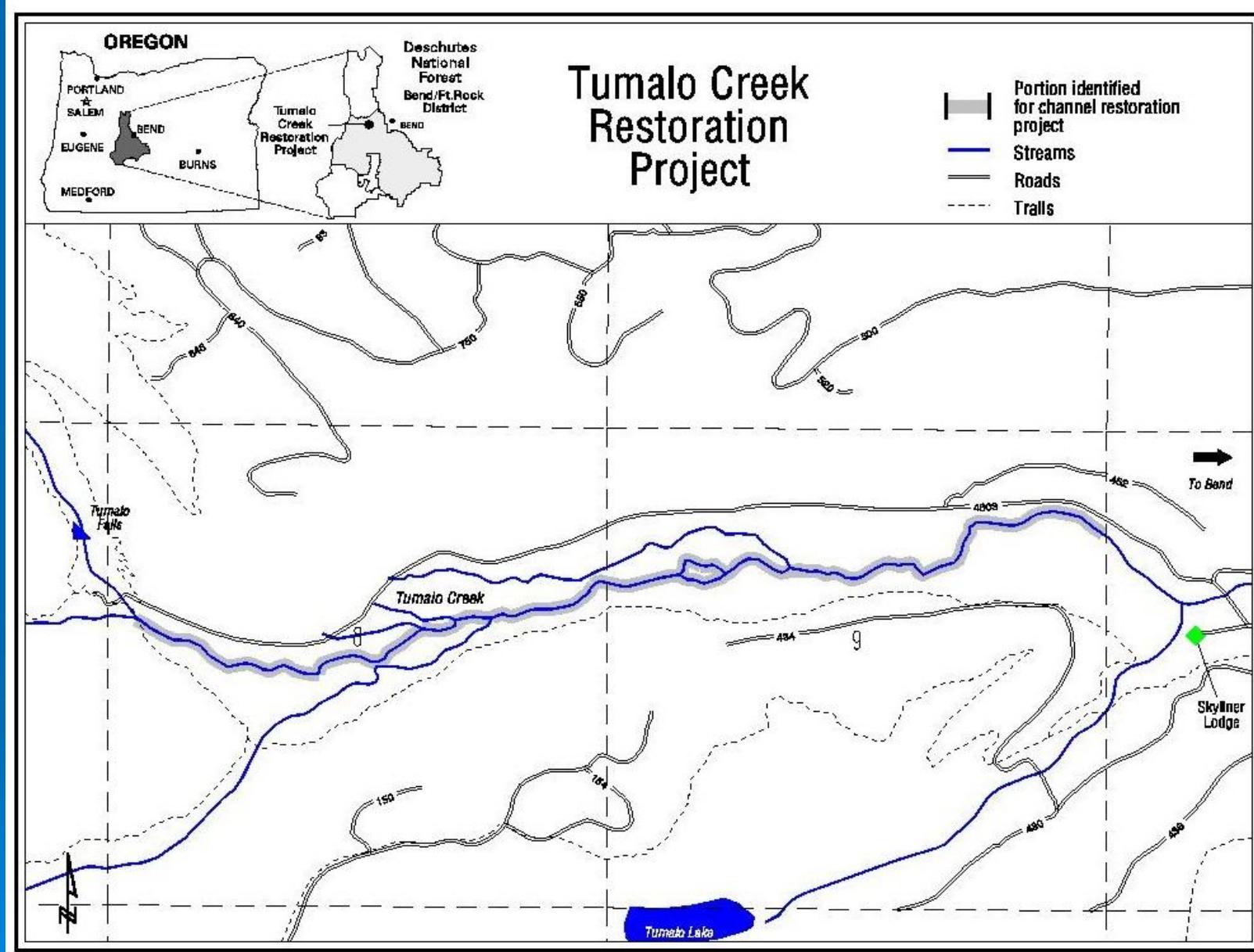
Restoration in the Tumalo Creek Drainage

- Tumalo Creek Bridge to Bridge Stream Restoration Project
- West Tumbull Hazardous Fuels Reduction Project
- Tumalo Creek Floodplain Enhancement Project

Tumalo Creek Bridge to Bridge Stream Restoration

Deschutes National Forest

Tom Walker -- Project Lead and Fisheries Biologist
Louis Wasniewski -- Hydrologist and Designer



Where the Story Started



- **1979 Bridge Creek Fire**
 - 4300 acre fire

- **1979-1980 Bridge Creek Salvage**
 - 2.8 miles of Tumalo Creek were left virtually devoid of riparian vegetation, trees, and instream wood.

Project Purpose and Need

➤ Results of Past Restoration Efforts

- 1990-1992 placed 200 wood structures and 6 boulder structures.
 - 1995-96 high flows washed wood downstream.
- 2001-2002 spot channel restoration to address excessive bank erosion.
 - Excessive upstream bedload reduced effectiveness.

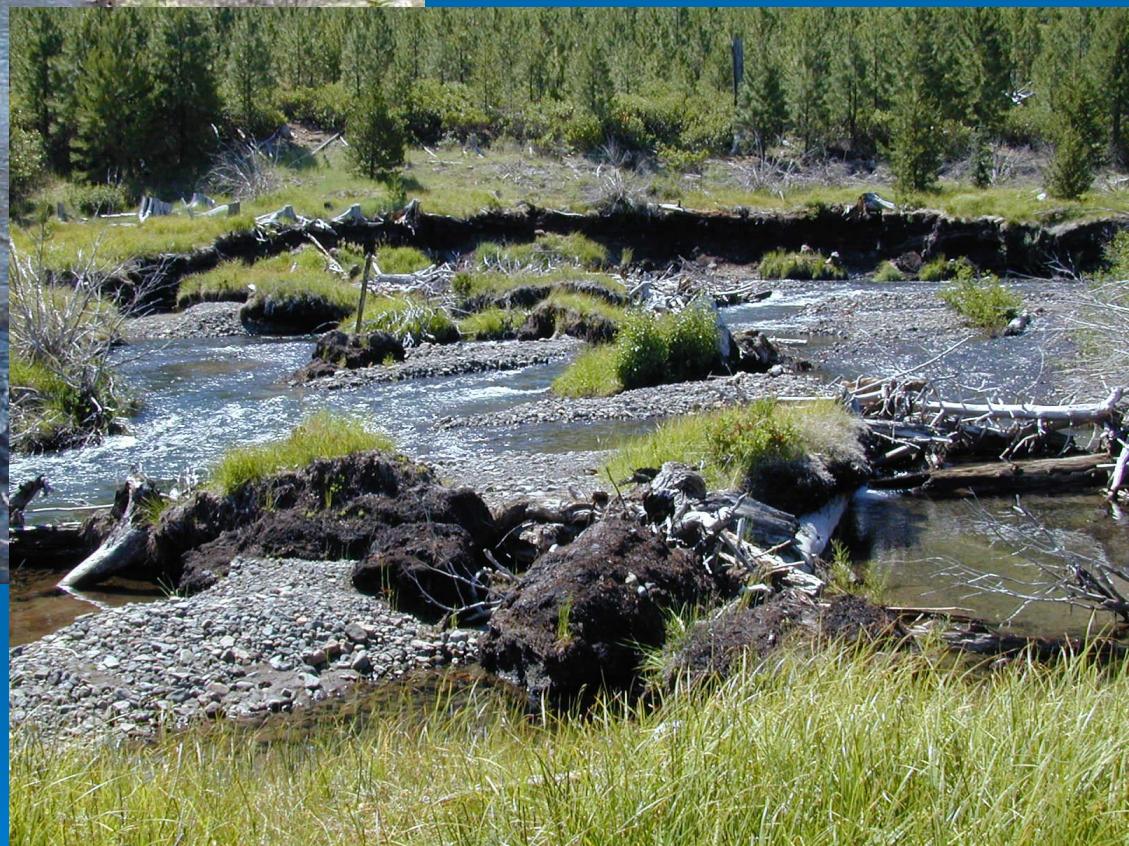
➤ After 20+ years Instability Still Existed

Widened and Braided Channel



- Average channel width was 45-50 feet wide with areas near 100 feet.
- Reference conditions indicate a stable width of 30-32 feet.
- As a result over 15,000 yards of bank material were eroded.

Meander Migration



- Channel migration and bank erosion increased the amount by 2 to 3 times.

Meander Cutoff



2001



2002

- Decreased channel length by 200 feet
- Increased channel slope
- Eroded nearly 1,500 yards of stream bank
- Risk of Tumalo Cr. entering SF Tumalo Cr.

Lack of Large Instream Wood



- In 1996 survey measured 19 pieces per mile of large wood (>20" dia. & > 35' in length).
- Reference condition indicated 110-180 pieces per mile.



The goal of the Tumalo Creek Restoration Project was to enhance stream function by restoring channel stability, riparian vegetation, fisheries habitat and flood plain connectivity.



Objectives

- Establish channel stability in 2.8 miles of Tumalo Creek through the use of in-stream channel restoration techniques designed to restore the channel to an appropriate pattern, profile and geometry.
- Reduce channel incision and re-connect the main channel to the floodplain.
- Restore riparian vegetation to promote habitat diversity, reduce erosion and enhance fish and wildlife habitat.
- Promote community awareness of watershed management and restoration through outreach to recreational users and established partnerships with the Cascade Science School and Summit High School.

Multi-partner Effort

- Deschutes National Forest
- Oregon Watershed and Enhancement Board
- Upper Deschutes Watershed Council
- National Forest Foundation
- City of Bend
- Deschutes Mitigation and Enhancement Program (ODFW)

Tumalo Design



Reference Conditions

- Aerial photograph assessment
- Fish habitat survey
- Reference stream survey

Design Variables

Variables	Existing Channel		Proposed Reach	
	Mean	Range	Mean	Range
Stream Type	F_4/C_4 Incised		C_4	
Drainage Area (sq. miles)	21.3		21.3	
Bankfull width (W_{bf})	45	31-100	31	30-35
Bankfull mean depth (d_{bf})	1.4	0.6-1.9	2	1.6-2.5
Width/Depth ratio (W_{bf}/d_{bf})	41	17-181	16	14-19
Bankfull X-sect. Area (A_{bf})			62	
Bankfull discharge, cfs (Q_{bf})	290		290	
Bankfull Max. depth (d_{max})			2.4	1.2-3.2
Width of flood prone area (W_{fpa})	158	60-600	230	132-401
Entrenchment ratio (W_{fpa}/W_{bf})	3.2	1.2-11.1	7.4	6.5-15.2
Meander length (L_m)			353	146-747
Radius of curvature (R_c)			99	37-232
Belt width (W_{bt})			138	52-230
Sinuosity (str. Length/valley dist.(k))	1.28	1.0-1.7	1.31	
Valley slope (ft/ft)	0.0174		0.0174	
Average slope ($S_{avg} = S_{valley/k}$)	0.0136	0.006-0.025	0.0133	
Pool to pool spacing (p-p)			212.3	40.3-421.6

Design Structure

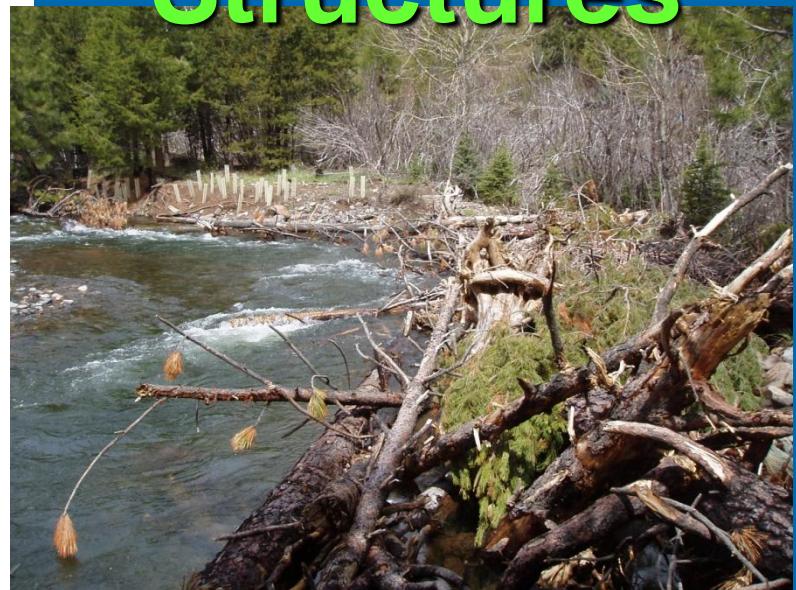
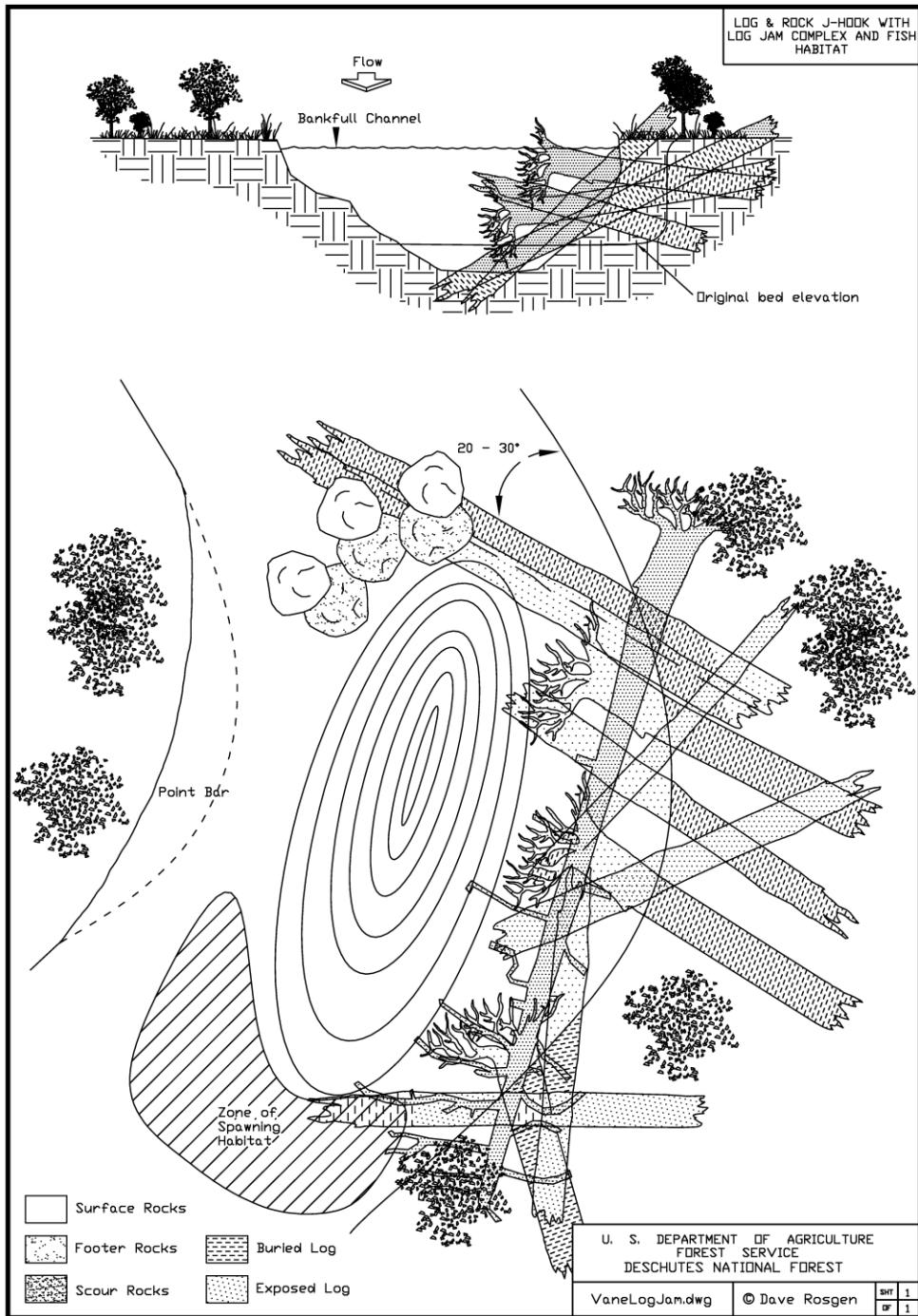
- 77 Log jam structures
- 33 Log jam with vane structures
- 5 Boulder Cross vanes
- 5 Boulder J-hook vanes
- 4 Side channels and 9 pond with side channel debris jams

Tumalo Creek Restoration Timelines

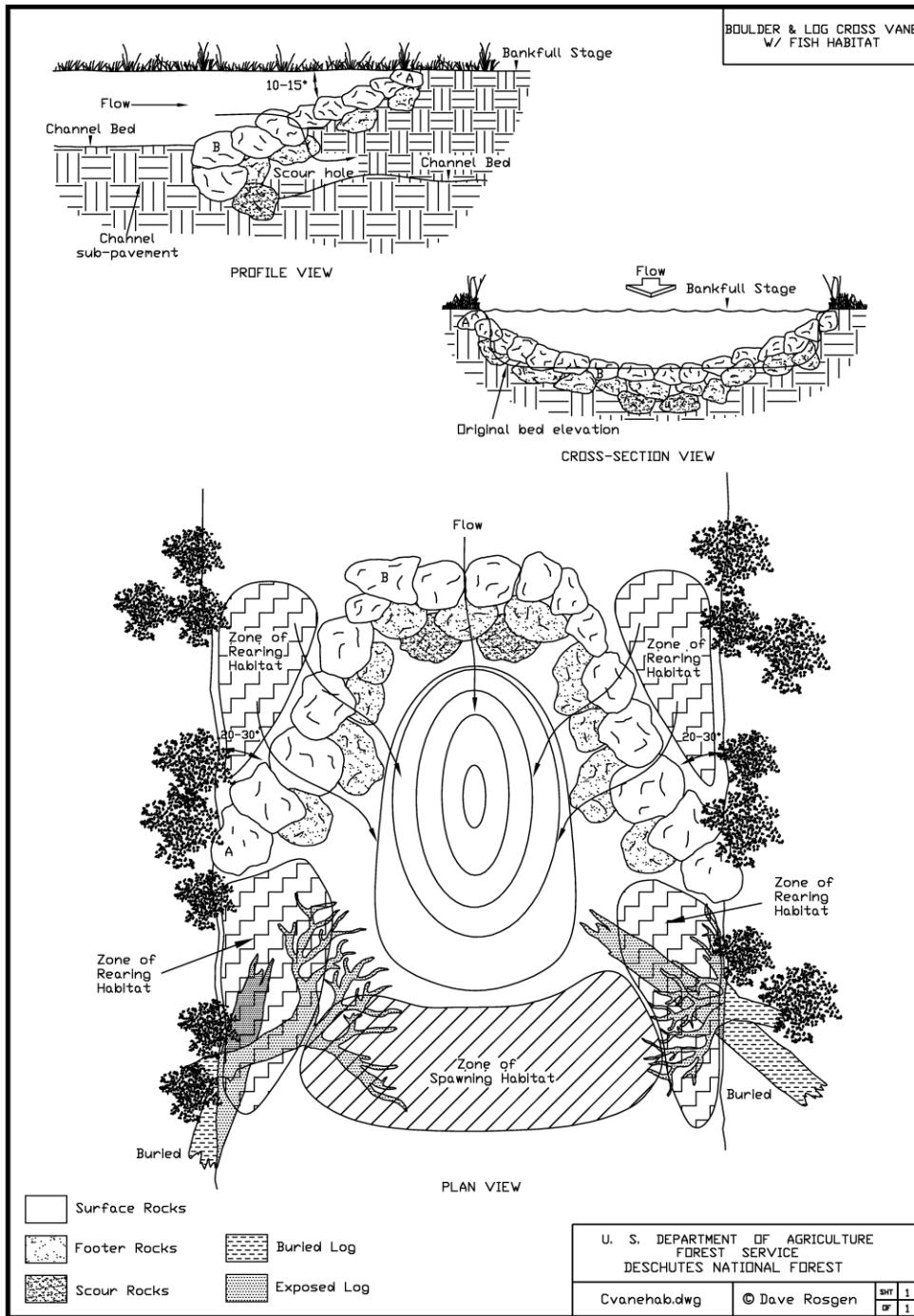


- Fall 2004 - Phase 1 restored 0.6 miles
- Fall 2005 - Phase 2 restored 1.1 miles
- Fall 2006 - Phase 3 restored 1.1 miles

Log Jam Structures

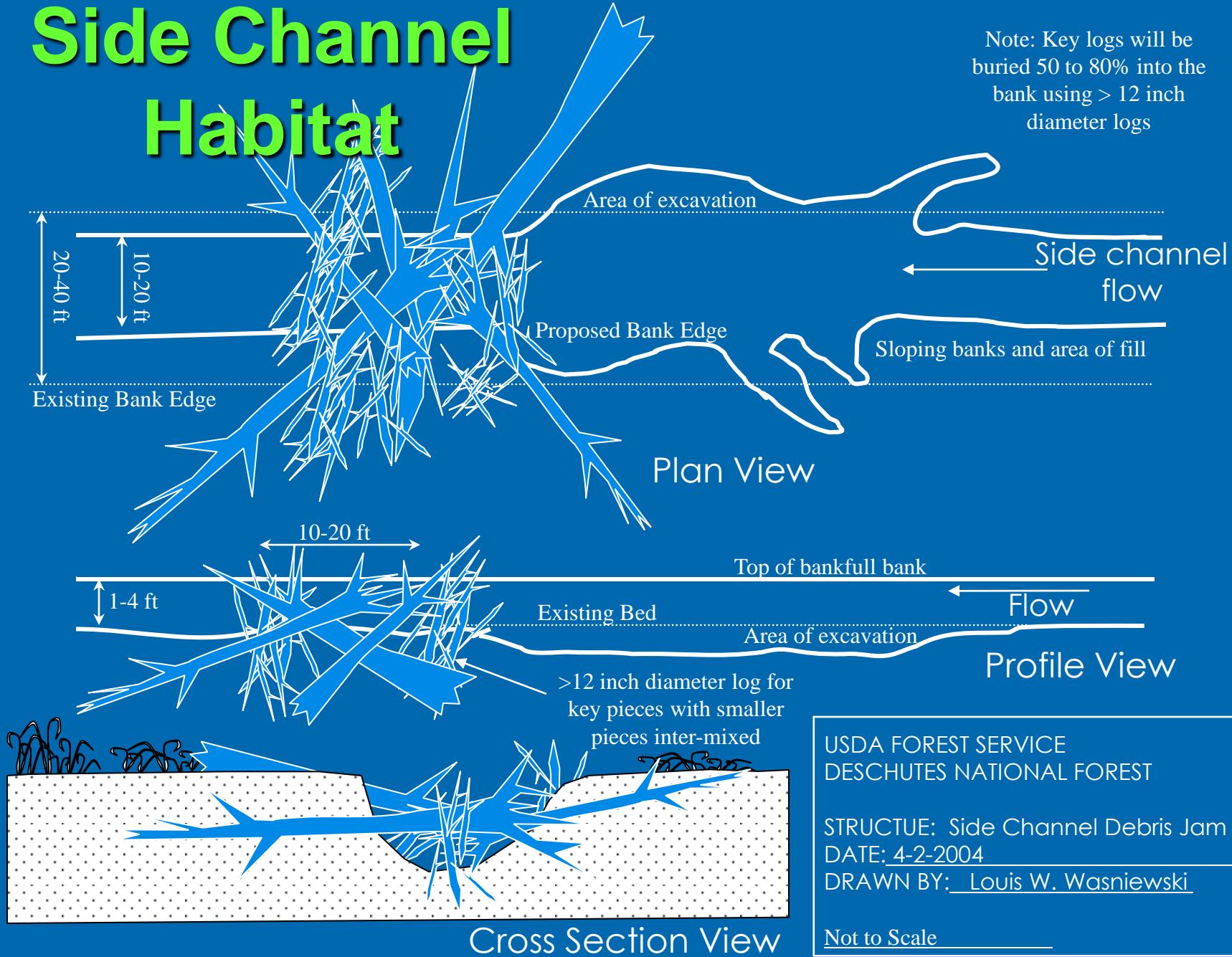


Boulder Cross Vane



Side Channel Habitat

Note: Key logs will be buried 50 to 80% into the bank using > 12 inch diameter logs



USDA FOREST SERVICE
DESCHUTES NATIONAL FOREST

STRUCTURE: Side Channel Debris Jam
DATE: 4-2-2004

DRAWN BY: Louis W. Wasniewski

Not to Scale

Riparian Planting

- Nearly 75,000 riparian shrubs and trees have been planted near the stream, on approximately 12 acres
- Seed and stock were taken from on-site as much as possible..
- Plantings included Engelmann spruce, western larch, mountain alder, red-osier dogwood (*Cornus stolonifera*), various willow (*Salix spp.*), Douglas spiraea (*Spiraea douglasii*), black cottonwood (*Populus trichocarpa*), various currants (), elderberry (), serviceberry (), various sedges (*Carex spp.*), baltic rush (*Juncus balticus*), and native grasses.



Riparian plantings

- Volunteers, school, scout, and church groups.
- Contracted crews.
- Important immediately for stream bank stability and floodplain roughness.



Restoration Materials

- Over 2100 whole trees with crowns and root wads for log jam and point bar construction
- Over 500 boulders for instream structures, point bar construction, and grade control
- Native tree and shrub plantings



Before and After

Pre-project riffle



Post-project pool and off-channel habitat



Before and After

Pre-project



Post-project



Interpretive Areas

Interpretive pull-out



Interpretive area at falls



Summit High Student Monitoring

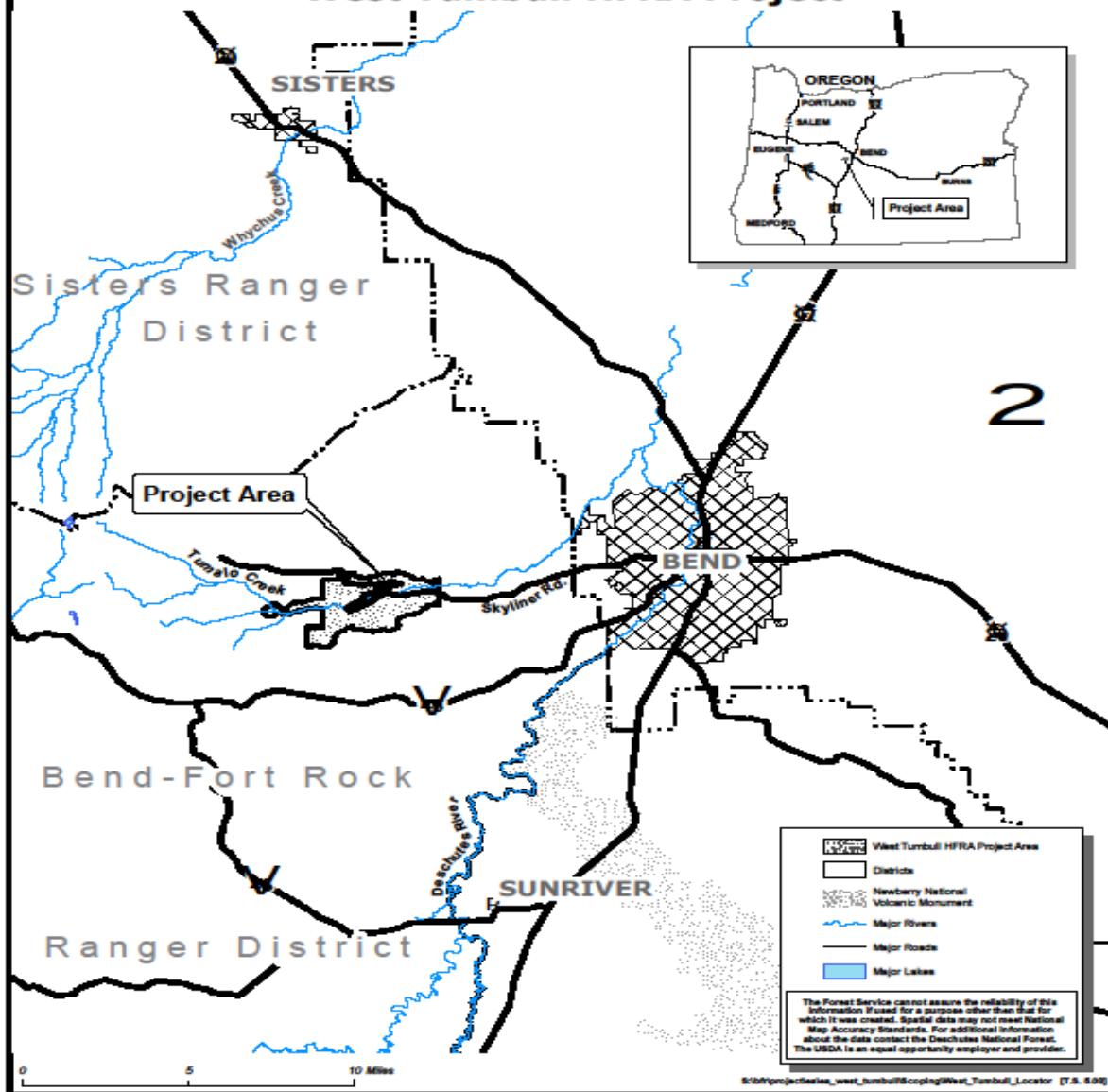
- Cross-sections
- Macroinvertebrates
- Substrate Analysis
- Longitudinal Profiles
- Vegetation
- Log Tagging



West Tumbull Hazardous Fuels Reduction Project

HFRA = Healthy Forests
Restoration Act

DESCHUTES NATIONAL FOREST West Tumbull HFRA Project



Project Objectives

- Reduce risk of uncharacteristic wildfire in the wildland-urban interface (WUI) of Skyliners.
- Decrease canopy density, tree density, and surface and ladder fuels.
- Change fire behavior from crown fire to surface fire.
- Improve evacuation and access routes for firefighters, residents, and the public.

West Tumbull

- Skyliners Identified as a Community At Risk
- Community Wildfire Protection Plans Completed (Greater Bend and East-West Deschutes County)
- Nearly 50 homes, Historic Skyliner Lodge, and City of Bend Municipal Water System Infrastructure



Mixed conifer stands

Railroad logged, fire exclusion, white fir abundant, pine beetle, heavy fuels.

Over 400 acres in project area treated commercially.



Plantations

1979 Bridge Creek Fire Area – replanted 1980

High density ponderosa pine, heavy brush

Nearly 900 acres within project area treated.



Fir and spruce stands

Hand thinned and piled - Sensitive soil areas



Miles of Piles

American Recovery and Reinvestment Act of 2009 (Stimulus) enabled treating all the non-commercial units in a short time frame. Collaborative Forest funds used to collect and chip many piles Shrub treatments and underburning next actions.



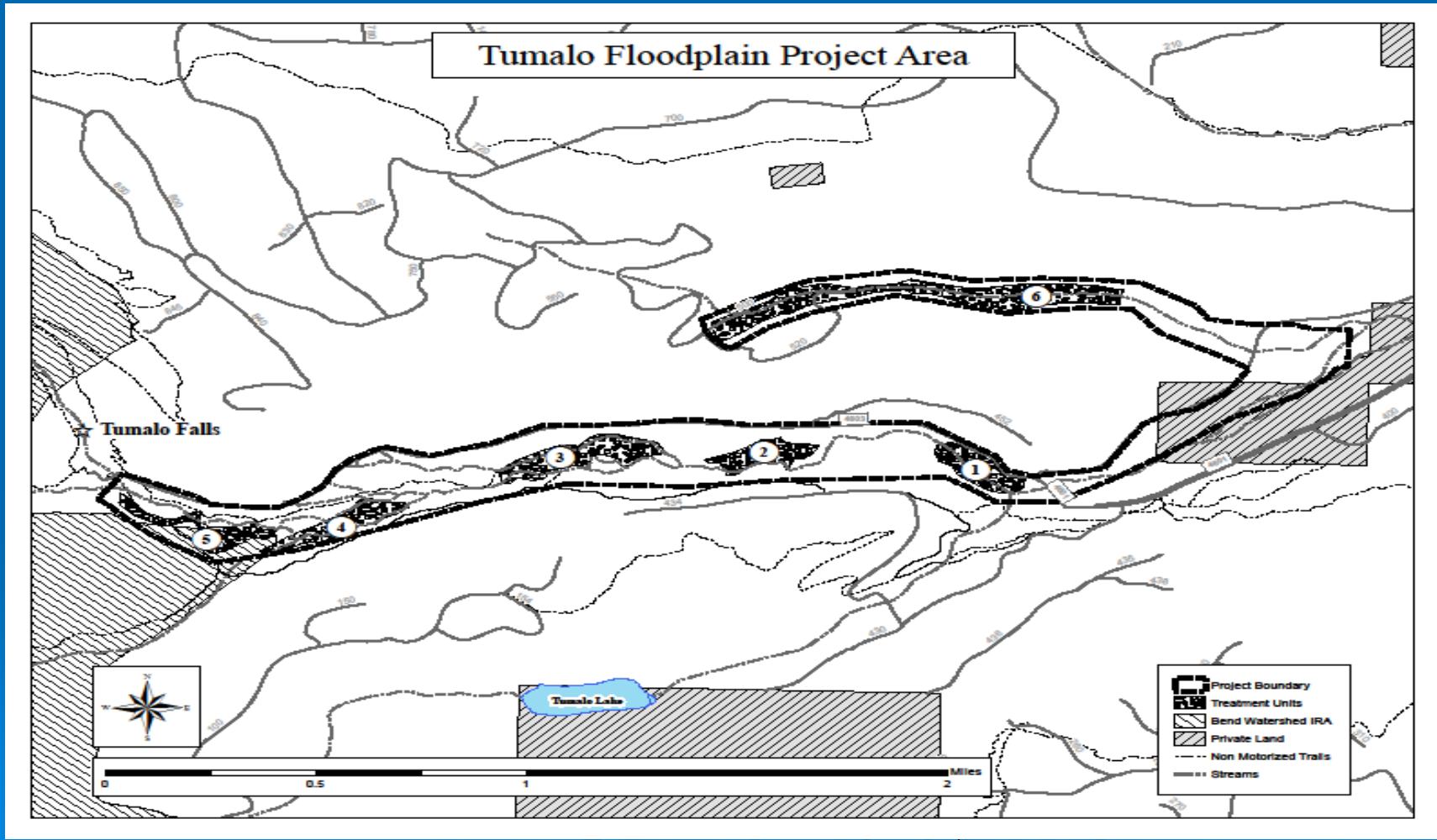
Public Firewood Provided

Fuels reduction resulted in some firewood opportunity for residents and the general public

Tumalo Floodplain Enhancement Project



Tumalo Floodplain Enhancement Project



Project Objective

Enhance riparian habitat on over 100 acres adjacent to Tumalo Creek and a tributary stream

- Accomplished by hand thinning conifers, primarily planted ponderosa and lodgepole pines
- 12"" diameter limit (handpiling)
- Aspen primary hardwood species benefitted by thinning
- Engelmann spruce also benefitted
- Spruce seedlings planted

In addition, spur road and stream ford closed and rehabilitated



Firewood Utilization

Some tree boles skidded and decked with ASV to provide firewood for OSU Forestry Club and general public.

Handpiling completed by volunteer groups, RMEF, Deschutes County juvenile justice and sheriff inmate crews, YCC, and FS personnel .



Partners

- Rocky Mountain Elk Foundation
- Deschutes County Corrections
- Deschutes County Juvenile Justice
- Skyline Collaborative Forest
- Volunteers





Spruce Planting

RMEF and youth crew planted over 1800 spruce seedlings along Tumalo Creek.

Future Work in Tumalo Drainage

- Finish West Tumbull Implementation – complete brush reduction and underburning
- Plant an additional 1250 spruce seedlings along Tumalo Creek
- City of Bend pipeline replacement (pending)
- Firewood areas north of Skyliners area