

Proposed Methodology for Aquatic Habitat Loss Assessment

Prepared by the
CBFWA
Resident Fish Advisory Committee



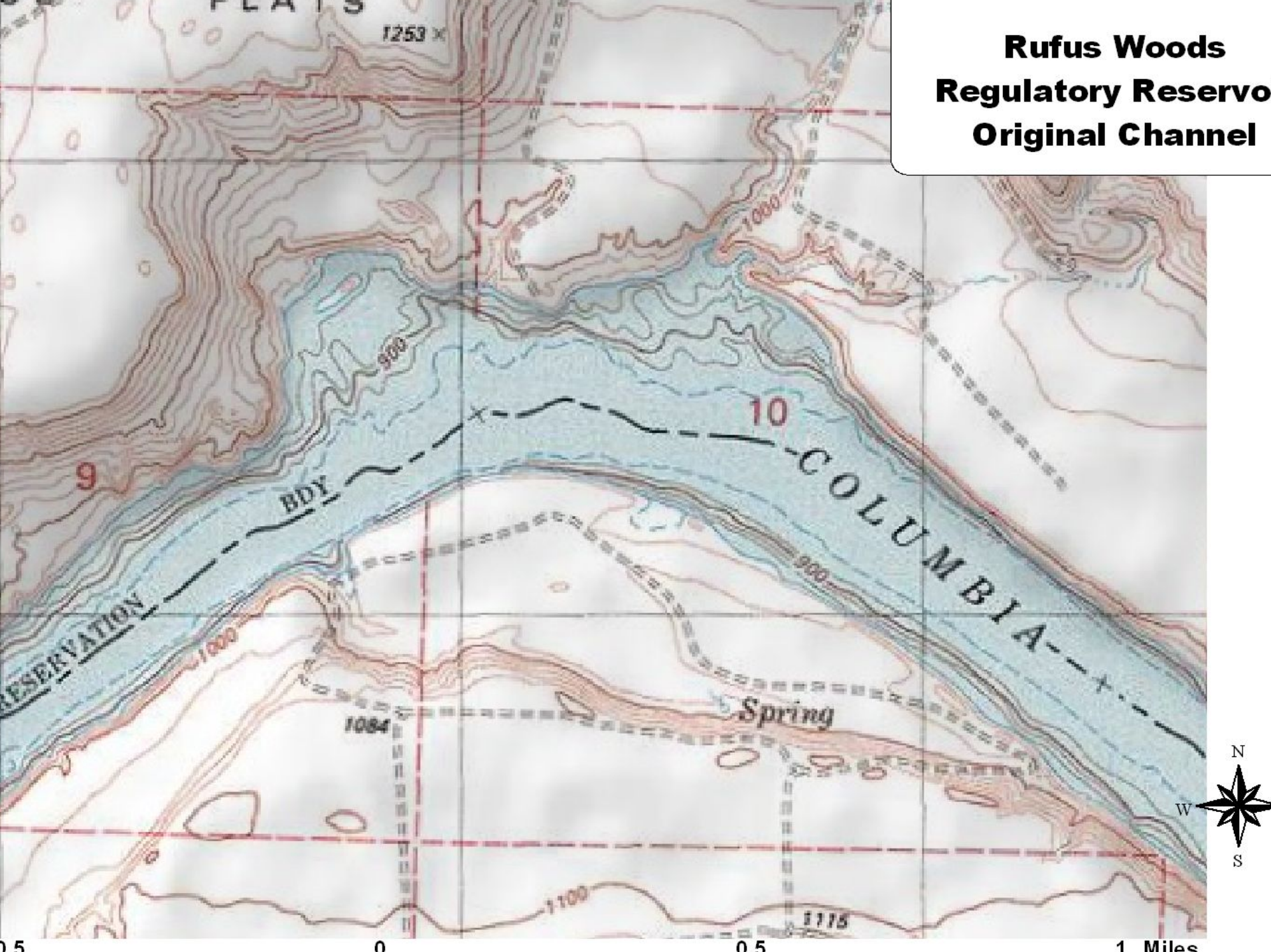
Full Circle

RFAC looked at several options

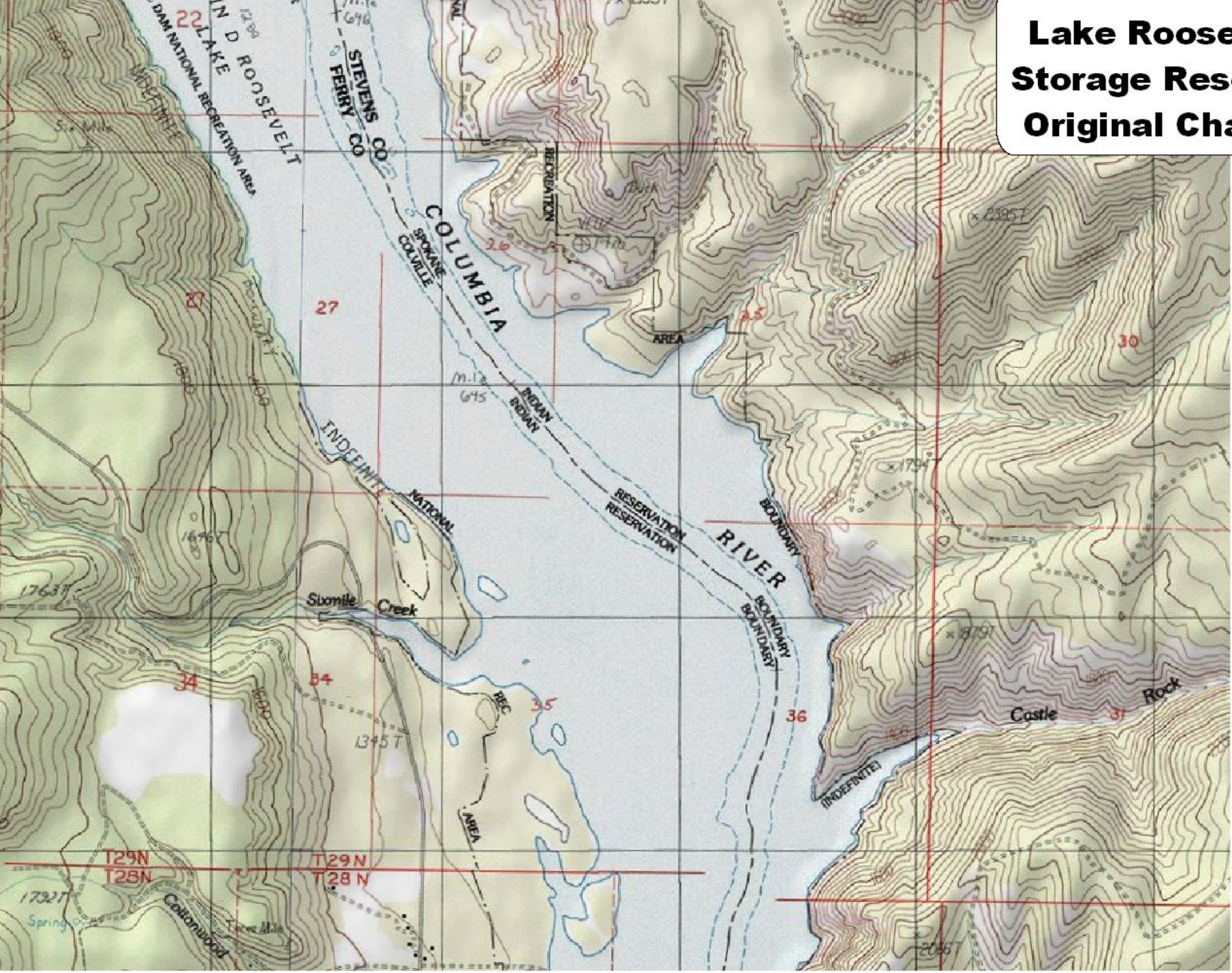
- Habitat gained
- Alterations in habitat
- Ecological approach
- Weighting of habitat
- Variations between different types of reservoirs and streams
- Loss of habitat features (islands, falls, side channels)



**Rufus Woods
Regulatory Reservo
Original Channel**

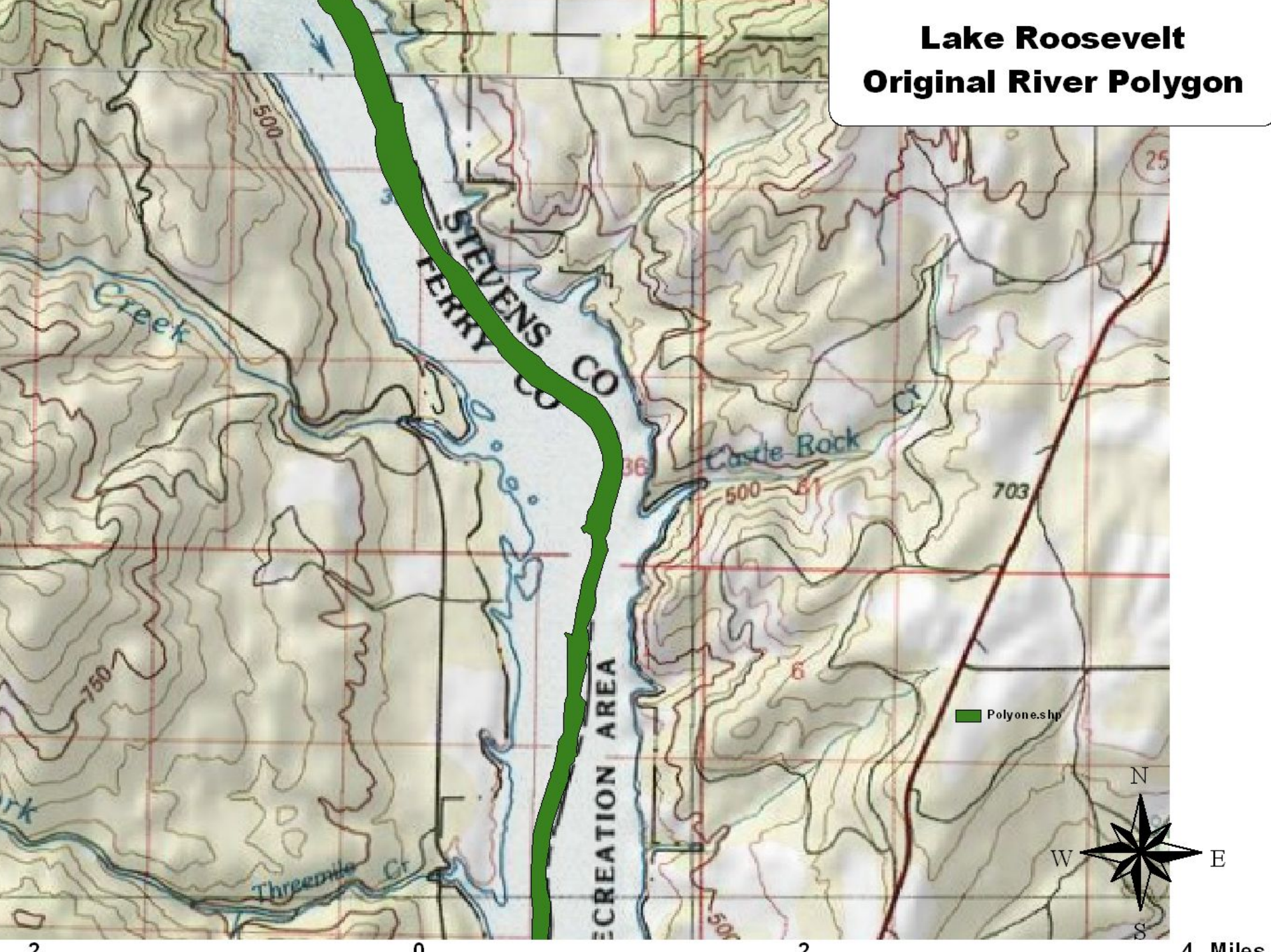


Lake Roosevelt Storage Reservoir Original Channel



2 Miles

Lake Roosevelt Original River Polygon



Area or Lineal Calculations

- Neither area or lineal works for all areas
- Managers will determine which is best method of the two for their area
- GIS calculations will be standardized
- Free of subjective judgments
- Will work for all stream classes



Determine Area Impacted

- How many kilometers or acres of river were lost to inundation from hydro-power construction
- How many kilometers or acres of aquatic habitat in tributaries was lost from hydro-power construction



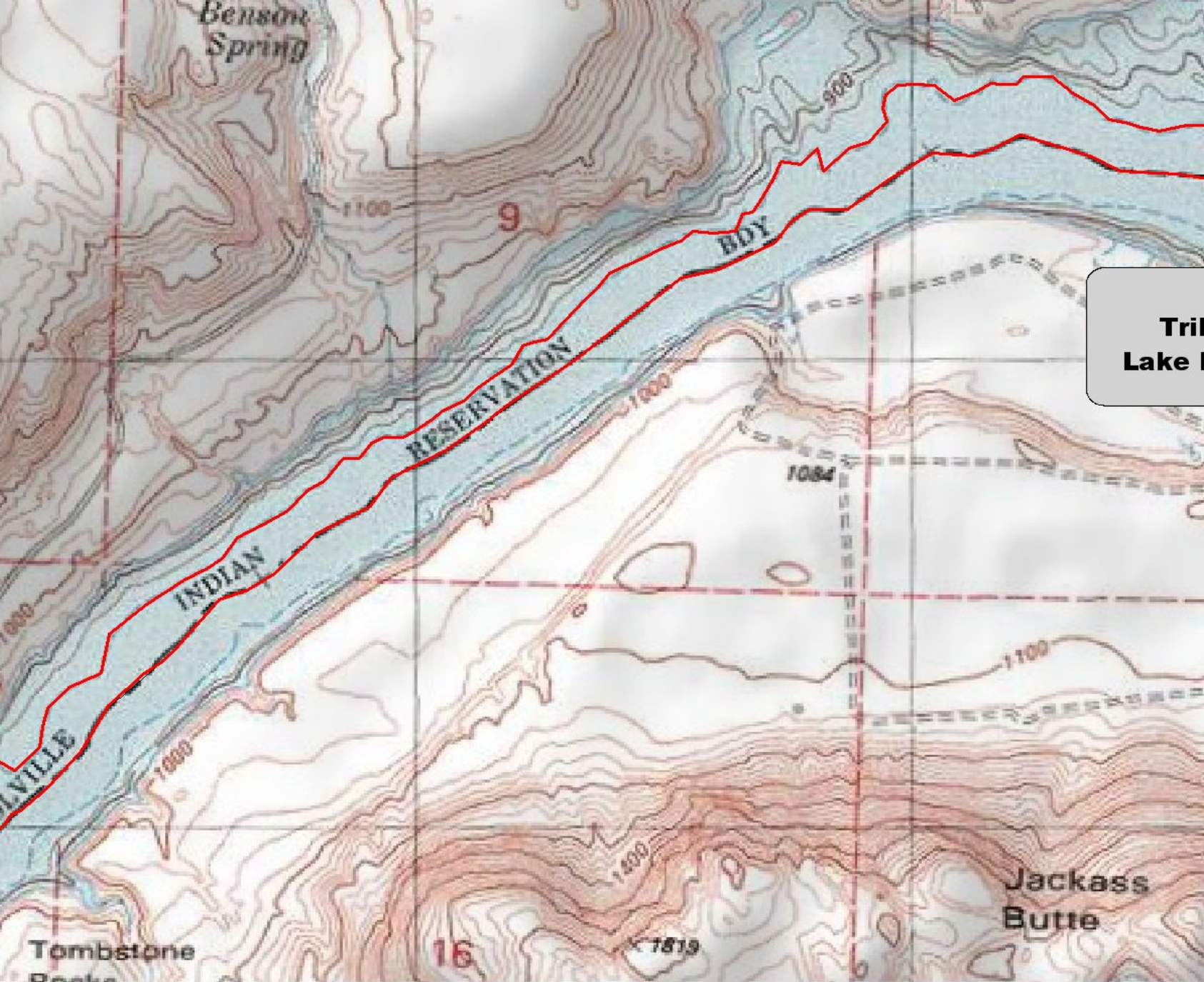
Determine Extent of Habitat

- Do natural barriers exist that were the end of fish passage?
- Did gradient create barrier?
- Calculate length of stream
- Determine average channel width
- Calculate square meters of habitat
- Convert to acres
- Or create polygon to automatically calculate area

Process and Benefits

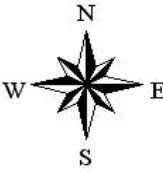
- Will acquire or digitize shape files of the original channel to calculate area and or length
- Work will be done at a scale of 1:12,000 or less
- Will determine stream order on 1 through 12 order streams then define by name or as mainstem
- Determine gradient
- Loss mitigation will be negotiated separately between each entity and BPA
- Can use to credit for acquisition or protection easements
- When unable to find similar habitat for acquisition especially on mainstem the process will provide for mitigation even when no similar habitat available





**Tribal Half of
Lake Rufus Woods**

- ▭ Rufuswoods_trib
- Colville_boundary

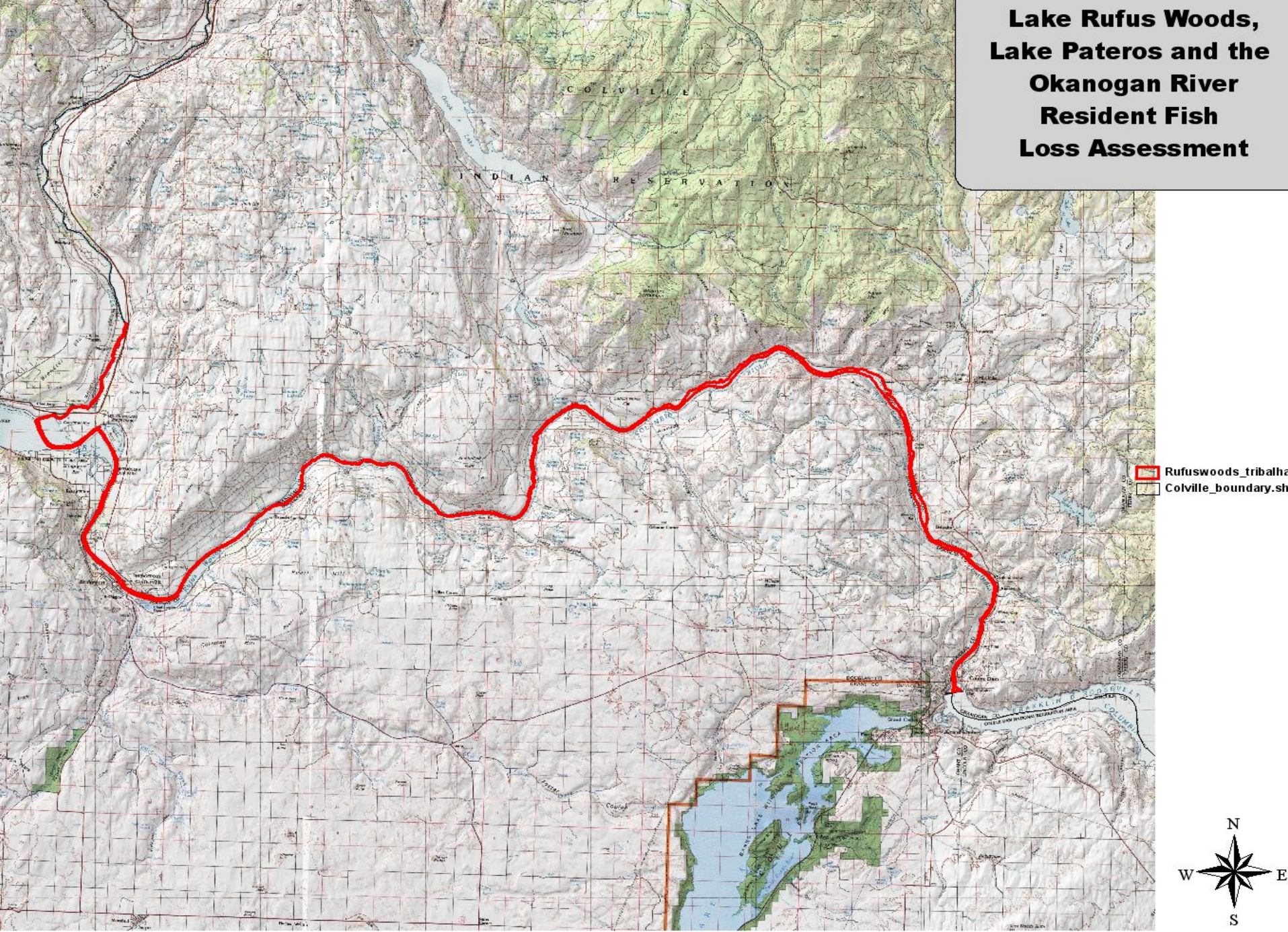


0 0.5 1 Miles

Calculating the Area or Length of Lost Habitat

- Select area to assess (Lake Rufus Woods)
- Create of locate GIS shapefile of original river and clip to Reservation boundary
- Clip to high water line of original river
- Loss will be defined in kilometers or acres
- of aquatic habitat

Lake Rufus Woods, Lake Pateros and the Okanogan River Resident Fish Loss Assessment



Rufuswoods_tribal
Colville_boundary.sh

0 10 20 Miles

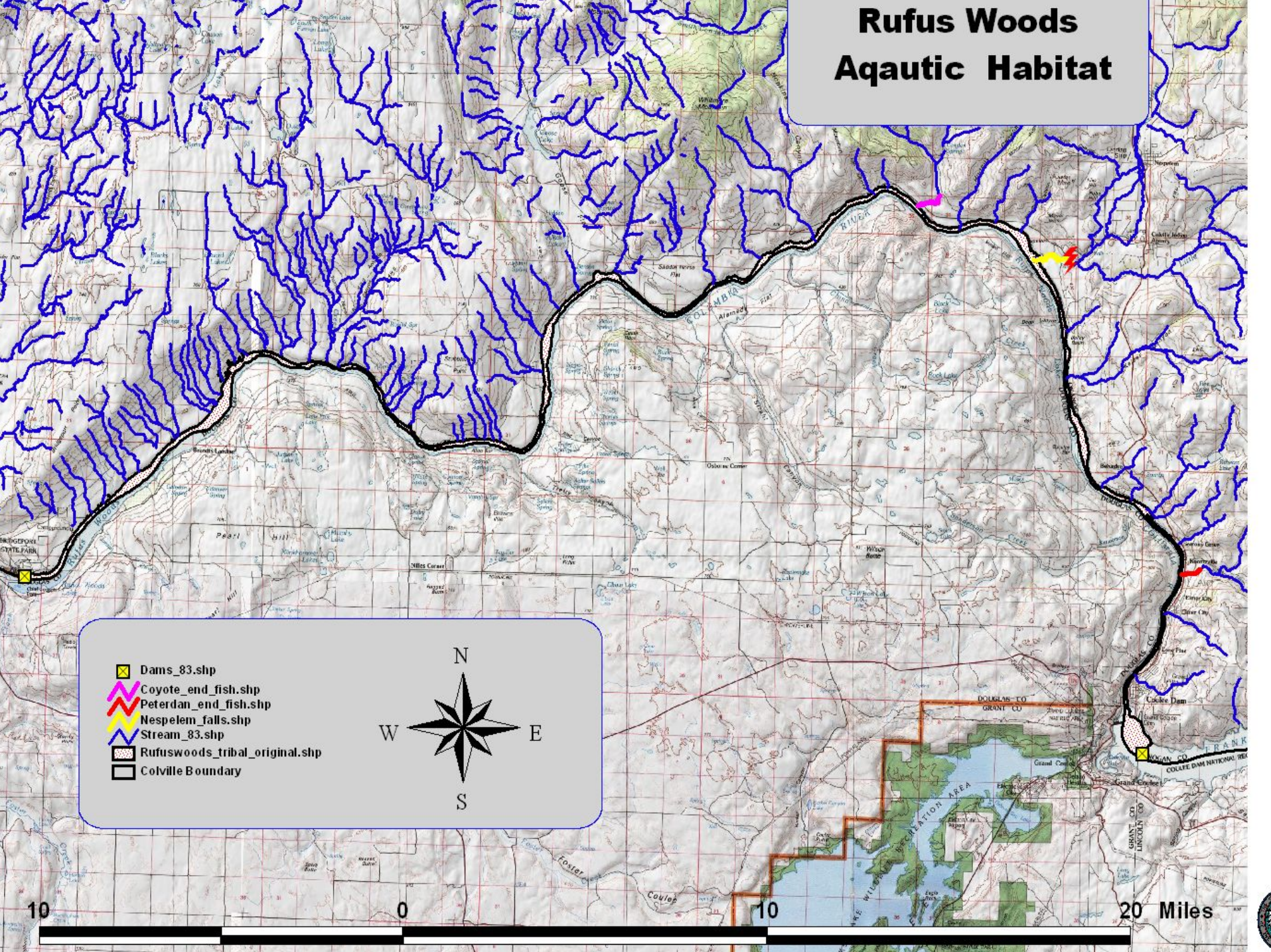


Determine Tributaries Impacted by Inundation

- Lake Rufus Woods has 4 tributaries that had historic use
 - Nespelem River
 - Peter Dan Creek
 - Coyote Creek
 - Tumwater Creek
- Many intermittent streams also provided habitat during the spring freshet

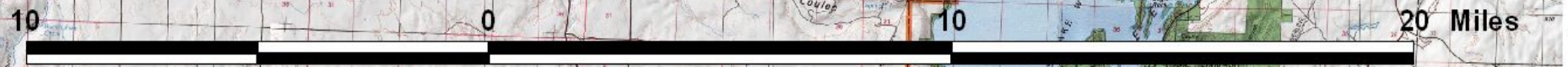


Rufus Woods Aquatic Habitat



- ☐ Dams_83.shp
- 🔴 Coyote_end_fish.shp
- 🔴 Peterdan_end_fish.shp
- 🟡 Nespelem_falls.shp
- 🟡 Stream_83.shp
- ▨ Rufuswoods_tribal_original.shp
- ▭ Colville Boundary

N
W E
S



for Lake Rufus Woods and Tributaries

Stream Name	Order	Reach #	Gradient (%)	Focal Species	Habitat Types	Length (km)	Area (km ²)
Rufus Woods	CR Main Stem	1	1	Kokanee, Brook Trout, Rainbow Trout, White Sturgeon, Burbot, Walleye	Migration, Wintering Rearing, Spawning	83.19	2668.5
Peilem River	5	1	4	Kokanee, Rainbow Trout, Bridgelip Sucker, Mountain Whitefish	Spawning & Rearing	8.96	1.43
White Creek	5	1	7	Kokanee, Rainbow Trout, Lahanton Cutthroat	Spawning & Rearing	5.67	0.74
Upper Dan Creek	5	1	4	Redband Rainbow Trout	Spawning & Rearing	4.17	0.54
Lower Dan Creek	4	1	12	Redband Rainbow Trout	Spawning & Rearing	0.40	0.05



Stream Name	Order	Reach #	Gradient (%)	Focal Species	Habitat Types	Length (km)	Area (km ²)
Intermittent	2	1	1	Redband Rainbow Trout	Spawning	0.26	0.03
Intermittent	3	1	7	Redband Rainbow Trout	Spawning	0.20	0.03
Intermittent	1	1	4	Redband Rainbow Trout	Spawning	0.23	0.03
Intermittent	1	1	3	Redband Rainbow Trout	Spawning	0.06	0.00
Intermittent	3	1	2	Redband Rainbow Trout	Spawning	0.79	0.11
Intermittent	1	1	4	Redband Rainbow Trout	Spawning	0.05	0.00
Intermittent	1	1	2	Redband Rainbow Trout	Spawning	0.08	0.00
Totals						127.1	2674



Calculating Area of Tributaries Without GIS

- Use of stream surveys to determine average width
- Determine length with surveys or map wheel
- Calculating the area



Nespelem River

Average width = 5.526 meters

Length of habitat = 121281 meters

$$w \times l = m^2$$

$5.526 \times 121281 = 670,198.6$ sq meters

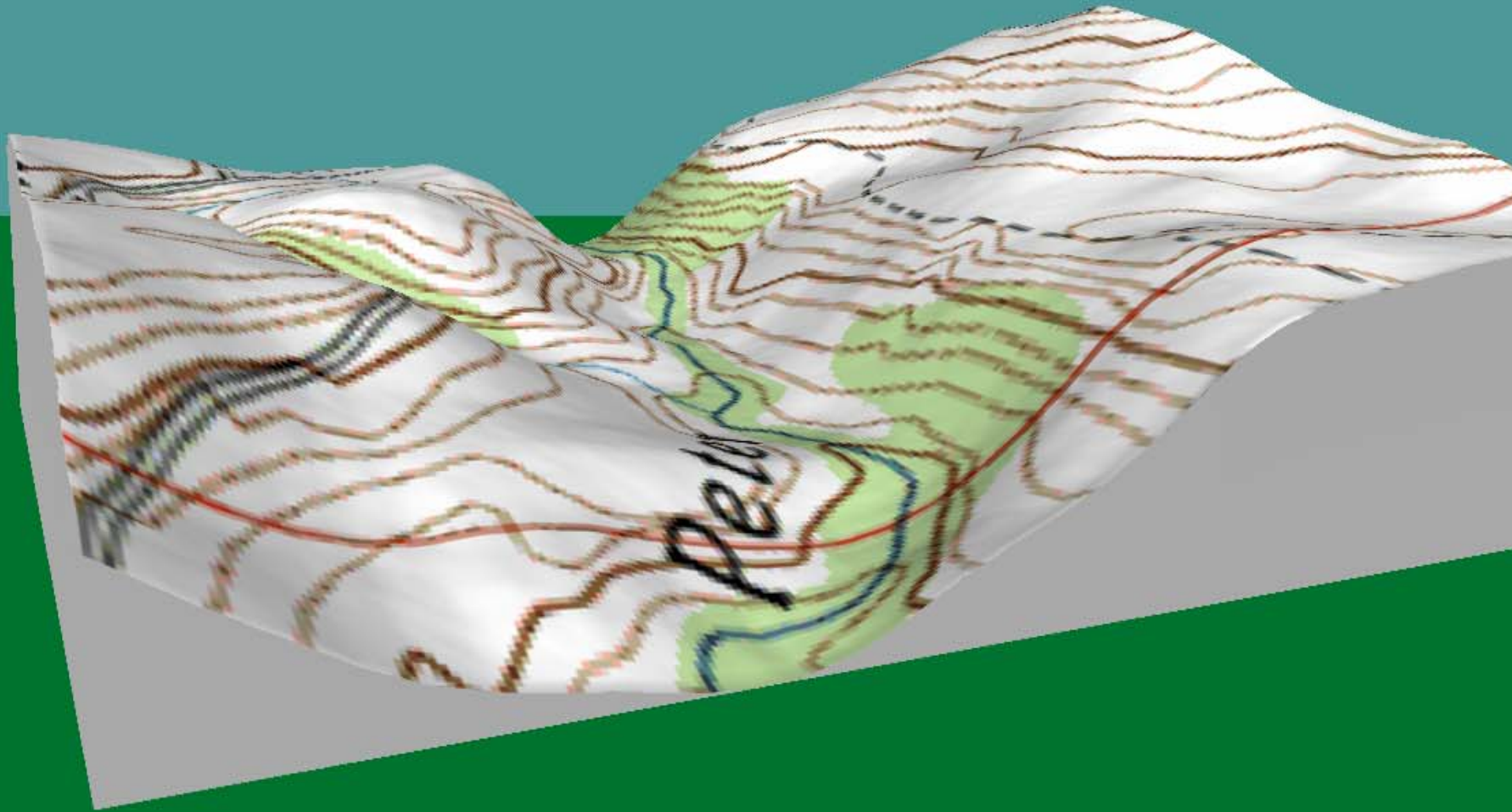
$$m^2 / 0.093 = ft^2$$

$670,198.6 / 0.093 = 7,206,436$ sq feet

$ft^2 / 43,560 = 165.437$ acres



Slope of stream 15%



Operational Losses Separated

- Methodology for the operational losses will be developed separately and presented at a later date.

