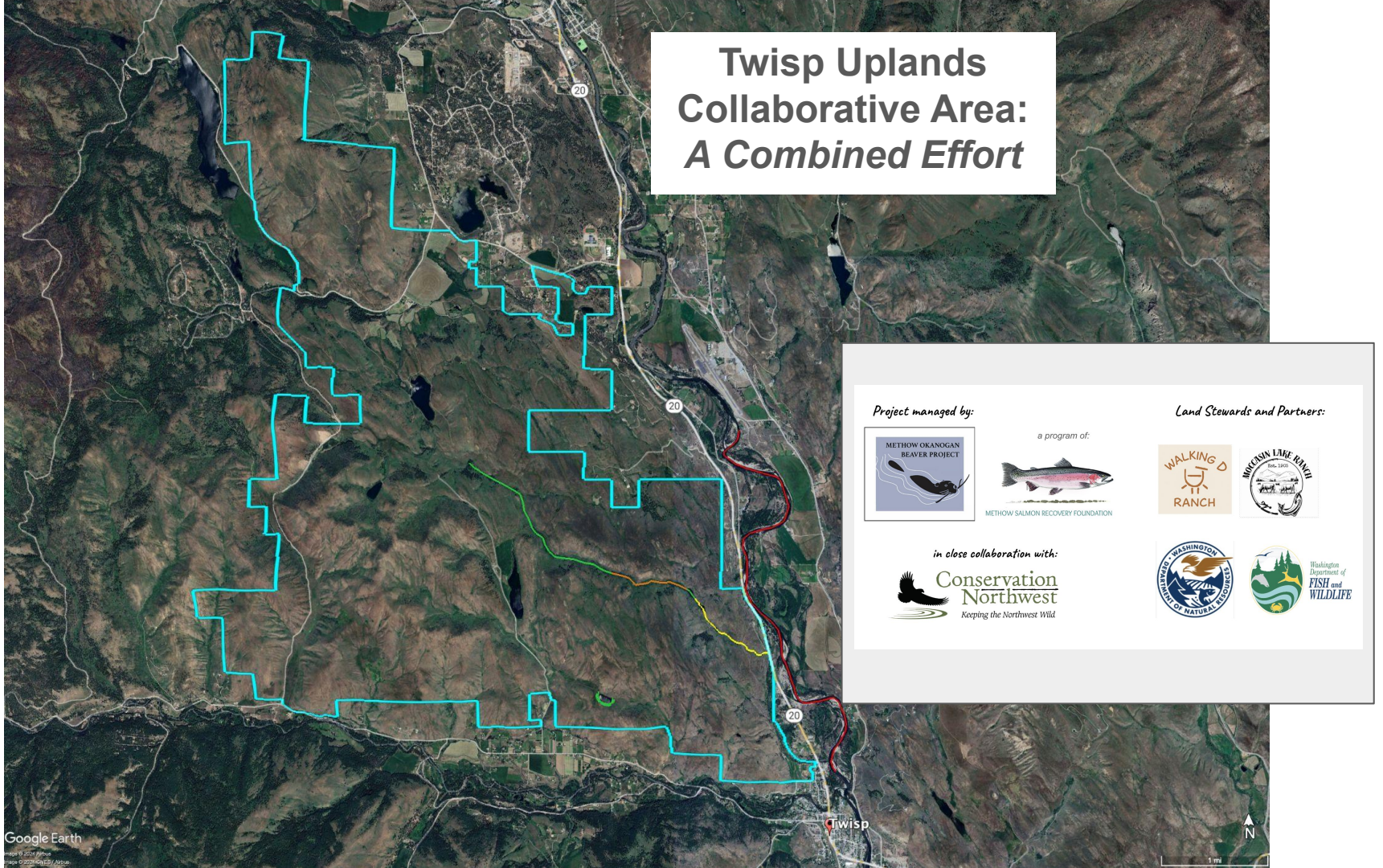


Twisp Uplands Ecological Restoration Project



Twisp Uplands Ecological Restoration Project


Twisp Uplands Collaborative Area: A Combined Effort
Project managed by:
METHOW OKANOGAN BEAVER PROJECT
a program of:
METHOW SALMON RECOVERY FOUNDATION
in close collaboration with:
Conservation Northwest
Keeping the Northwest Wild
Land Stewards and Partners:
WALKING D RANCH
MOCCASIN LAKE RANCH
Washington Department of FISH and WILDLIFE
20
20
20
Twisp
N
Google Earth

Twisp Uplands Project Partners

Project managed by:

METHOW OKANOGAN BEAVER PROJECT

a program of:



METHOW SALMON RECOVERY FOUNDATION

in close collaboration with:

Conservation Northwest

Keeping the Northwest Wild

Project Partners:

ILC

A BIG PICTURE SCHOOL

Methow Valley School District

Beaver Food Forest

Colville Reservation Conservation District

Land Stewards and Partners:

Walking D Ranch

Moccasin Lake Ranch Est. 1905

Washington Department of Natural Resources

Washington Department of Fish and Wildlife

With funding from:

National Fish and Wildlife Foundation

NFWF

Department of Ecology State of Washington

Washington Department of Natural Resources

Funded by Washington's Climate Commitment Act

This work is supported through funding from Washington's Climate Commitment Act (CCA). The CCA supports Washington's climate action efforts by putting cap-and-invest dollars to work reducing climate pollution, creating jobs, and improving public health. Information about the CCA is available at www.climate.wa.gov.

Washington State Conservation Commission

Washington Shrubsteppe Restoration & Resiliency Initiative (WSRRI)

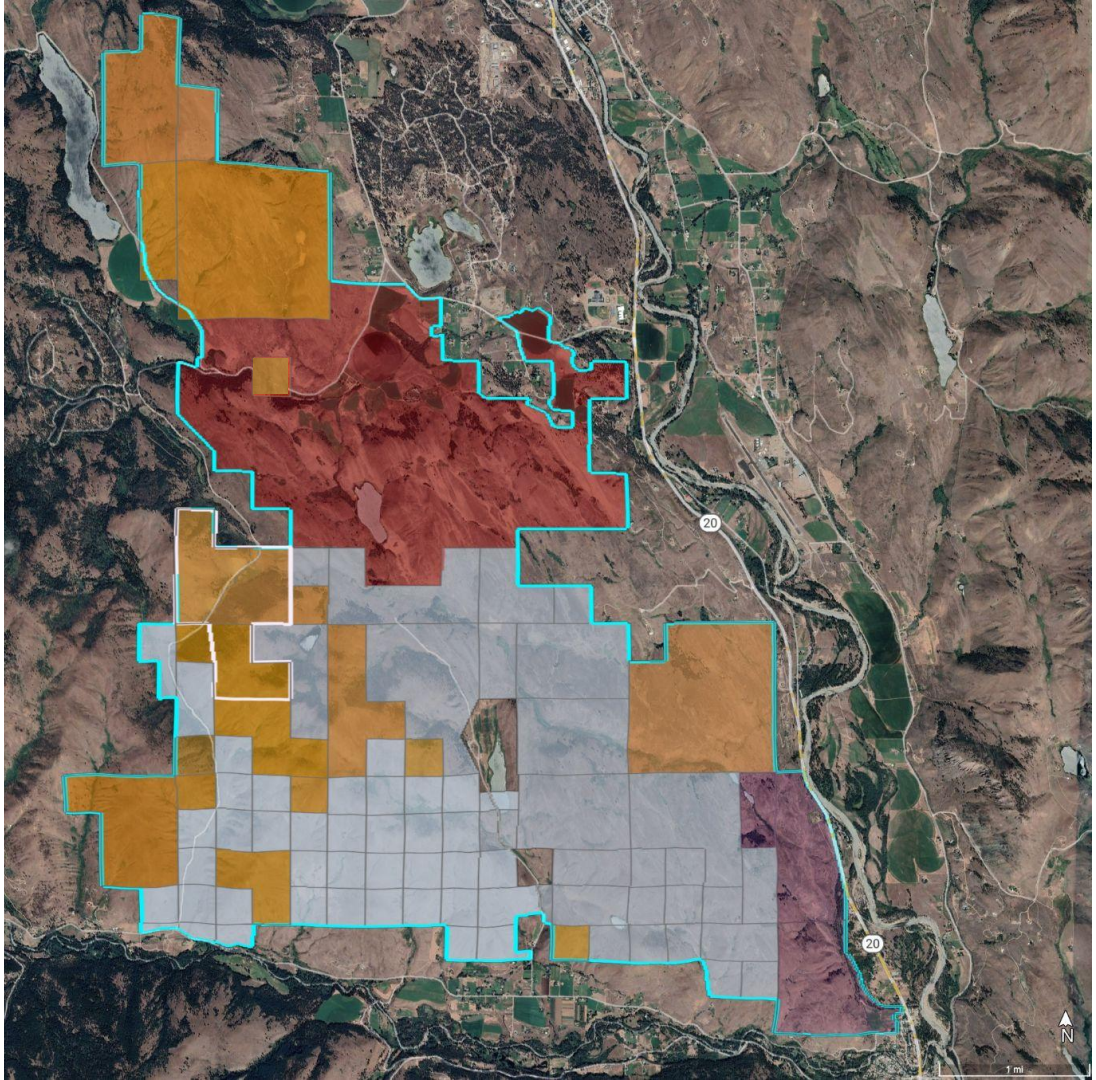
Okanogan Conservation District

Mule Deer Foundation

Conservation Northwest

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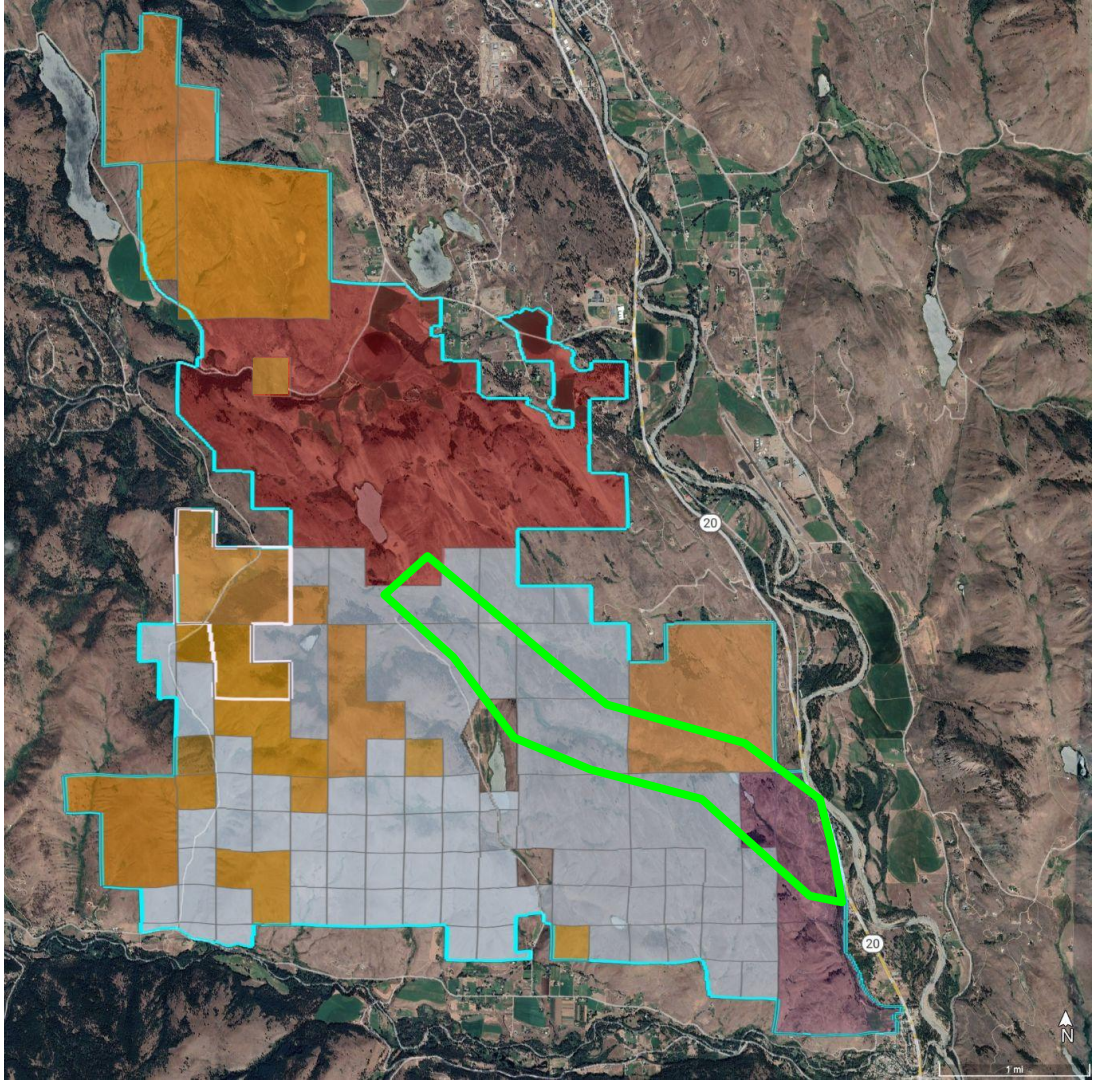
Land Ownership



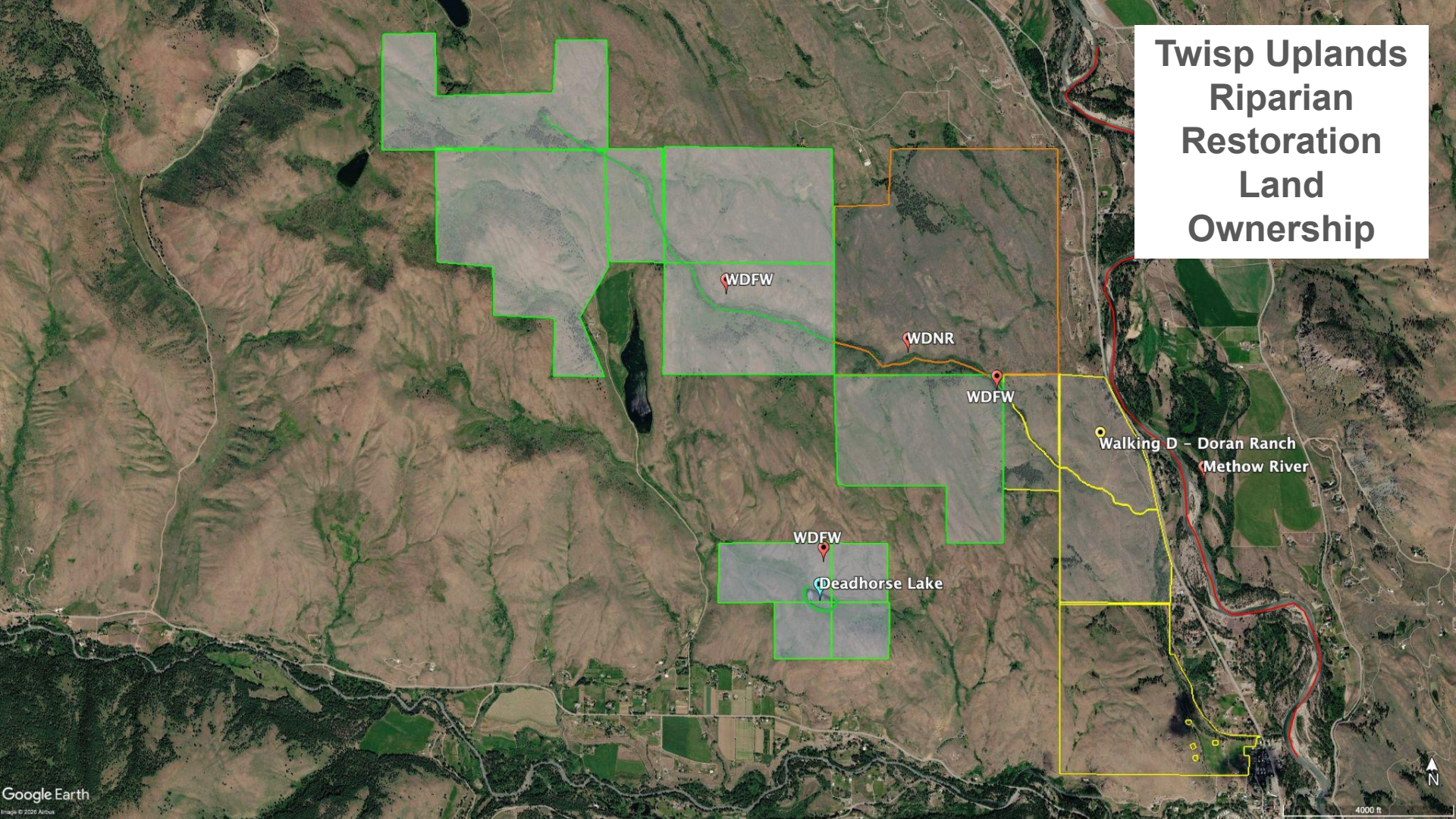
- DNR
- Moccasin Lake Ranch
- WDFW
- Doran / Walking D Ranch

Twisp Uplands Ecological Restoration Project:

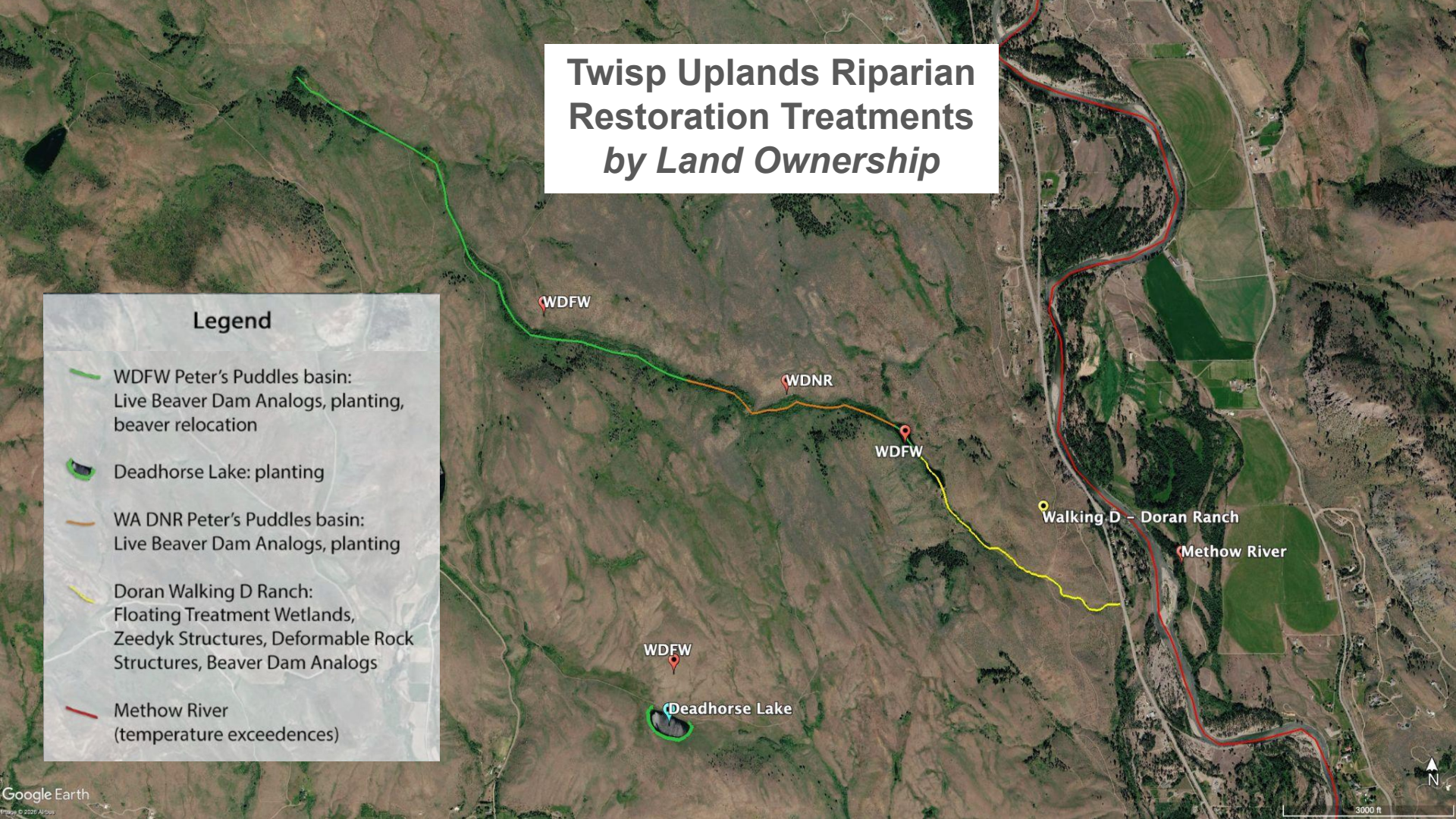
Land Ownership



- DNR
- Moccasin Lake Ranch
- WDFW
- Doran / Walking D Ranch


Twisp Uplands Riparian Restoration Land Ownership
WDFW
WDNR
WDFW
Walking D – Doran Ranch
Methow River
WDFW
Deadhorse Lake
Google Earth
N
4000 ft

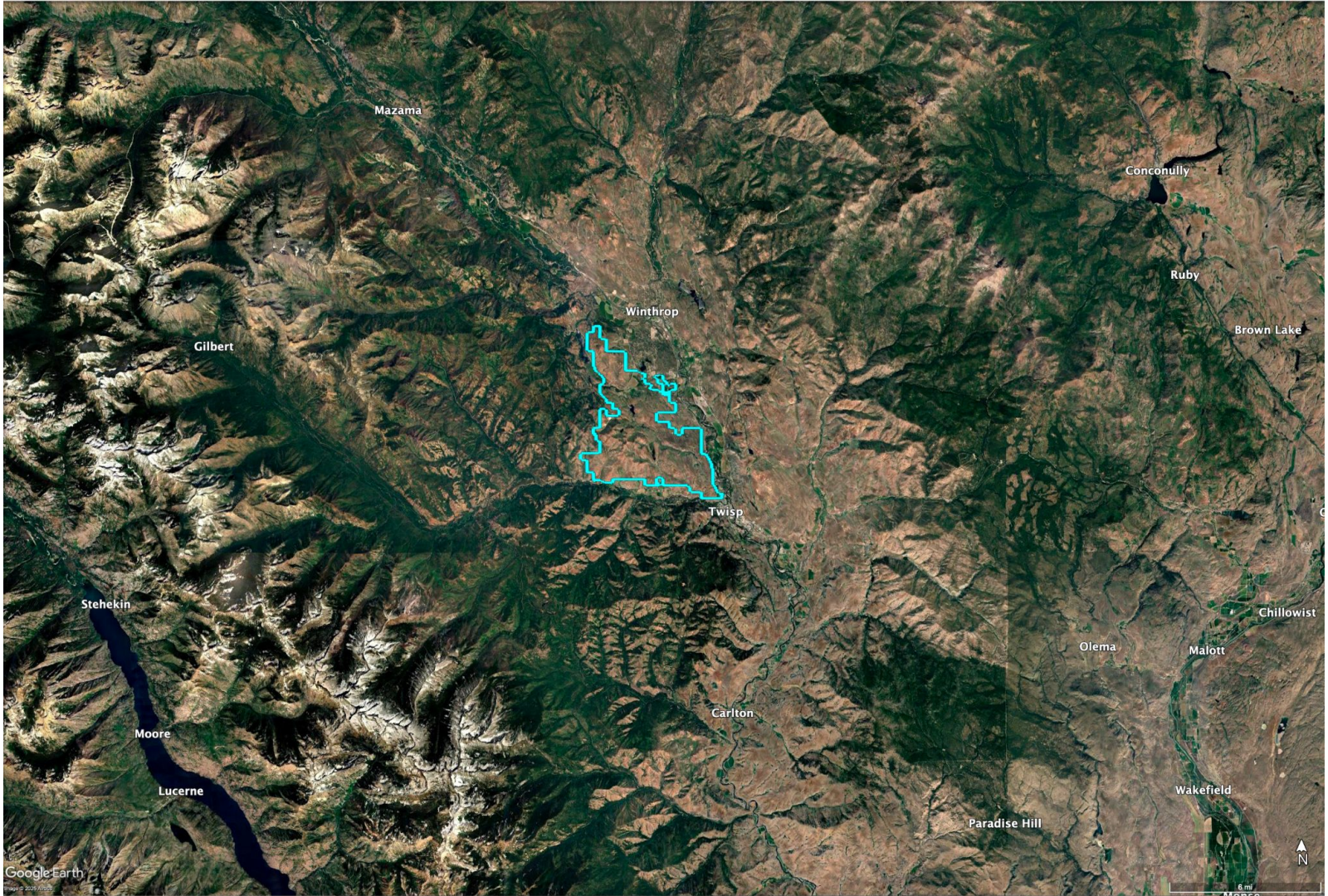
Twisp Uplands Riparian Restoration Treatments *by Land Ownership*



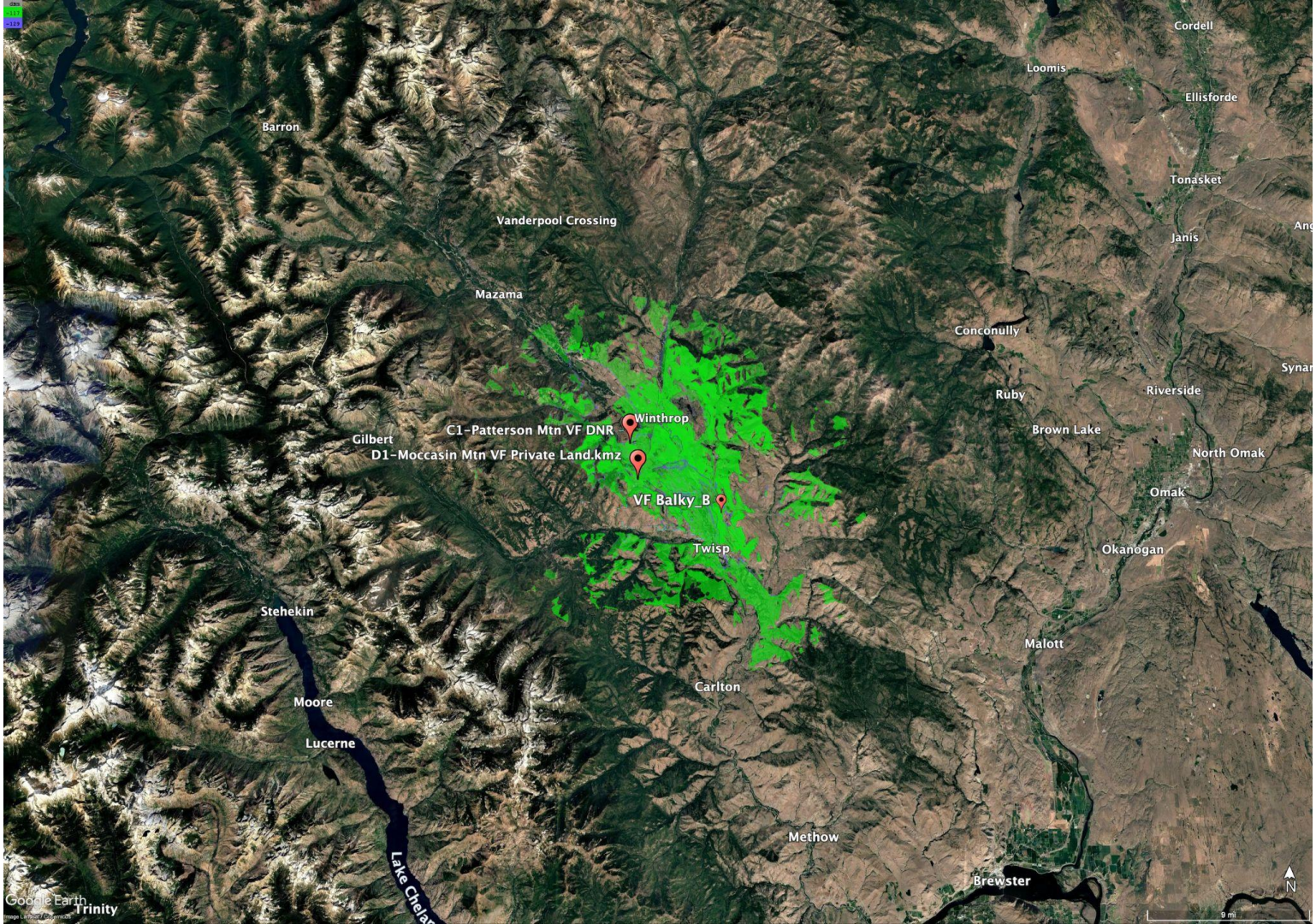


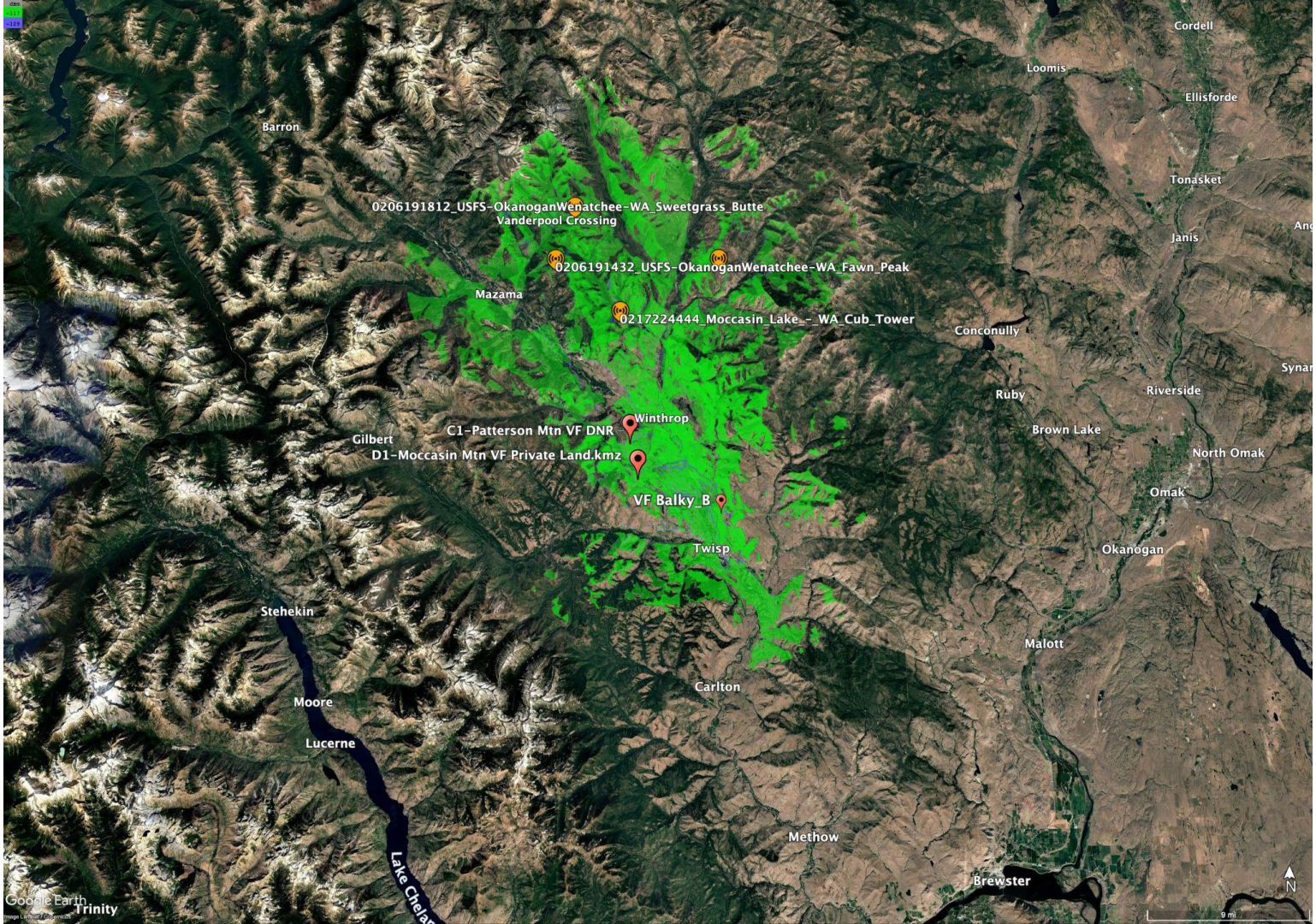


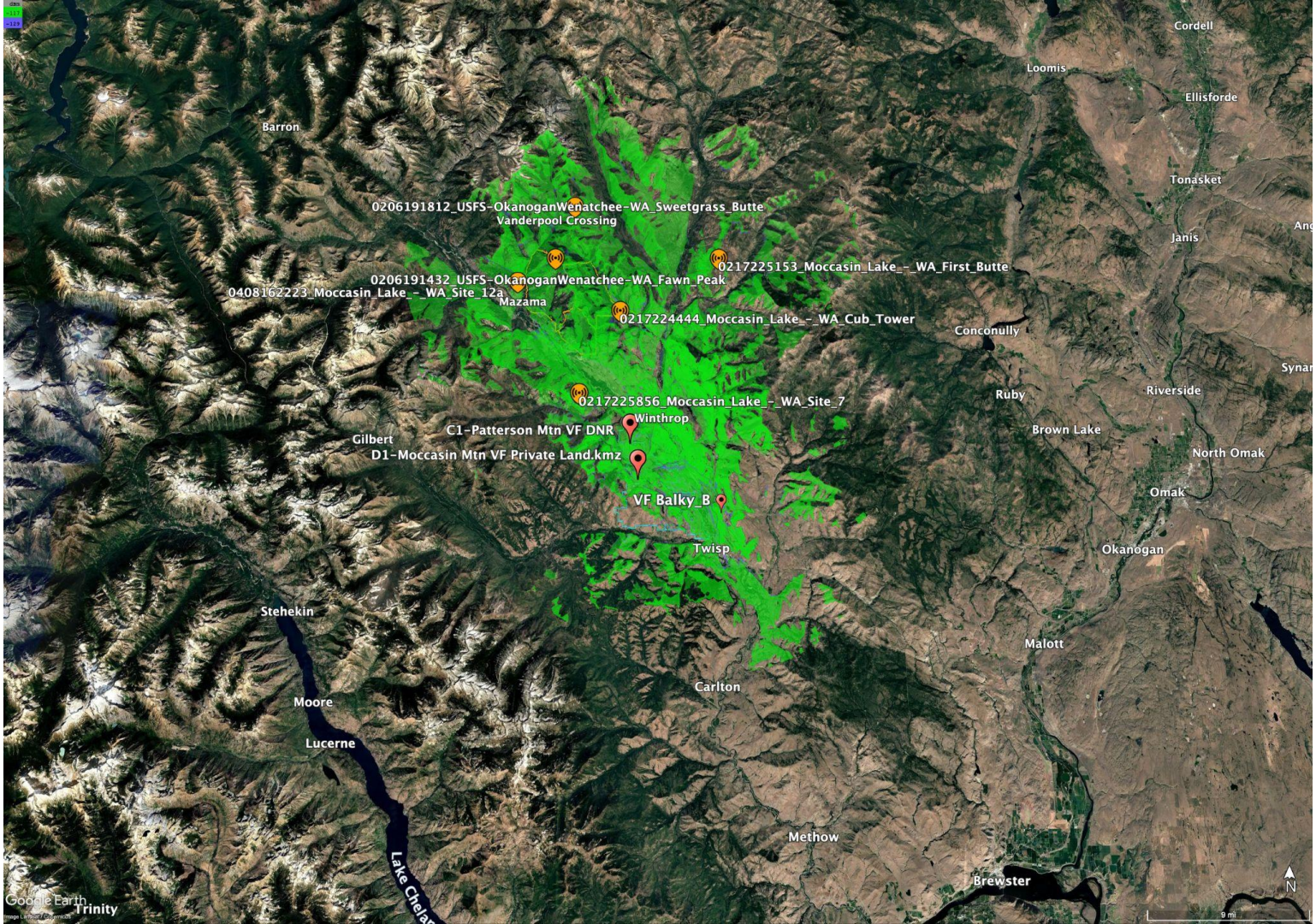



Mazama
Conconully
Ruby
Winthrop
Brown Lake
Gilbert
Twisp
Stehekin
Chillowist
Olema
Malott
Carlton
Moore
Lucerne
Wakefield
Paradise Hill
Google Earth
N
6 mi


7/31/2025 8:07:47 am
Mazama
Conconully
Ruby
Winthrop
C-Patterson Mtn VF DNR
Brown Lake
Gilbert
D-Moccasin Mtn VF Private Land.kmz
VF Balky_B
Twisp
Stehekin
Chillowist
Olema
Malott
Carlton
Moore
Lucerne
Wakefield
Paradise Hill
Google Earth
N
6 mi

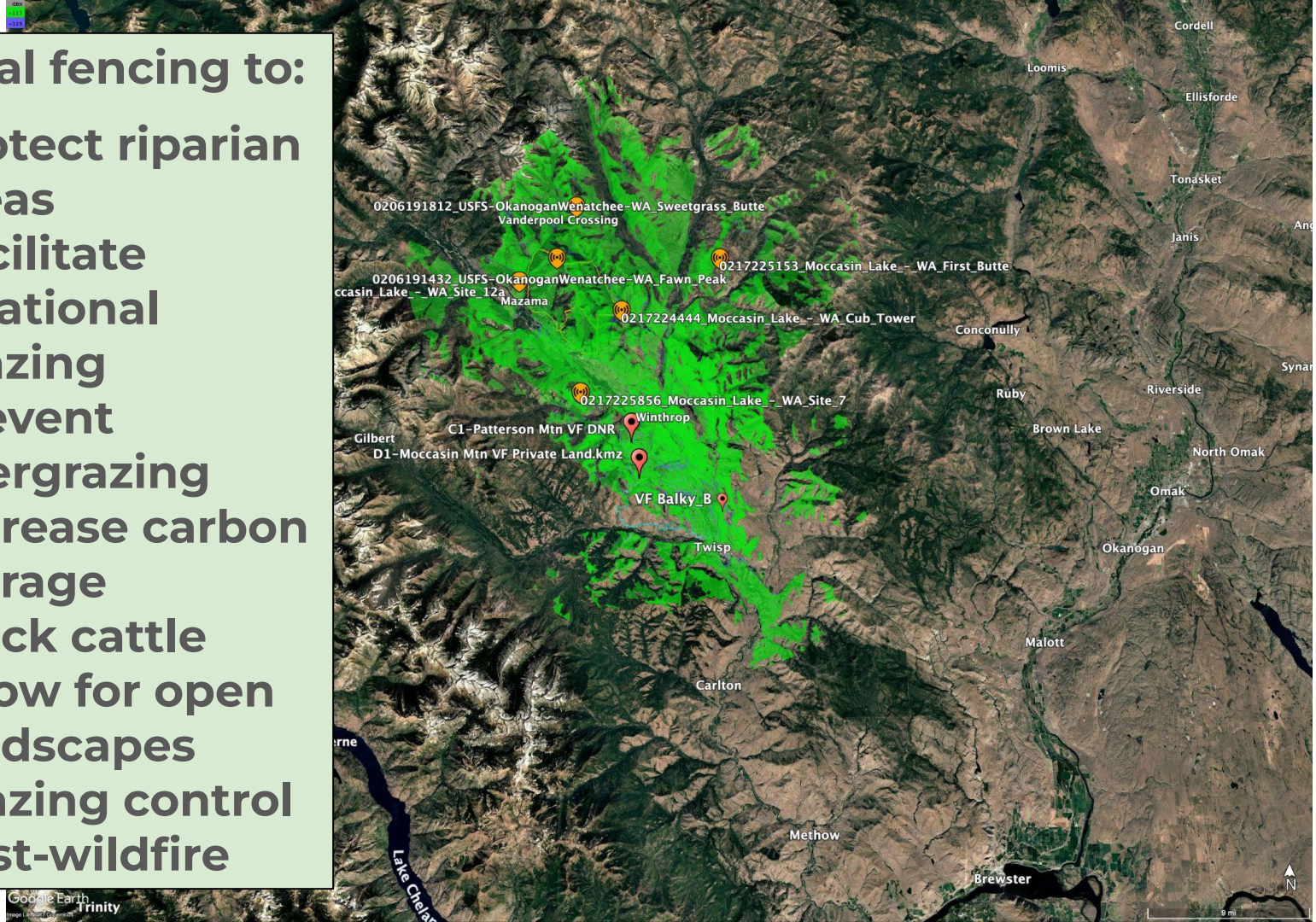

Cordell
Loomis
Ellisforde
Barron
Tonasket
Vanderpool Crossing
Janis
Mazama
Conconully
Ruby
Riverside
Winthrop
C1-Patterson Mtn VF DNR
Brown Lake
Gilbert
D1-Moccasin Mtn VF Private Land.kmz
North Omak
VF Balky_B
Omak
Twisp
Okanogan
Stehekin
Malott
Carlton
Moore
Lucerne
Methow
Brewster
Trinity
Google Earth
N
9 mi

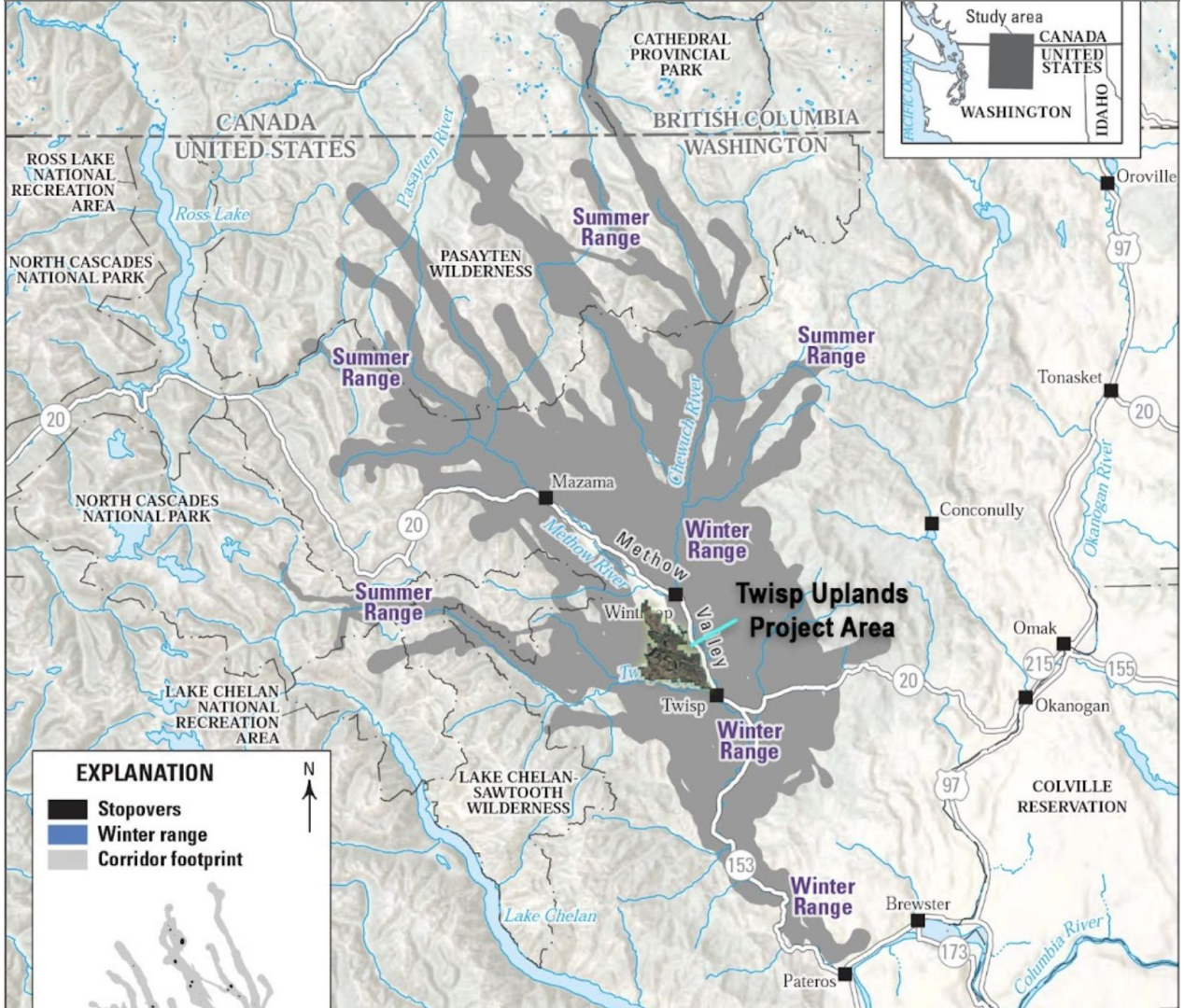

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Loomis
Ellisforde
Barron
Tonasket
0206191812_USFS-OkanoganWenatchee-WA_Sweetgrass_Butte
Vanderpool Crossing
Janis
0206191432_USFS-OkanoganWenatchee-WA_Fawn_Peak
Mazama
0217224444_Moccasin_Lake_-_WA_Cub_Tower
Conconully
Ruby
Riverside
Winthrop
C1-Patterson Mtn VF DNR
Brown Lake
Gilbert
D1-Moccasin Mtn VF Private Land.kmz
North Omak
VF Balky_B
Omak
Twisp
Okanogan
Stehekin
Malott
Carlton
Moore
Lucerne
Methow
Brewster
Trinity
N
9 mi


Cordell
Loomis
Ellisforde
Barron
Tonasket
0206191812_USFS-OkanoganWenatchee-WA_Sweetgrass_Butte
Vanderpool Crossing
Janis
0217225153_Moccasin_Lake_-_WA_First_Butte
0206191432_USFS-OkanoganWenatchee-WA_Fawn_Peak
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Mazama
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Conconully
0217225856_Moccasin_Lake_-_WA_Site_7
Ruby
Riverside
Winthrop
C1-Patterson Mtn VF DNR
Brown Lake
Gilbert
D1-Moccasin Mtn VF Private Land.kmz
North Omak
Omak
VF Balky_B
Twisp
Okanogan
Stehekin
Malott
Carlton
Moore
Lucerne
Methow
Brewster
Trinity
N
9 mi
Google Earth

Virtual fencing to:

- Protect riparian areas
- Facilitate rotational grazing
- Prevent overgrazing
- Increase carbon storage
- Track cattle
- Allow for open landscapes
- Grazing control post-wildfire

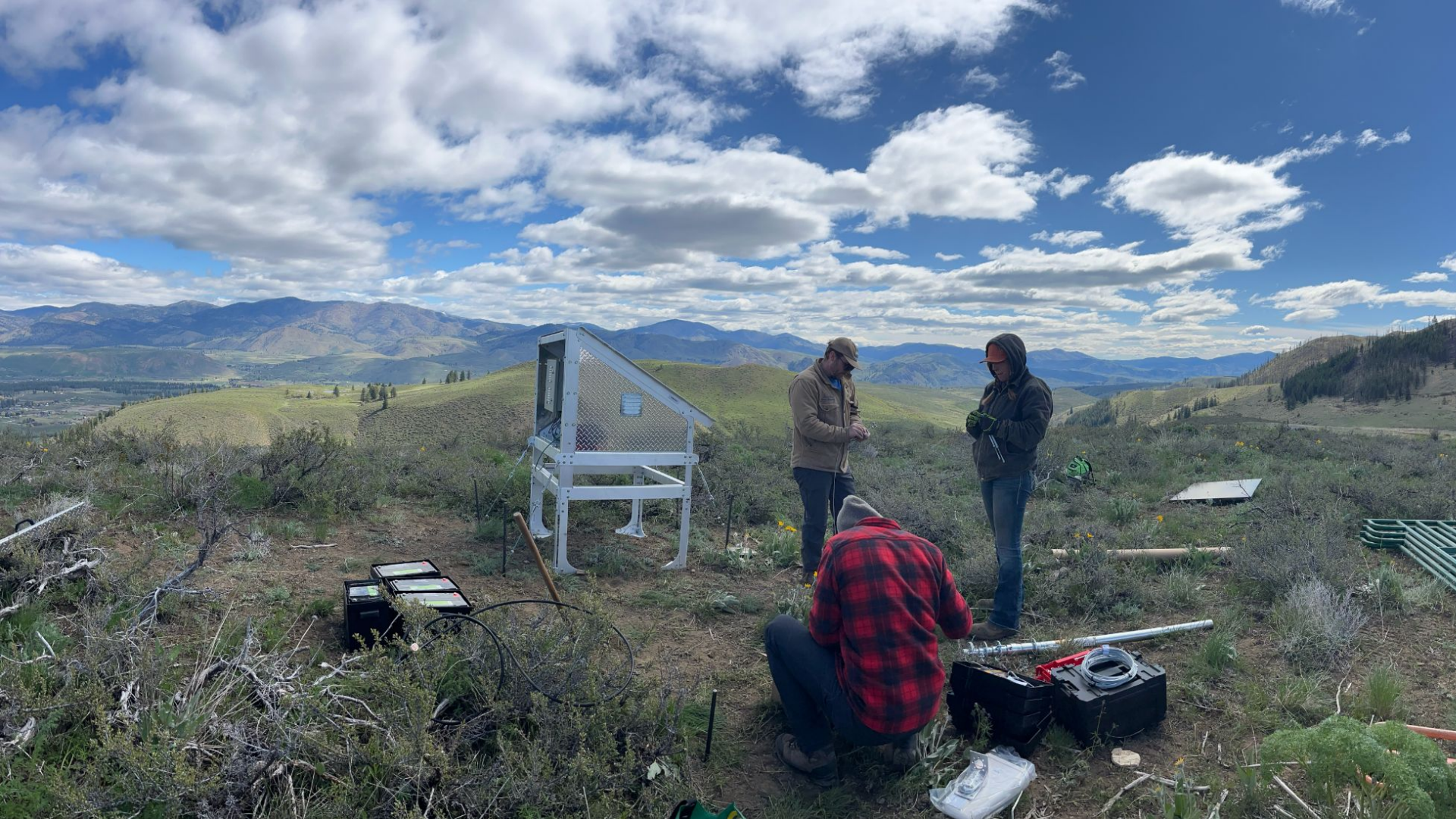



Study area
CANADA
UNITED STATES
WASHINGTON
IDAHO
PACIFIC OCEAN
CANADA
UNITED STATES
BRITISH COLUMBIA
WASHINGTON
CATHEDRAL PROVINCIAL PARK
ROSS LAKE NATIONAL RECREATION AREA
Ross Lake
NORTH CASCADES NATIONAL PARK
Pasayten River
PASAYTEN WILDERNESS
Summer Range
Summer Range
Summer Range
Summer Range
Chewuch River
Mazama
Methow
Methow River
Winter Range
Winter Range
Winter Range
Twisp Uplands Project Area
Valley
Twisp
Winthrop
LAKE CHELAN NATIONAL RECREATION AREA
LAKE CHELAN-SAWTOOTH WILDERNESS
Lake Chelan
Oroville
Tonasket
Conconully
Okanogan River
Omak
Okanogan
Brewster
Pateros
Columbia River
COLVILLE RESERVATION
20
97
215
155
153
173
EXPLANATION
Stopovers
Winter range
Corridor footprint
N













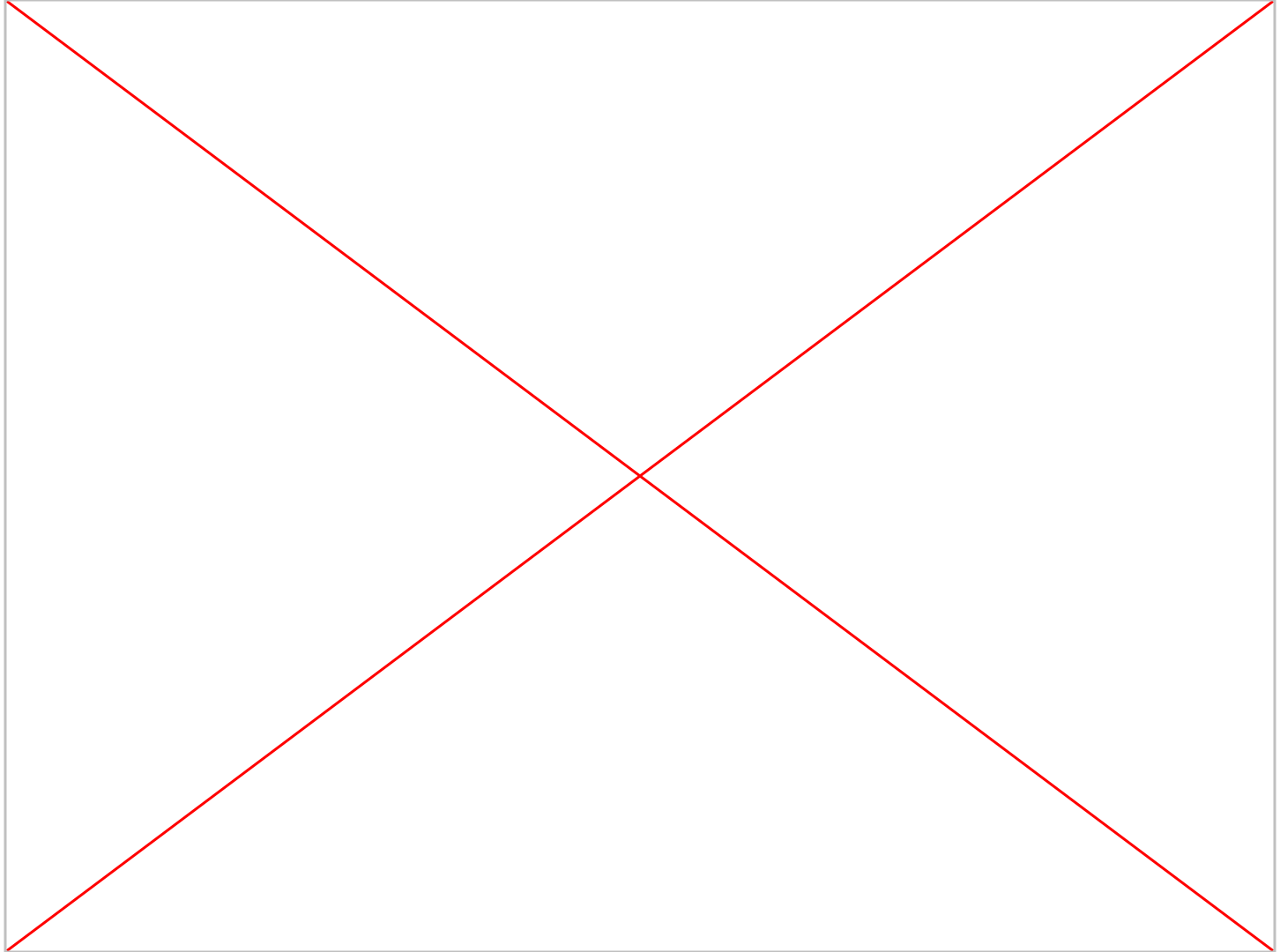


Mobile virtual fence base station installed on trailer (instead of being placed on the ground)

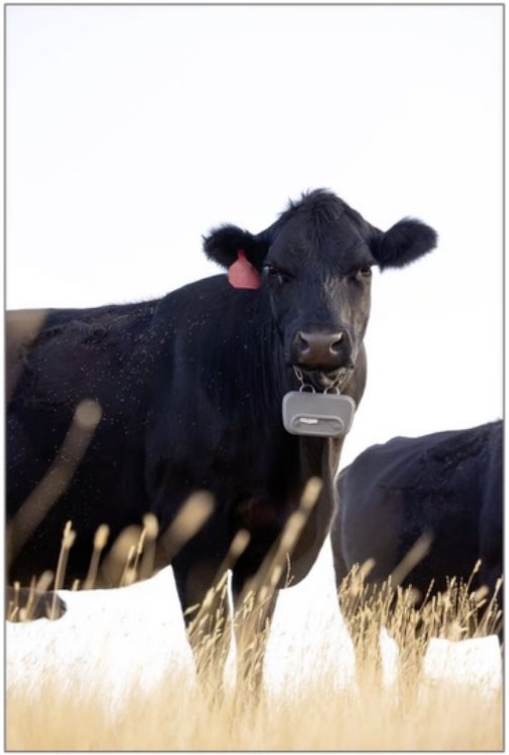

22


7


7



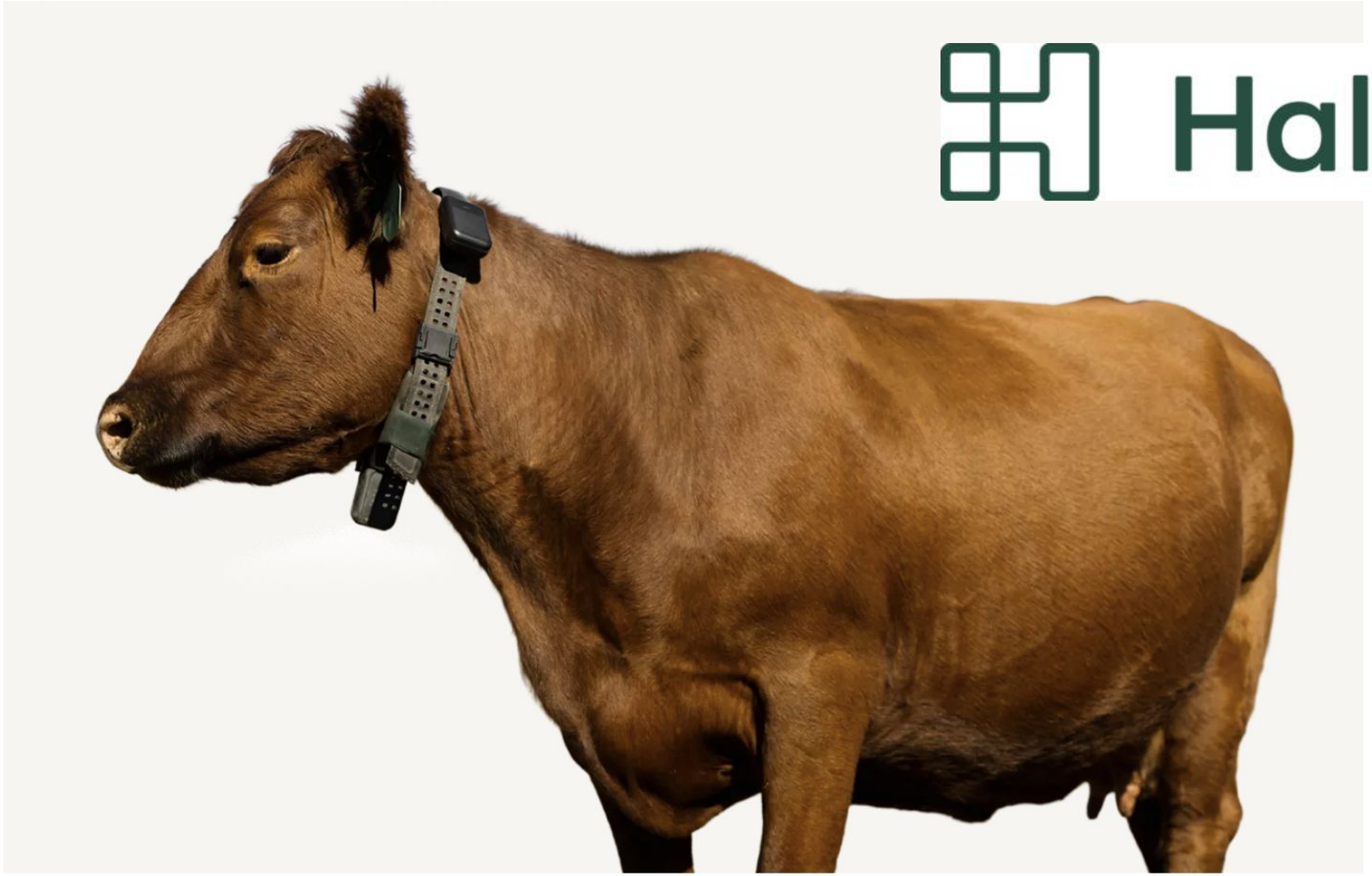




VENCE®

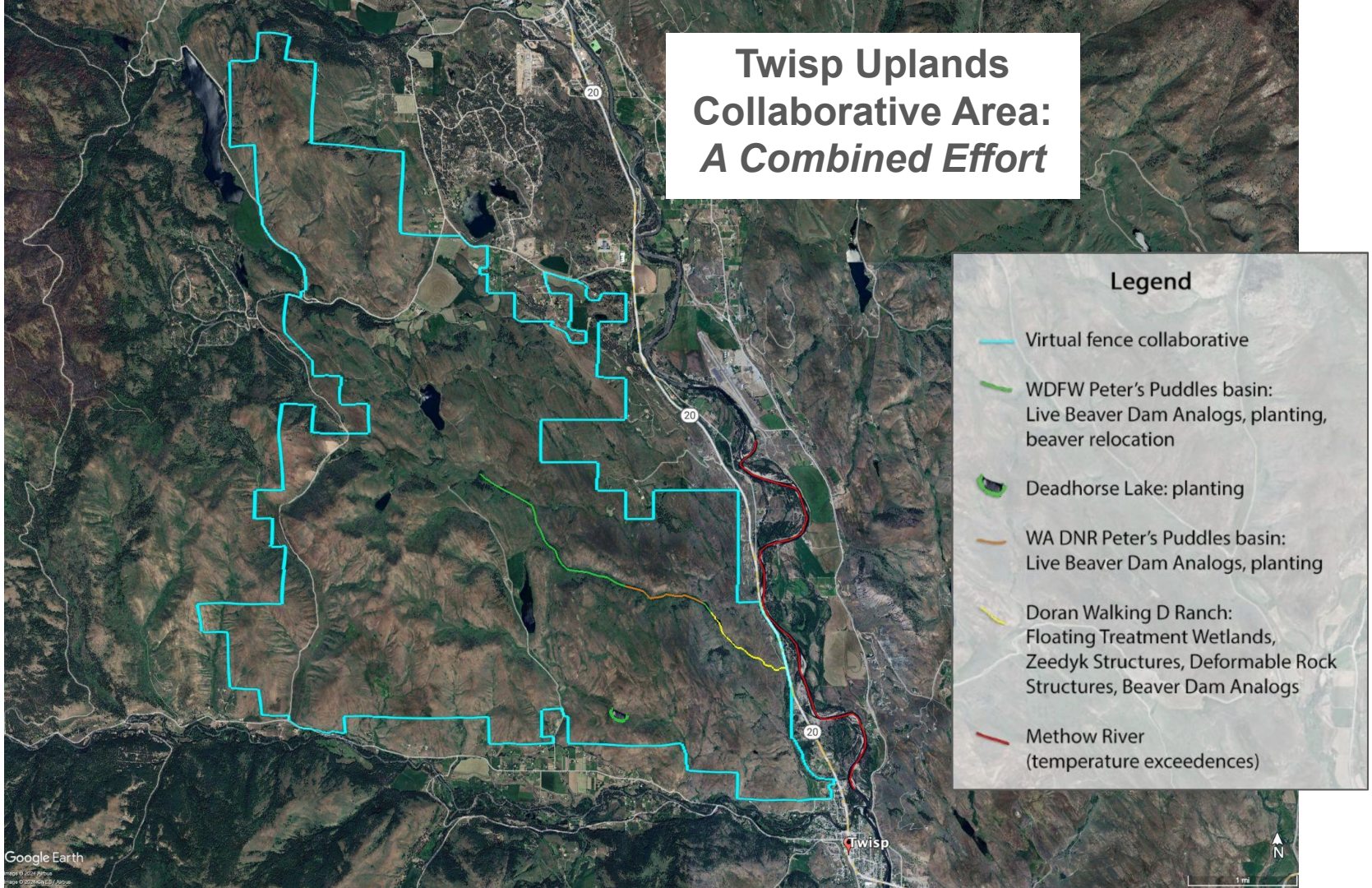
MERCK
Animal Health


GALLAGHER

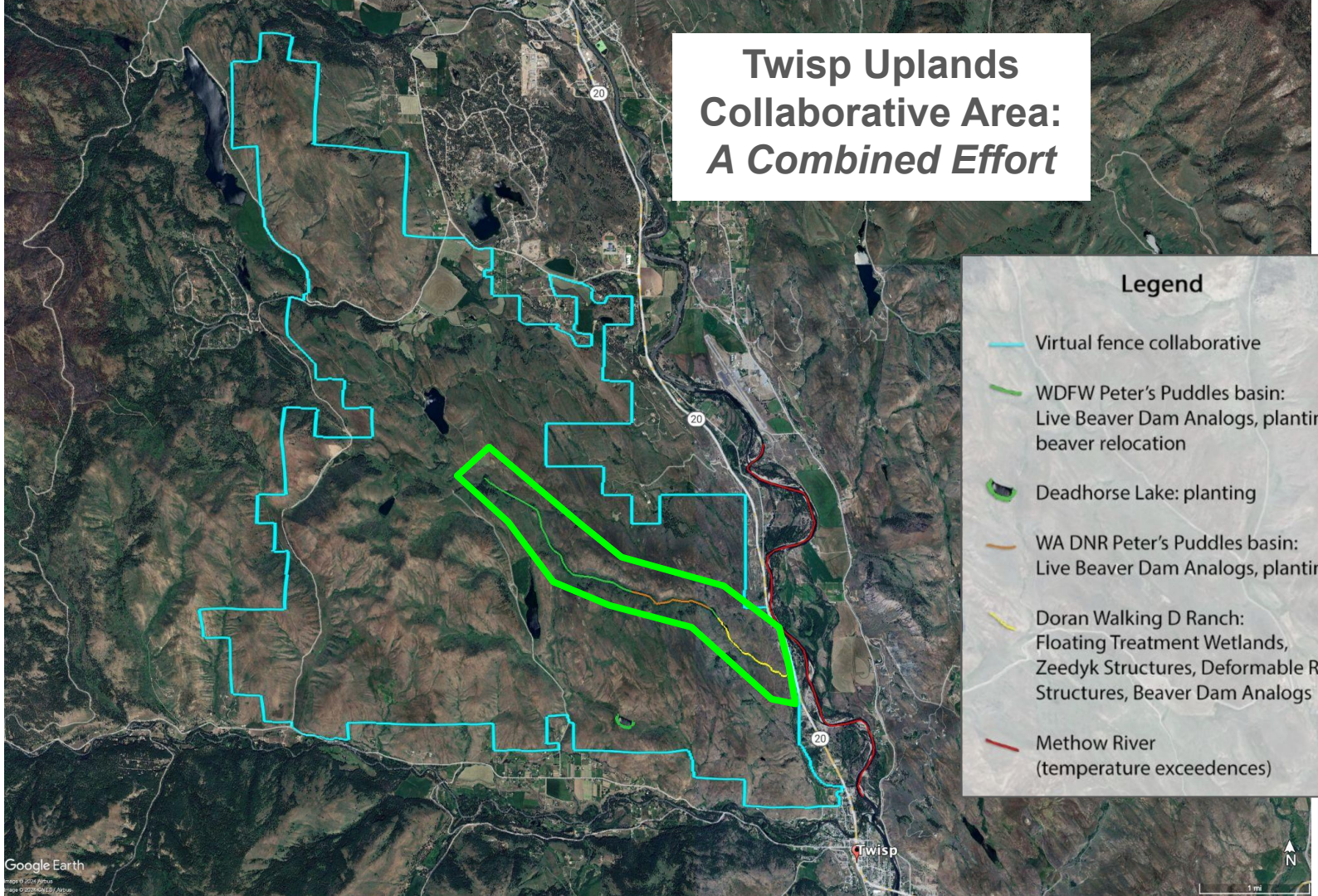


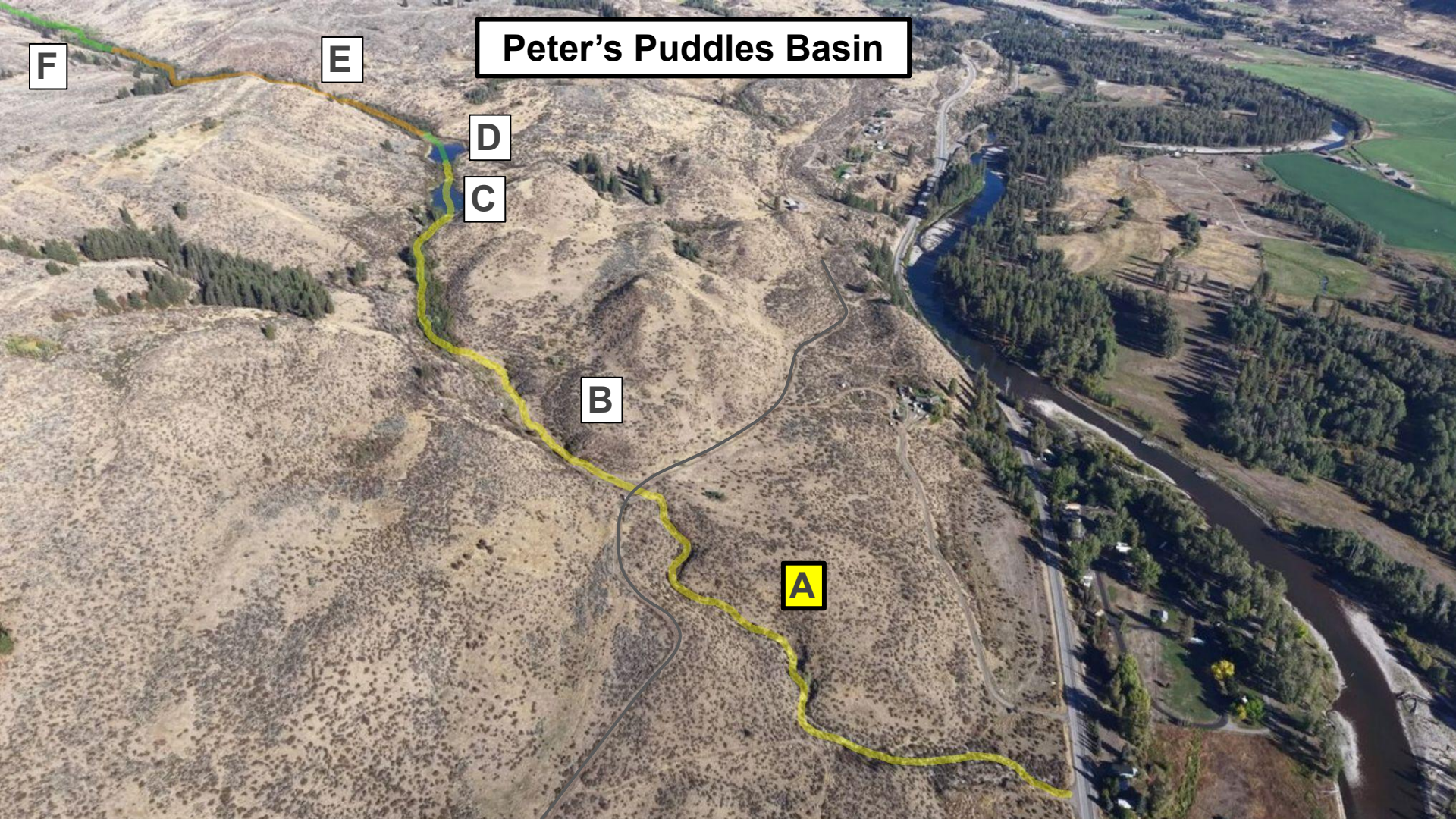
Halter

Twisp Uplands Collaborative Area: *A Combined Effort*



Twisp Uplands Collaborative Area: *A Combined Effort*




Peter’s Puddles Basin
F
E
D
C
B
A

Lost Boy Gulch



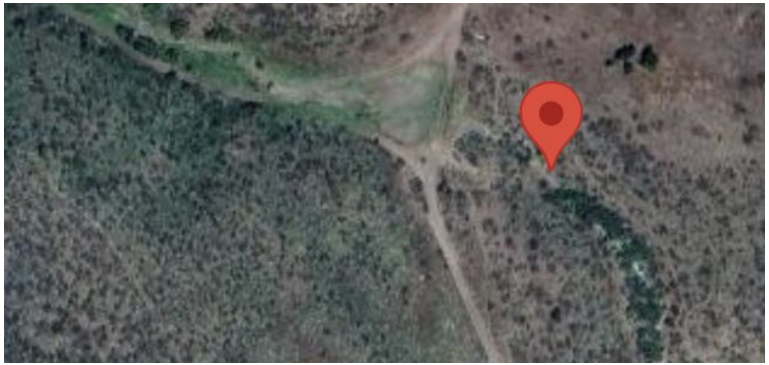


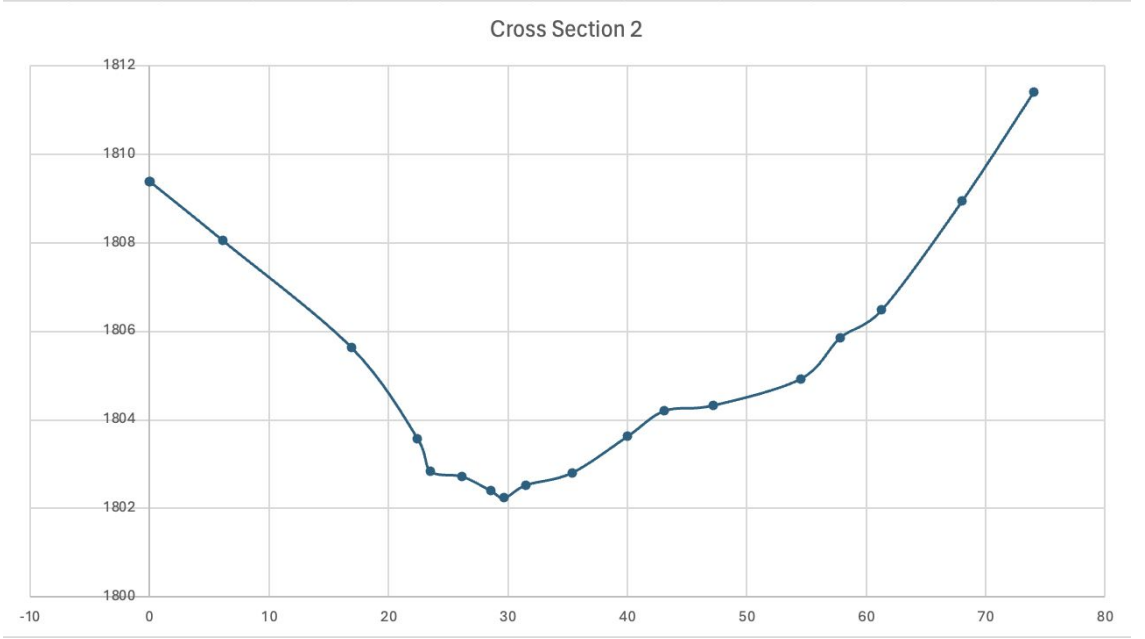


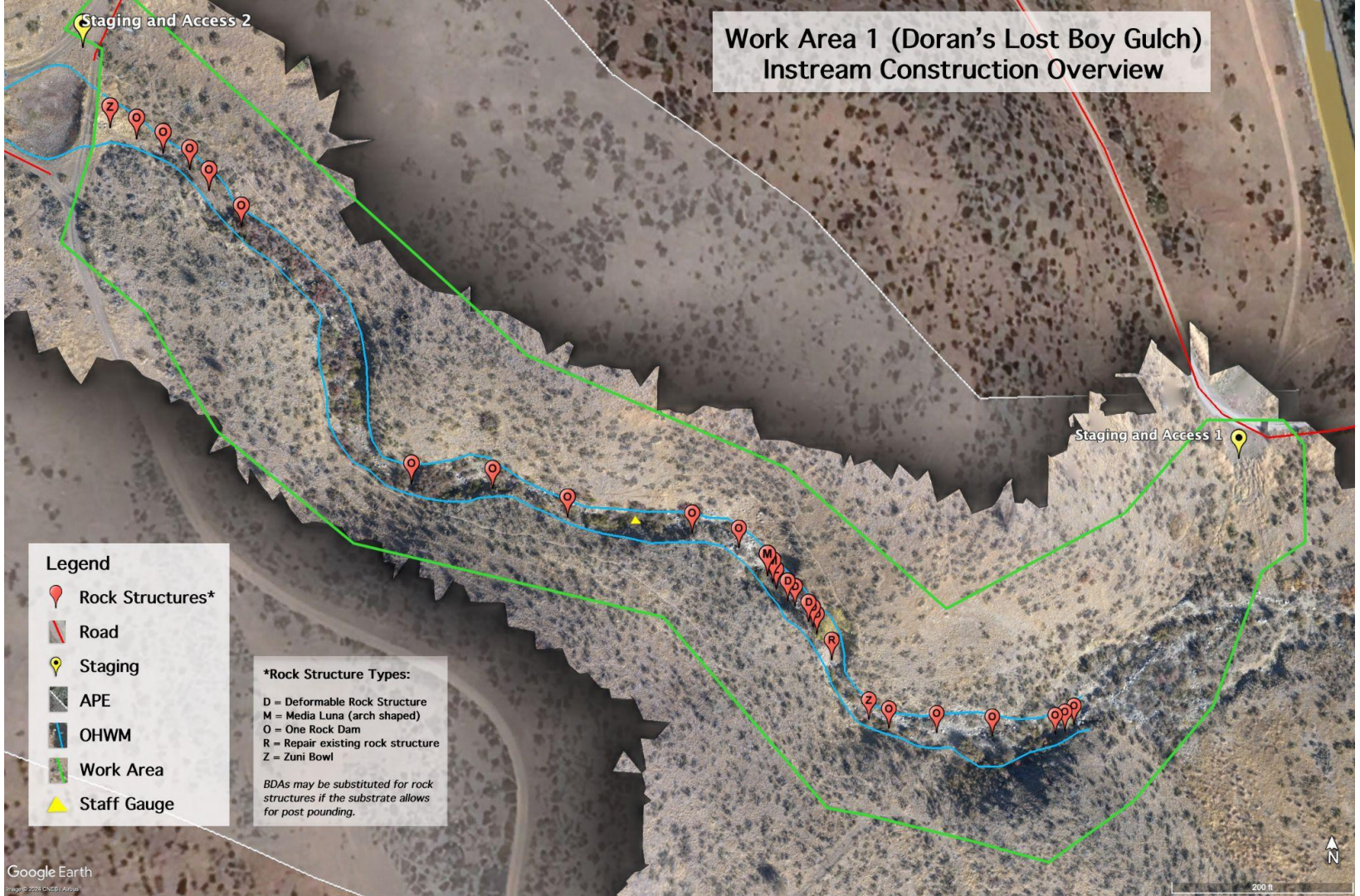






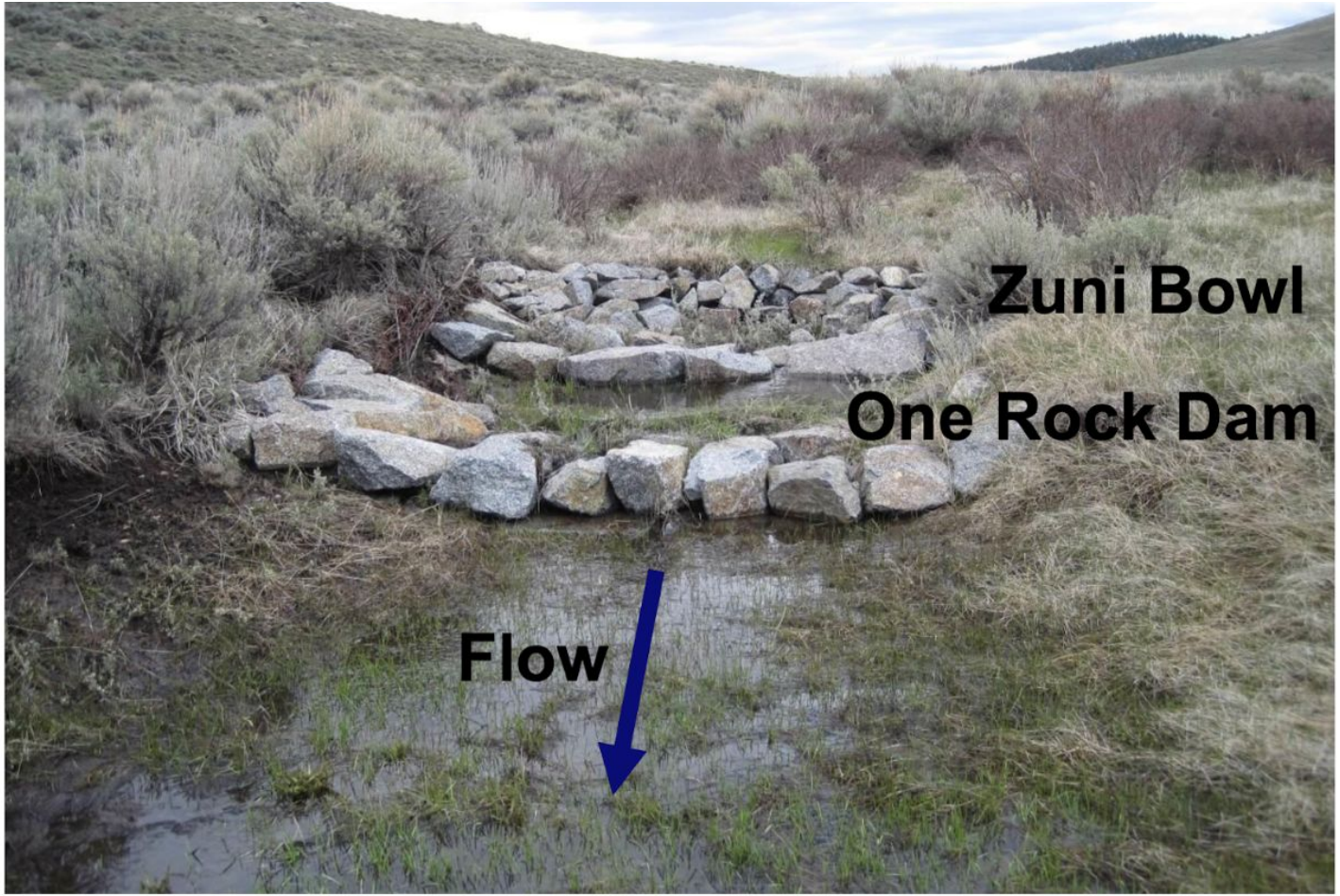



Cross Section 2
1812
1810
1808
1806
1804
1802
1800
-10
0
10
20
30
40
50
60
70
80


Work Area 1 (Doran's Lost Boy Gulch)
Instream Construction Overview
Staging and Access 2
Staging and Access 1
Legend
Rock Structures*
Road
Staging
APE
OHWM
Work Area
Staff Gauge
*Rock Structure Types:
D = Deformable Rock Structure
M = Media Luna (arch shaped)
O = One Rock Dam
R = Repair existing rock structure
Z = Zuni Bowl
BDAs may be substituted for rock structures if the substrate allows for post pounding.
Google Earth
N
200 ft


One Rock Dam


Zuni Bowl



NWS-2019-149

Figure 22, Zuni Bowl with One Rock Dam in tandem, Example Photo (NRCS)






Before


After



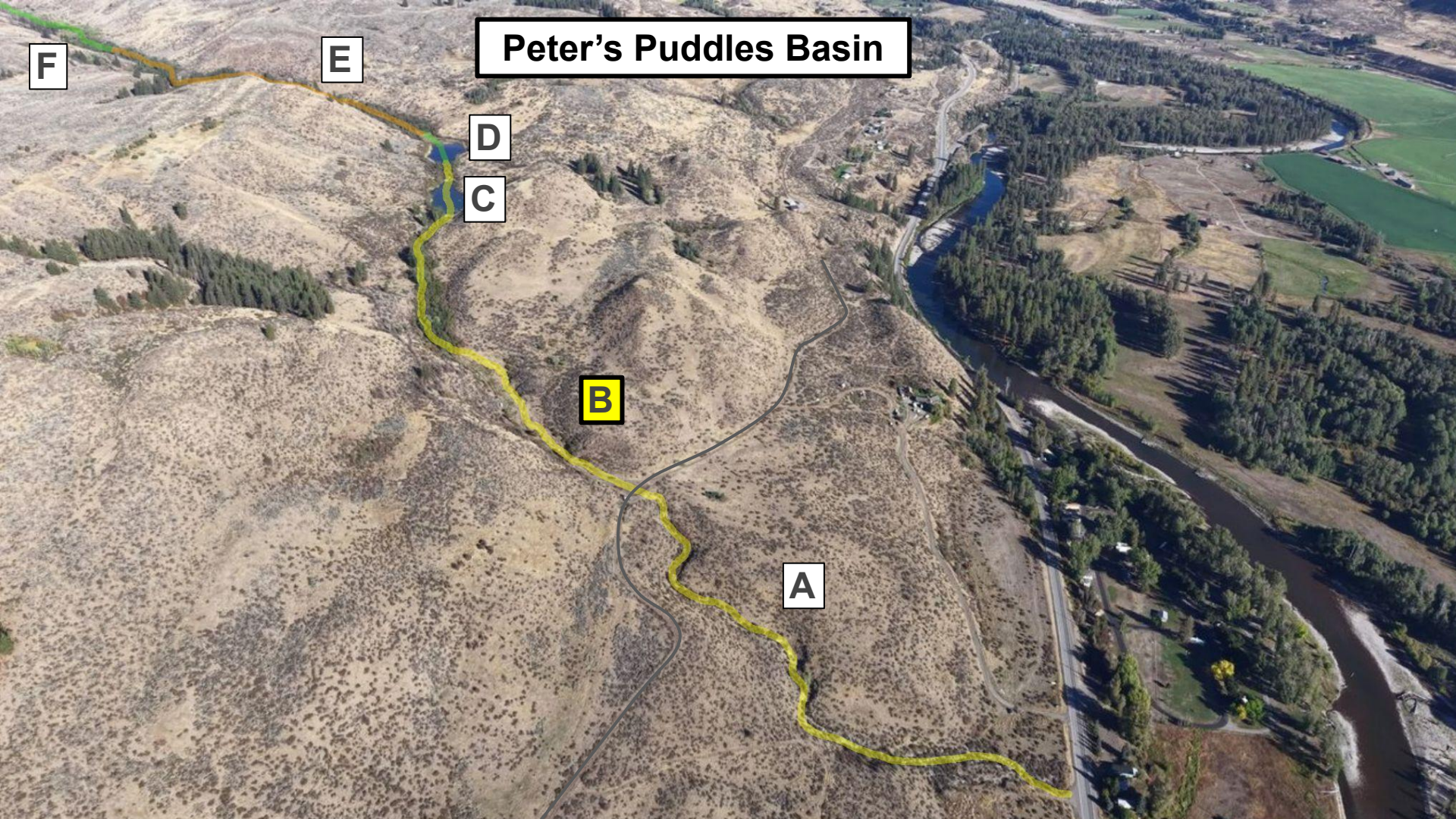











Peter's Puddles Basin
F
E
D
C
B
A





Doran's Scott Canyon





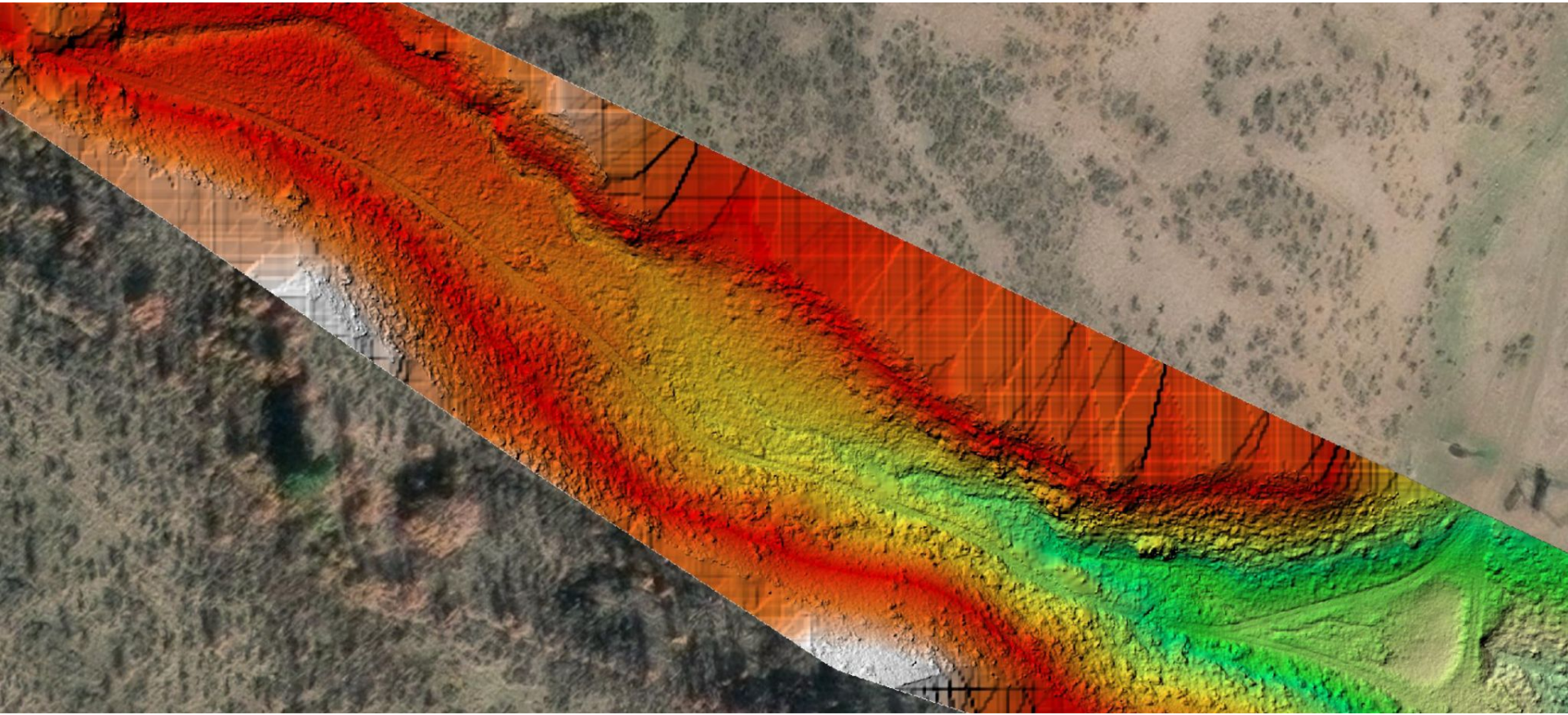


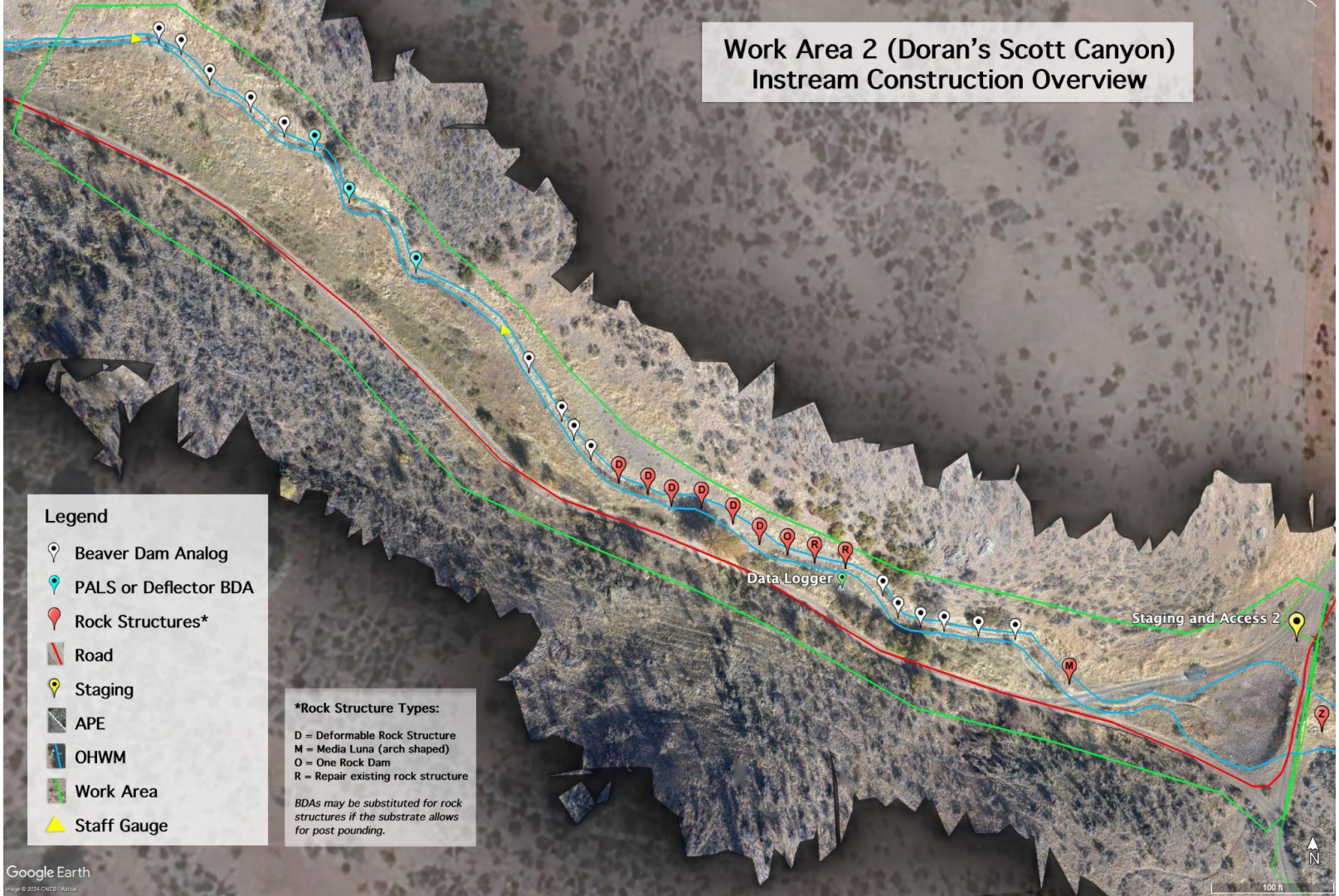











Work Area 2 (Doran's Scott Canyon)
Instream Construction Overview
Legend
Beaver Dam Analog
PALS or Deflector BDA
Rock Structures*
Road
Staging
APE
OHWM
Work Area
Staff Gauge
*Rock Structure Types:
D = Deformable Rock Structure
M = Media Luna (arch shaped)
O = One Rock Dam
R = Repair existing rock structure
BDAs may be substituted for rock structures if the substrate allows for post pounding.
Data Logger
Staging and Access 2
N
Google Earth





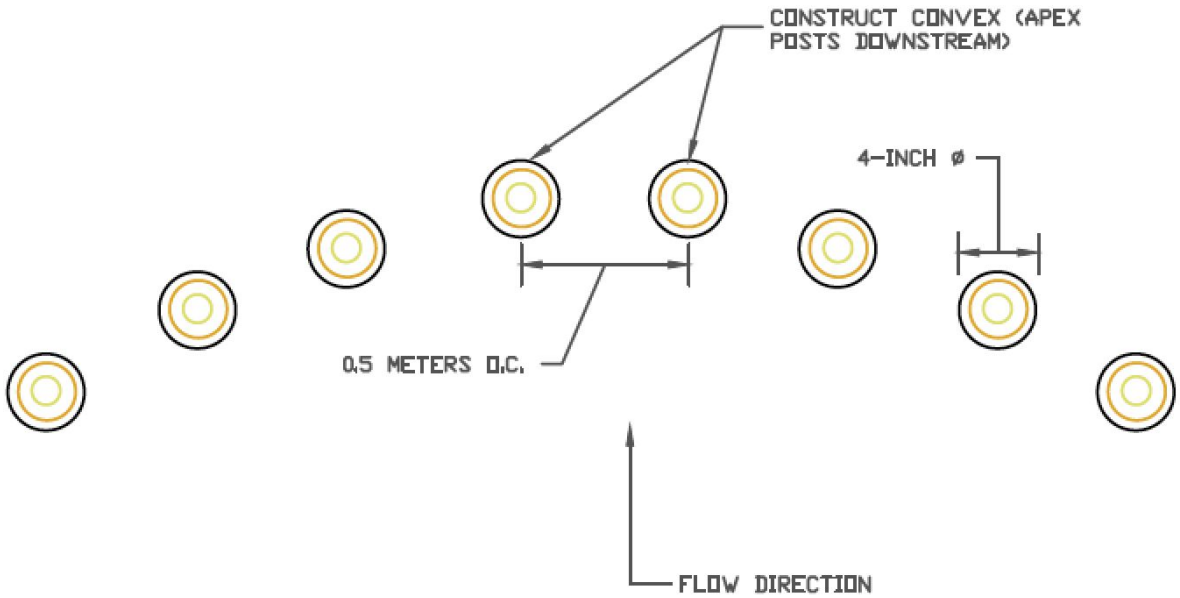





October 3, 2019


May 29, 2020





PLANVIEW OF BEAVER DAM ANALOG POST LINE

SCALE: NTS

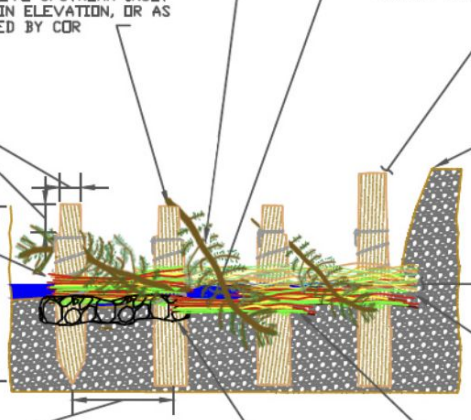
3

BDA CONSTRUCTION DETAILS

NOT TO SCALE

NOTE:

- INSPECT PLANT MATERIAL PRIOR TO ACCEPTANCE OF DELIVERY. PLANTS SHALL BE FREE OF DISEASE AND INJURY AND SHALL NOT EXHIBIT POOR PRUNING OR CIRCLING, GIRDLING, OR KINKED ROOTS.



(1) TOP OF POST MAY BE TRIMMED ONLY IF GREATER THAN 4" ø TO ACCOMODATE DIAMETER AND DEPTH OF CHUCK

(2) REMOVE BRANCH STOBS AND SHARPEN TIP OF POST (IF NECESSARY) TO FACILITATE DRIVING

(3) DRIVE POST TO 50% DEPTH (MEASURED BY TOTAL LENGTH). MIN. DEPTH = 1 METER

(4) SPACE POSTS 0.5 METERS O.C.

(5) POSTS FOR PLWW STRUCTURES SHOULD BE INSTALLED ACROSS ENTIRE CHANNEL TO OPPOSITE STREAMBANK WHERE GROUND BECOMES VERTICAL, INCLUDING LOW TERRACES AND DRY AREAS. DD STRUCTURES SHOULD EXTEND ACROSS 75% OF BANKFULL CHANNEL

(6) POSTS MAY BE CUT AFTER REACHING DRIVE DEPTH. IN AREAS WHERE CHANNEL IS INCISED <1 METER, CUT TO ADJACENT FLOODPLAIN ELEVATION. IN AREAS >1 METER CUT TO APPX. 1 METER ABOVE UPSTREAM INSET FLOODPLAIN ELEVATION, OR AS PRESCRIBED BY COR

(7) COBBLE WILL NOT BE NEEDED IF SUFFICIENT VOLUME OF ROBUST, FRESH CONIFER BOUGHS ARE INSTALLED FACING BOTH UPSTREAM AND DOWNSTREAM AND SECURED APPROPRIATELY WITH FLEXIBLE WOVEN STEMS

(8) MONITOR THE TOE FOR SCOUR AND ADD ADDITIONAL CONIFER BOUGHS IF NEEDED. SPRUCE WILL PROVIDE THE MOST PROTECTION, AND CAN ALSO BE ADDED TO STREAMBANK AS A REVETMENT

(9) EMBED ENDS OF LIVE WEAVING MATERIALS WHEREVER POSSIBLE TO PROMOTE A LIVING INTERFACE (E.G. WILLOW, RED OSIER DOGWOOD)

(10) INDIVIDUALLY WEAVE FLEXIBLE STEMMED DOUGLAS FIR, WILLOW, DOGWOOD, MAPLE, ETC., ALTERNATING FRONT TO BACK BETWEEN THE POSTS TO LOCK THE CONIFER BOUGHS IN PLACE. PERIODICALLY COMPACT THE WEAVE MATERIAL. TO MAINTAIN >50% STEM DENSITY, USE LARGER AND LONGER BRANCHES TO INCREASE TORSIONAL STRENGTH, AS NEEDED

(11) POSTS SHOULD BE LEFT HIGHER ALONG STREAMBANKS WHERE FLANKING IS UNDESIRABLE

(12) PLACE CONIFER BOUGHS WITH STEMS PARALLEL TO FLOWS, FACING BOTH UPSTREAM AND DOWNSTREAM TO CREATE A BRUSH MATTRESS. A BROAD BASE WILL HELP PREVENT TOE PLUNGE SCOUR, AND THE ROUGHNESS WILL SUPPORT SEDIMENT CAPTURE.

VOIDS ARE ACCEPTABLE ON BOTH STRUCTURE TYPES BUT SHOULD BE MINIMIZED TO THE EXTENT POSSIBLE. VOIDS SHOULD ONLY OCCUR WITHIN ACTIVE CHANNEL TO ENHANCE FISH PASSAGE.

TOP OF INCISION TRENCH

BEAVER DAM ANALOG STRUCTURE DETAILS (CHANNEL-SPANNING AND DEFLECTOR DAMS)

SCALE: NTS

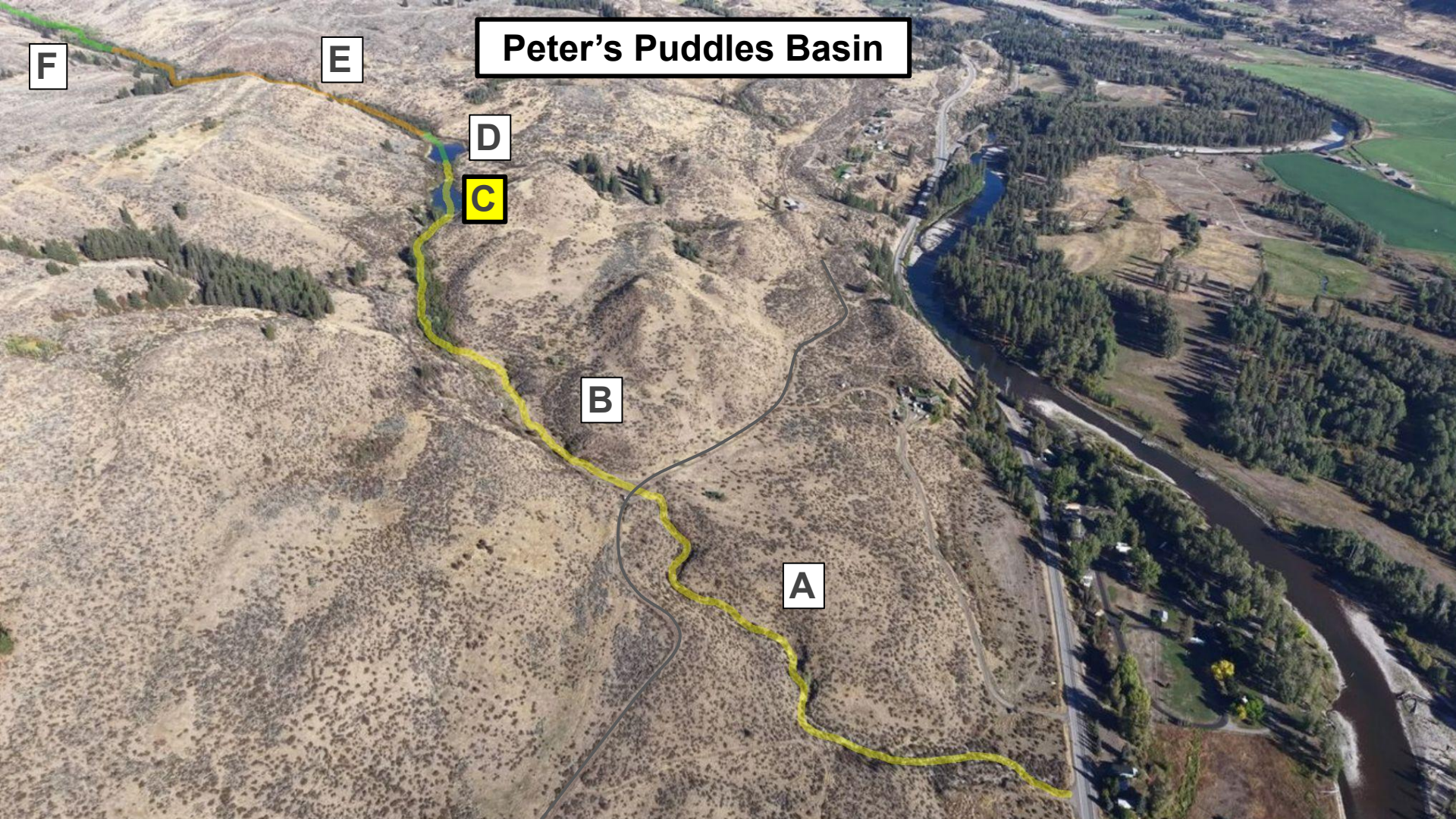
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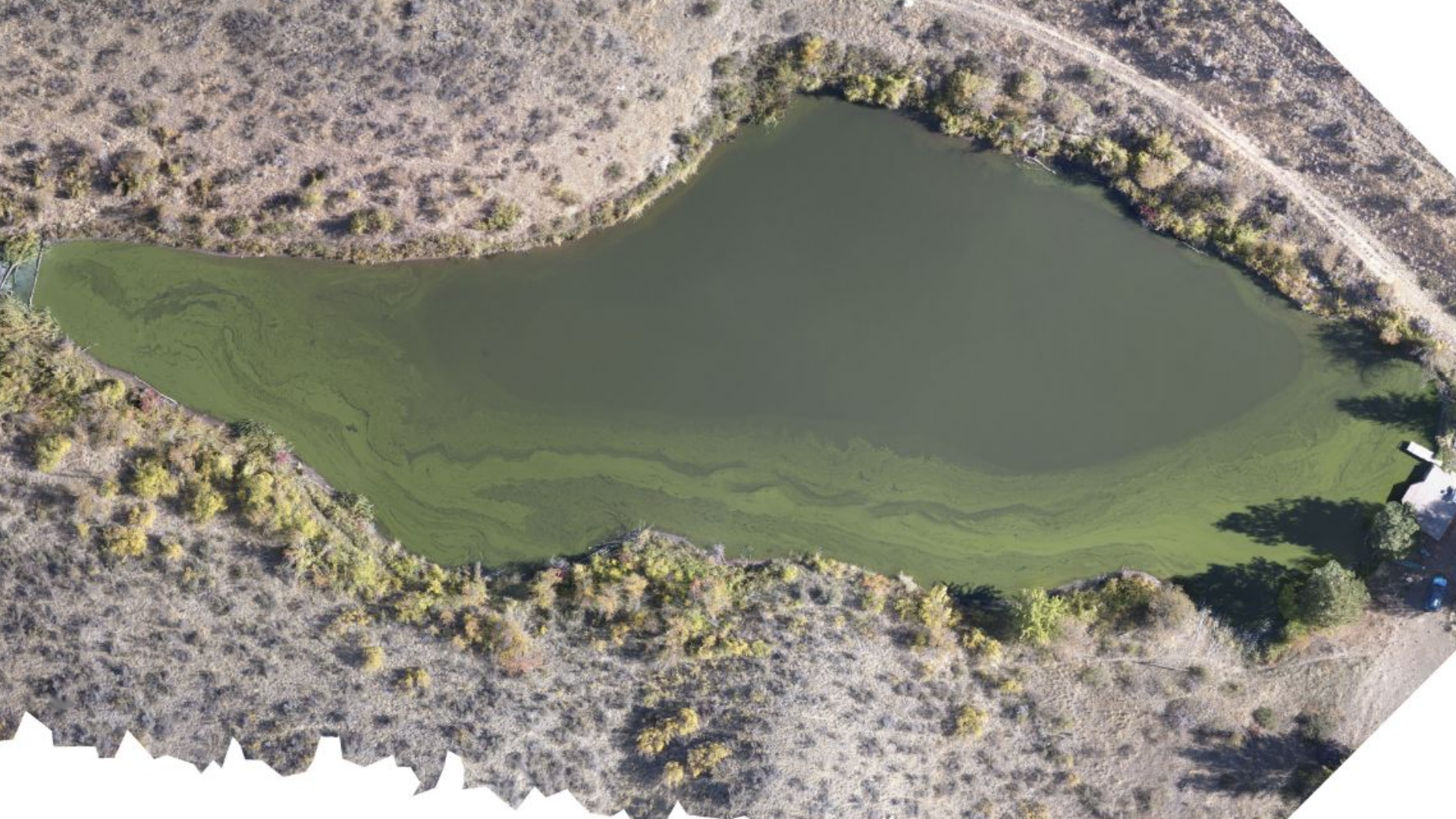

Peter’s Puddles Basin
F
E
D
C
B
A


C


Doran Pond







Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phosphorus, Total (SM 4500 P E)	0.43		0.060		mg/L			09/09/24 13:38	1





Floating Wetlands





Plastic Platform





Native Plant Platform


Naturally occurring
floating wetlands


Naturally occurring
floating wetlands





Woven Willow Wetland

Cedar Frame Woven Wetland



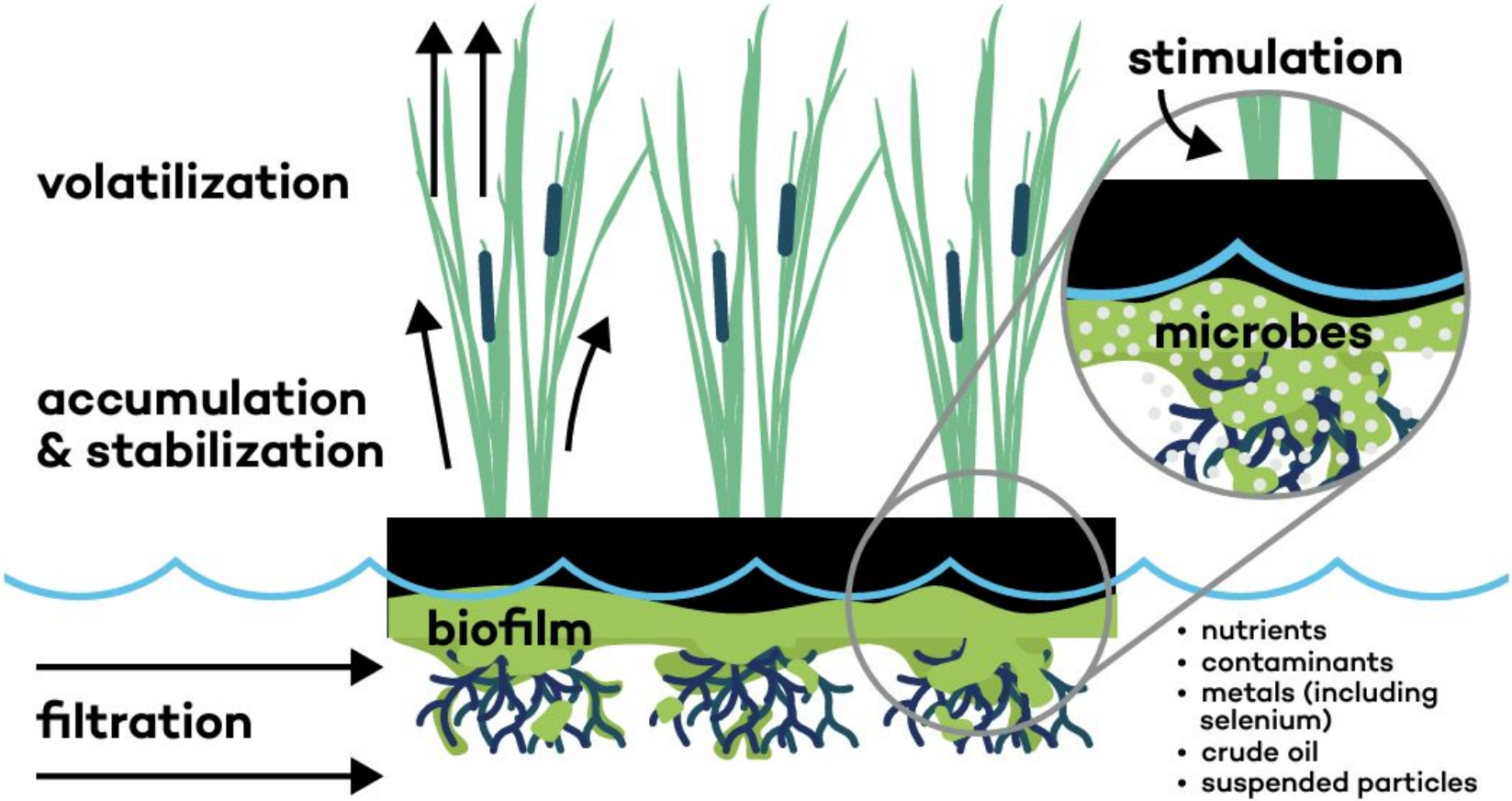


Nutrient Uptake

Plants: ~20%

Biofilm: ~80%
Microorganisms utilize the surface area of the roots and island





Cross-sectional diagram of a typical floating treatment wetland system.

Source: International Institute for Sustainable Development (Grosshans et al, 2019)





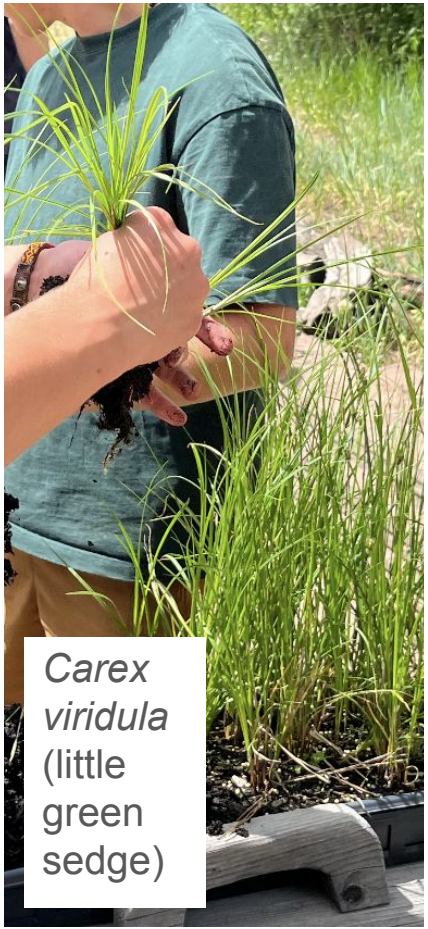






Plant Species Installed (in addition to willow and red osier dogwood)













1. Woven Willow Wetland

2. Wooden Frame Woven Wetland (1st Gen)





2. Wooden Frame Simple Weave Wetland (2nd Gen)




Wooden Frame
Simple Weave Wetland
(2nd Gen)


Wooden Frame
Simple Weave Wetland
(2nd Gen)

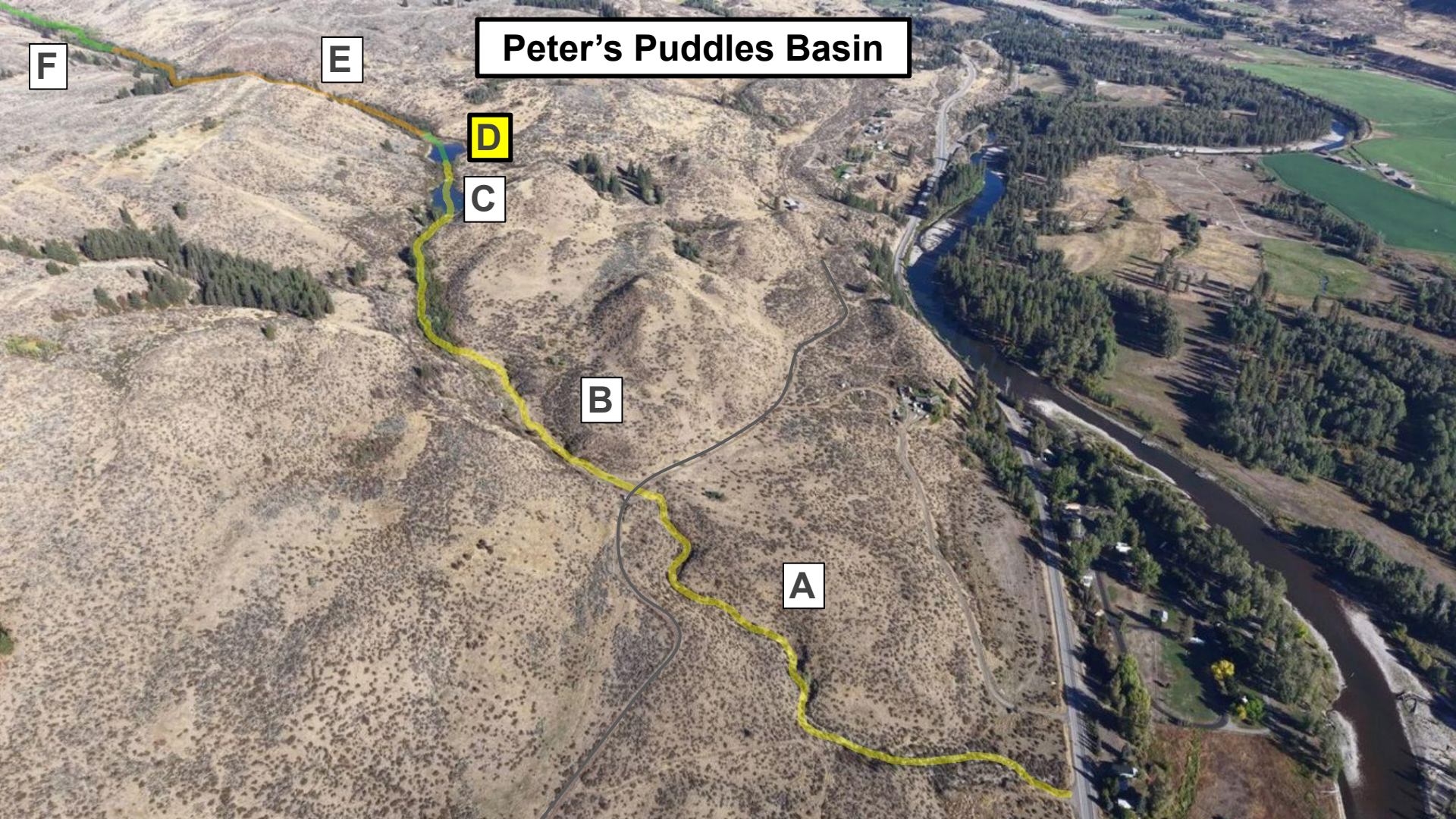
Wooden Frame Simple Weave Wetland (2nd Gen)










Peter’s Puddles Basin
F
E
D
C
B
A


D

WDFW Pond



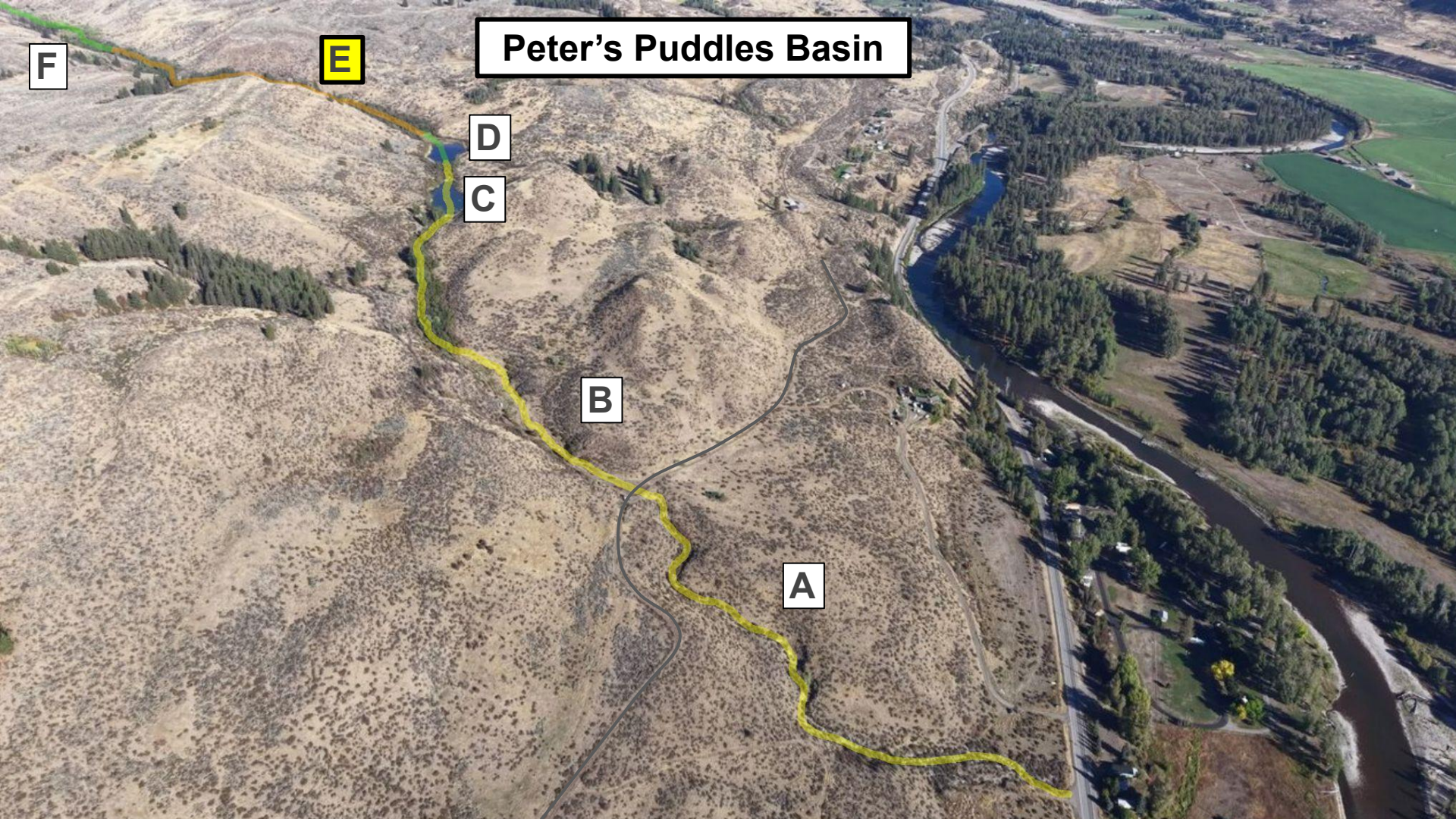





Peters Puddles
Google Earth
N
100 ft

Peter's Puddles Basin




Peter’s Puddles Basin
F
E
D
C
B
A

Living BDAs!





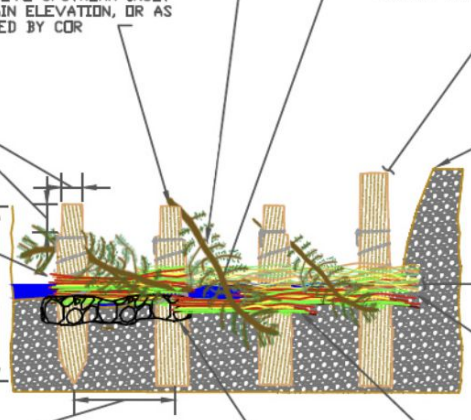
Living BDAs!





NOTE:

- INSPECT PLANT MATERIAL PRIOR TO ACCEPTANCE OF DELIVERY. PLANTS SHALL BE FREE OF DISEASE AND INJURY AND SHALL NOT EXHIBIT POOR PRUNING OR CIRCLING, GIRDLING, OR KINKED ROOTS.



(1) TOP OF POST MAY BE TRIMMED ONLY IF GREATER THAN 4" ø TO ACCOMODATE DIAMETER AND DEPTH OF CHUCK

(2) REMOVE BRANCH STOBS AND SHARPEN TIP OF POST (IF NECESSARY) TO FACILITATE DRIVING

(3) DRIVE POST TO 50% DEPTH (MEASURED BY TOTAL LENGTH), MIN. DEPTH = 1 METER

(4) SPACE POSTS 0.5 METERS O.C.

(5) POSTS FOR PLWW STRUCTURES SHOULD BE INSTALLED ACROSS ENTIRE CHANNEL TO OPPOSITE STREAMBANK WHERE GROUND BECOMES VERTICAL, INCLUDING LOW TERRACES AND DRY AREAS. DD STRUCTURES SHOULD EXTEND ACROSS 75% OF BANKFULL CHANNEL

(6) POSTS MAY BE CUT AFTER REACHING DRIVE DEPTH. IN AREAS WHERE CHANNEL IS INCISED <1 METER, CUT TO ADJACENT FLOODPLAIN ELEVATION. IN AREAS >1 METER CUT TO APPX. 1 METER ABOVE UPSTREAM INSET FLOODPLAIN ELEVATION, OR AS PRESCRIBED BY COR

(7) COBBLE WILL NOT BE NEEDED IF SUFFICIENT VOLUME OF ROBUST, FRESH CONIFER BOUGHS ARE INSTALLED FACING BOTH UPSTREAM AND DOWNSTREAM AND SECURED APPROPRIATELY WITH FLEXIBLE WOVEN STEMS

(8) MONITOR THE TOE FOR SCOUR AND ADD ADDITIONAL CONIFER BOUGHS IF NEEDED. SPRUCE WILL PROVIDE THE MOST PROTECTION, AND CAN ALSO BE ADDED TO STREAMBANK AS A REVETMENT

(9) EMBED ENDS OF LIVE WEAVING MATERIALS WHEREVER POSSIBLE TO PROMOTE A LIVING INTERFACE (E.G. WILLOW, RED OSIER DOGWOOD)

(10) INDIVIDUALLY WEAVE FLEXIBLE STEMMED DOUGLAS FIR, WILLOW, DOGWOOD, MAPLE, ETC., ALTERNATING FRONT TO BACK BETWEEN THE POSTS TO LOCK THE CONIFER BOUGHS IN PLACE. PERIODICALLY COMPACT THE WEAVE MATERIAL. TO MAINTAIN >50% STEM DENSITY, USE LARGER AND LONGER BRANCHES TO INCREASE TORSIONAL STRENGTH, AS NEEDED

(11) POSTS SHOULD BE LEFT HIGHER ALONG STREAMBANKS WHERE FLANKING IS UNDESIRABLE

TOP OF INCISION TRENCH

(12) PLACE CONIFER BOUGHS WITH STEMS PARALLEL TO FLOWS, FACING BOTH UPSTREAM AND DOWNSTREAM TO CREATE A BRUSH MATTRESS. A BROAD BASE WILL HELP PREVENT TOE PLUNGE SCOUR, AND THE ROUGHNESS WILL SUPPORT SEDIMENT CAPTURE.

VOIDS ARE ACCEPTABLE ON BOTH STRUCTURE TYPES BUT SHOULD BE MINIMIZED TO THE EXTENT POSSIBLE. VOIDS SHOULD ONLY OCCUR WITHIN ACTIVE CHANNEL TO ENHANCE FISH PASSAGE.

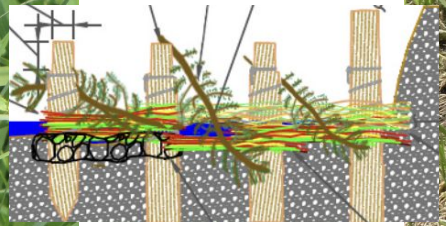
BEAVER DAM ANALOG STRUCTURE DETAILS (CHANNEL-SPANNING AND DEFLECTOR DAMS)

SCALE: NTS

1
-



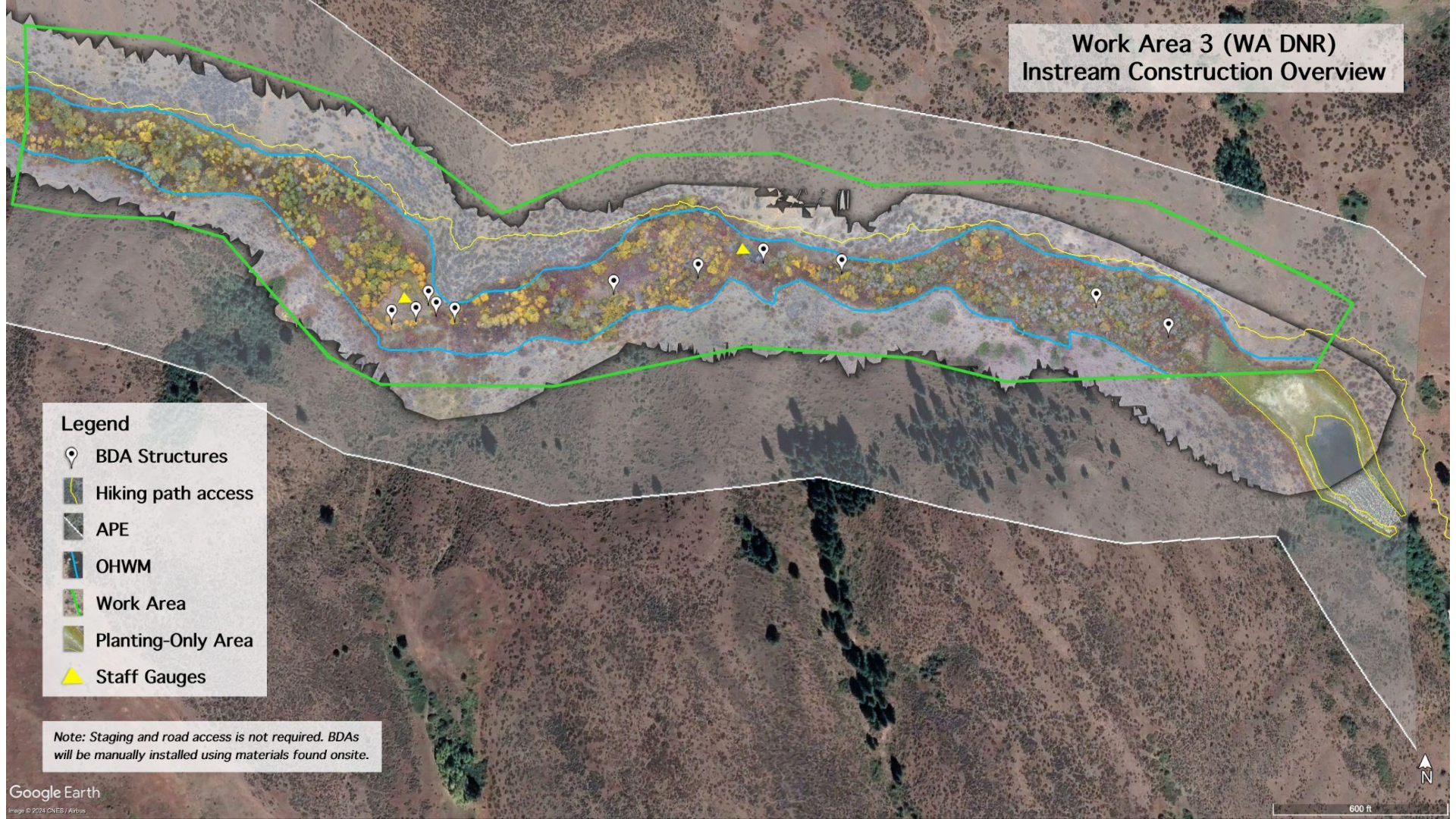
Shoots



Roots






Work Area 3 (WA DNR)
Instream Construction Overview
Legend
BDA Structures
Hiking path access
APE
OHWM
Work Area
Planting-Only Area
Staff Gauges
Note: Staging and road access is not required. BDAs will be manually installed using materials found onsite.
Google Earth
N
600 ft











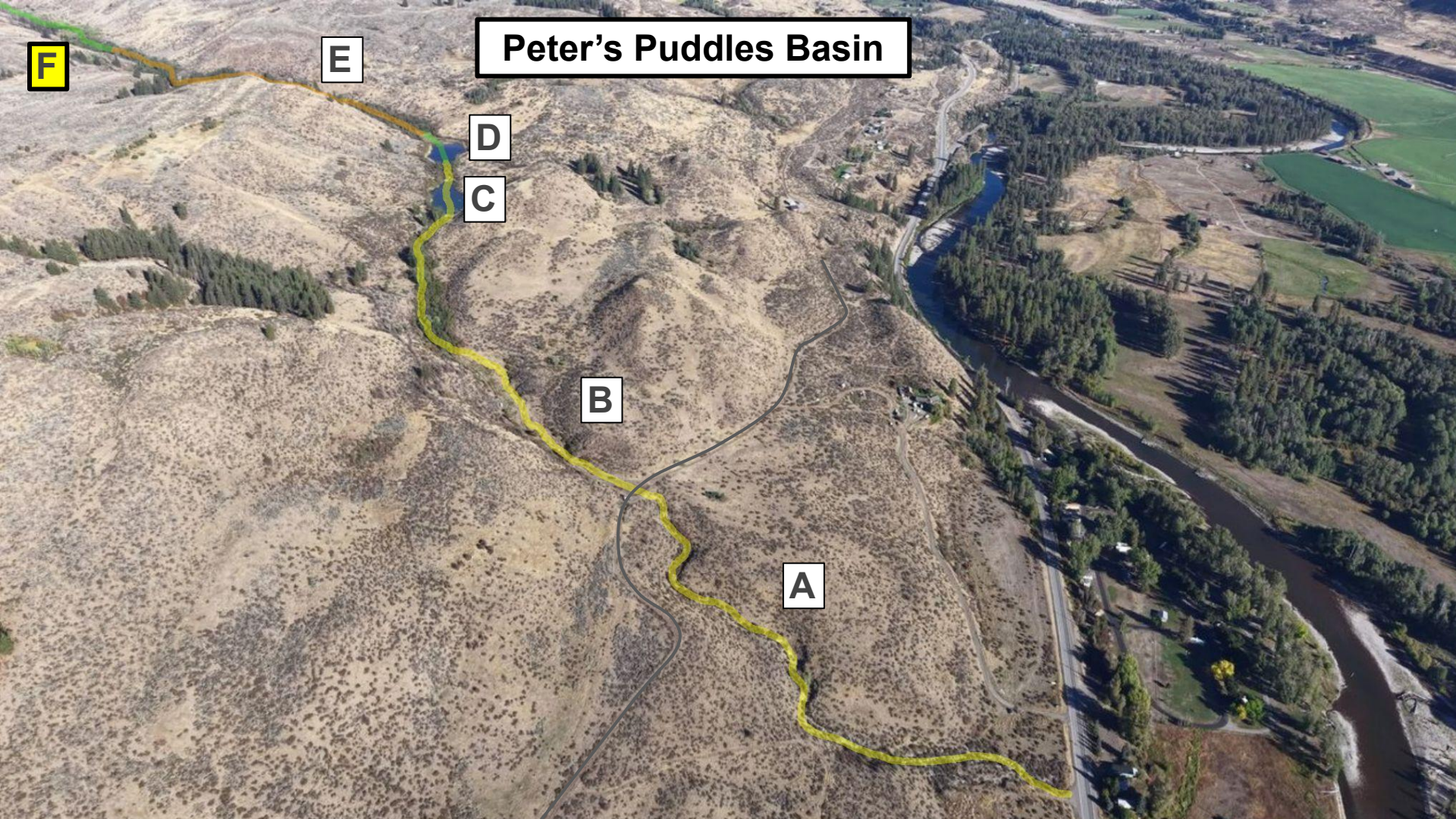


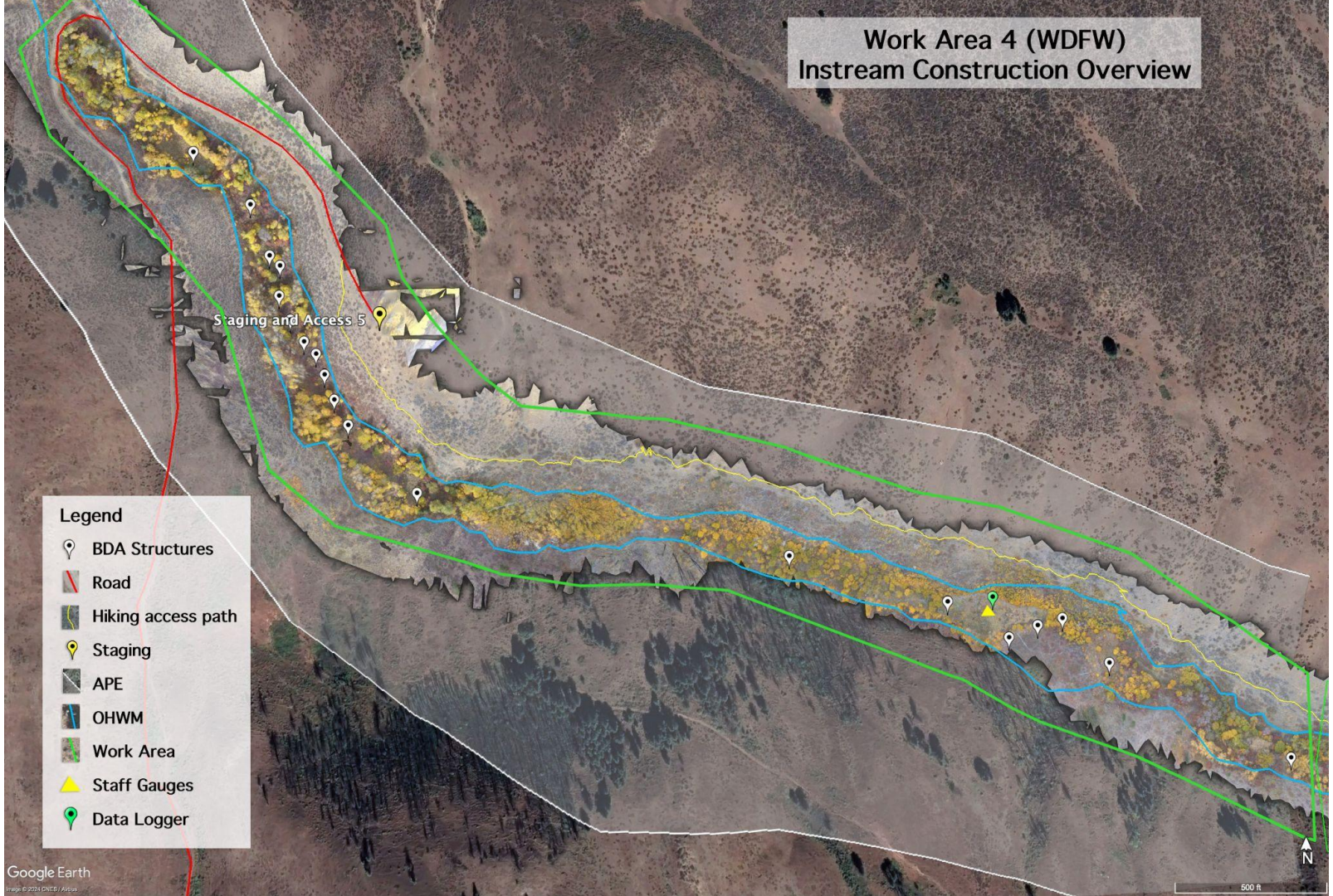
July 3, 2013



October 18, 2024




Peter’s Puddles Basin
F
E
D
C
B
A


Work Area 4 (WDFW)
Instream Construction Overview
Staging and Access 5
Legend
BDA Structures
Road
Hiking access path
Staging
APE
OHWM
Work Area
Staff Gauges
Data Logger
N
500 ft
Google Earth







2015 Twisp River Fire

Photo by Richard Murray


2024








WDFW Pond 2

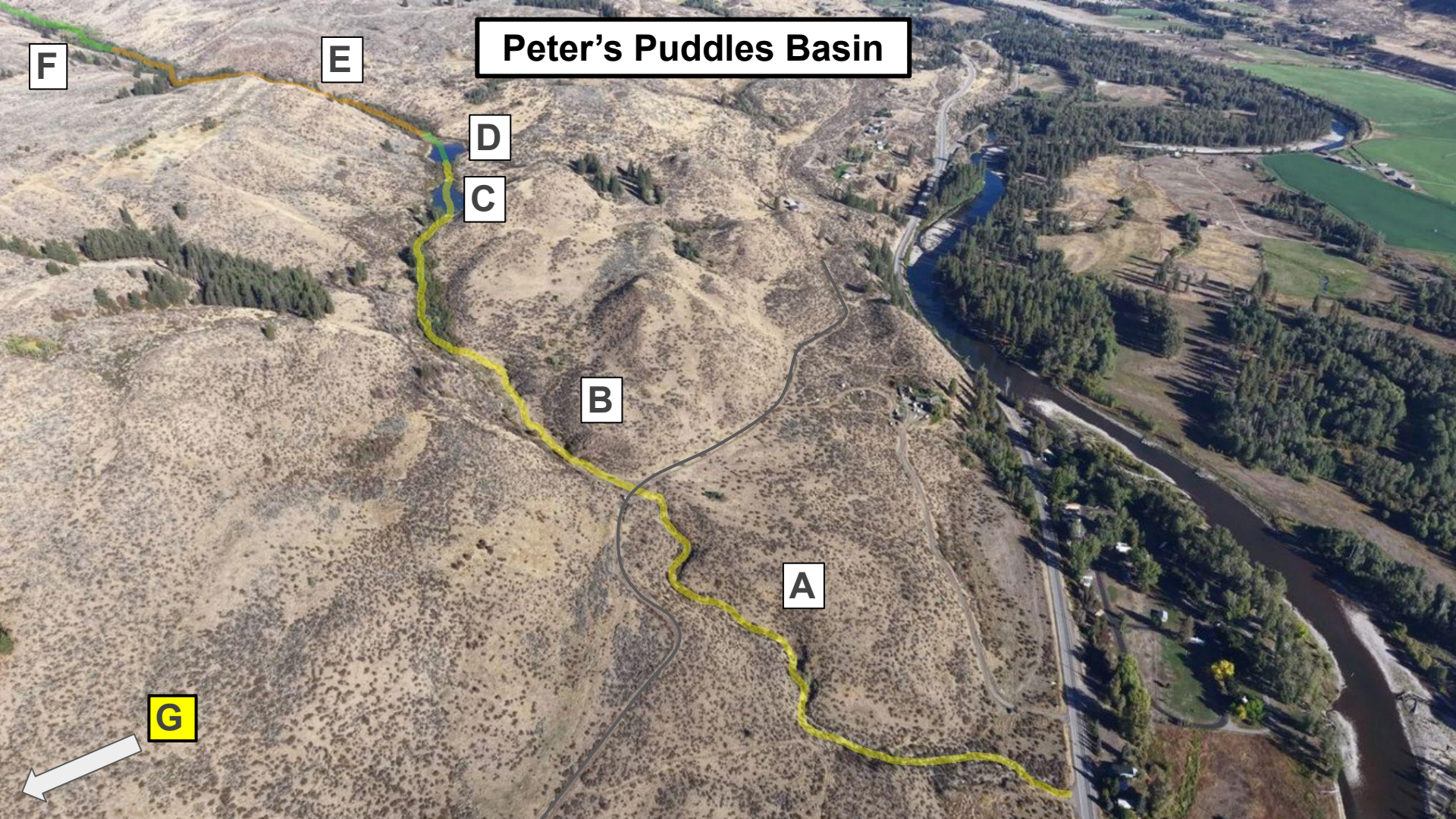

Photo by Ryan Wagner

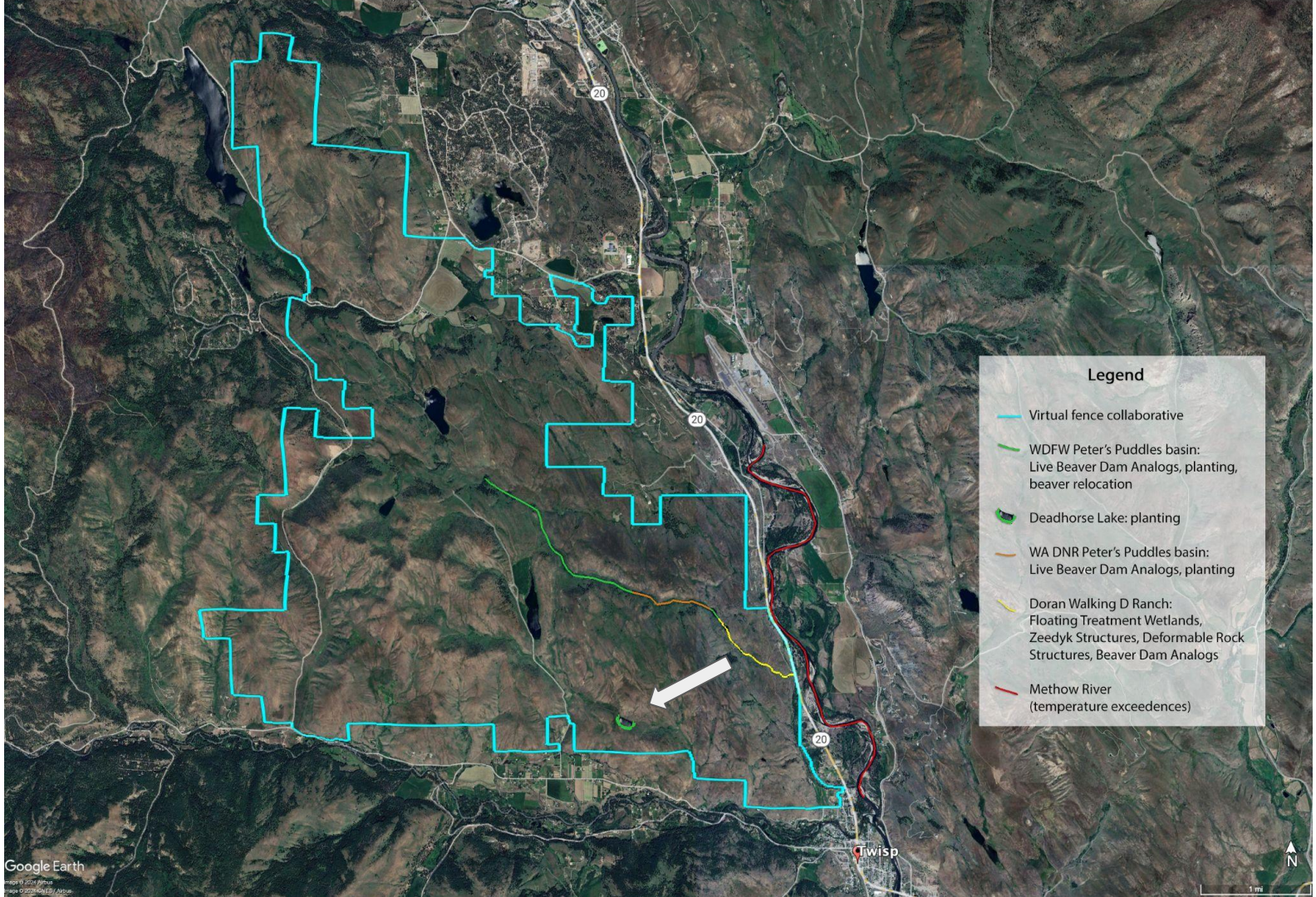


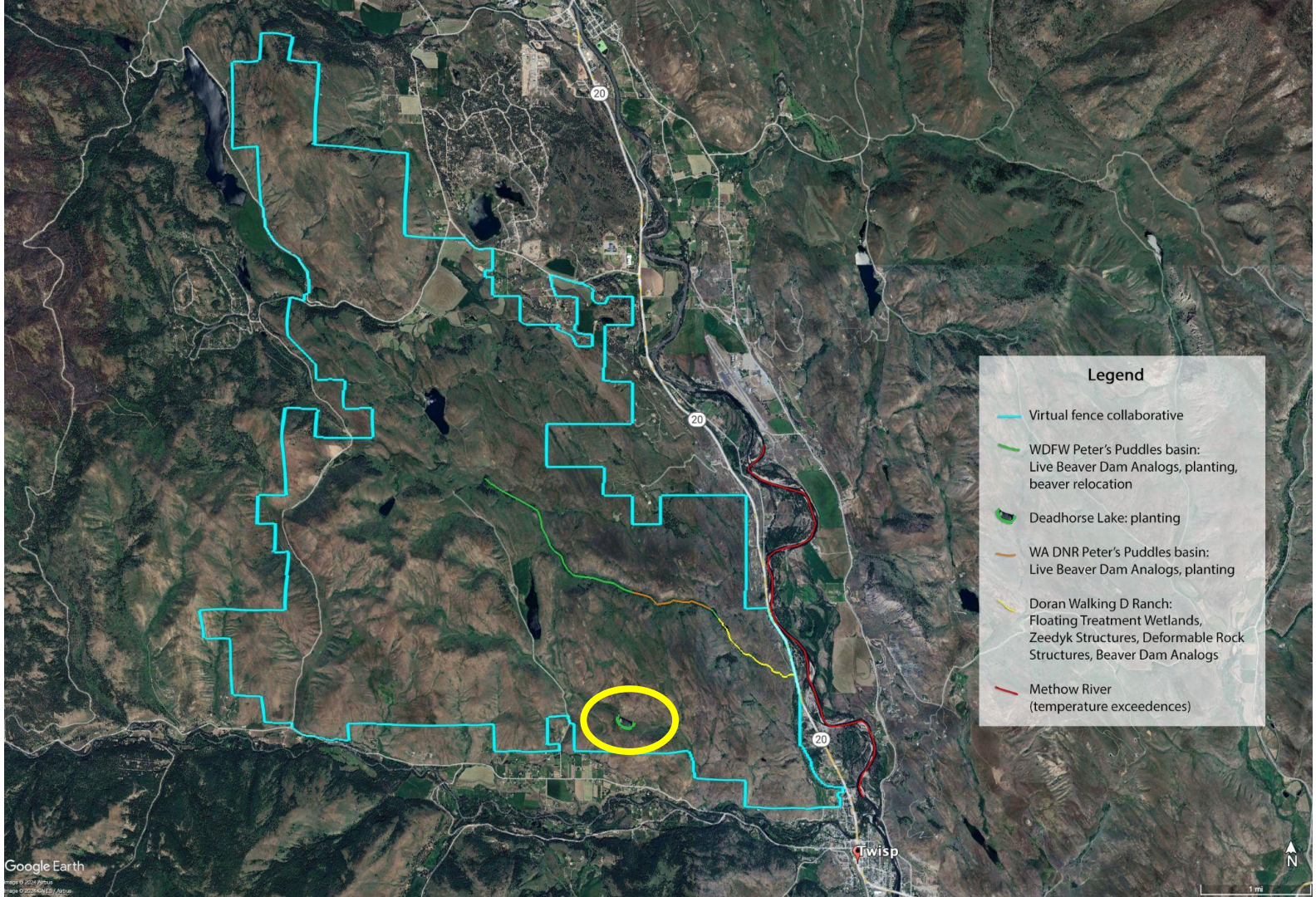




Photo by Ryan Wagner


Peter’s Puddles Basin
F
E
D
C
B
A
G


Legend
Virtual fence collaborative
WDFW Peter's Puddles basin: Live Beaver Dam Analogs, planting, beaver relocation
Deadhorse Lake: planting
WA DNR Peter's Puddles basin: Live Beaver Dam Analogs, planting
Doran Walking D Ranch: Floating Treatment Wetlands, Zeedyk Structures, Deformable Rock Structures, Beaver Dam Analogs
Methow River (temperature exceedences)
20
20
20
Twisp
Google Earth
N
1 mi


Legend
Virtual fence collaborative
WDFW Peter's Puddles basin: Live Beaver Dam Analogs, planting, beaver relocation
Deadhorse Lake: planting
WA DNR Peter's Puddles basin: Live Beaver Dam Analogs, planting
Doran Walking D Ranch: Floating Treatment Wetlands, Zeedyk Structures, Deformable Rock Structures, Beaver Dam Analogs
Methow River (temperature exceedences)
20
20
20
Twisp
Google Earth
N
1 mi


Deadhorse Lake





2015 Twisp River Fire
Photo by Richard Murray



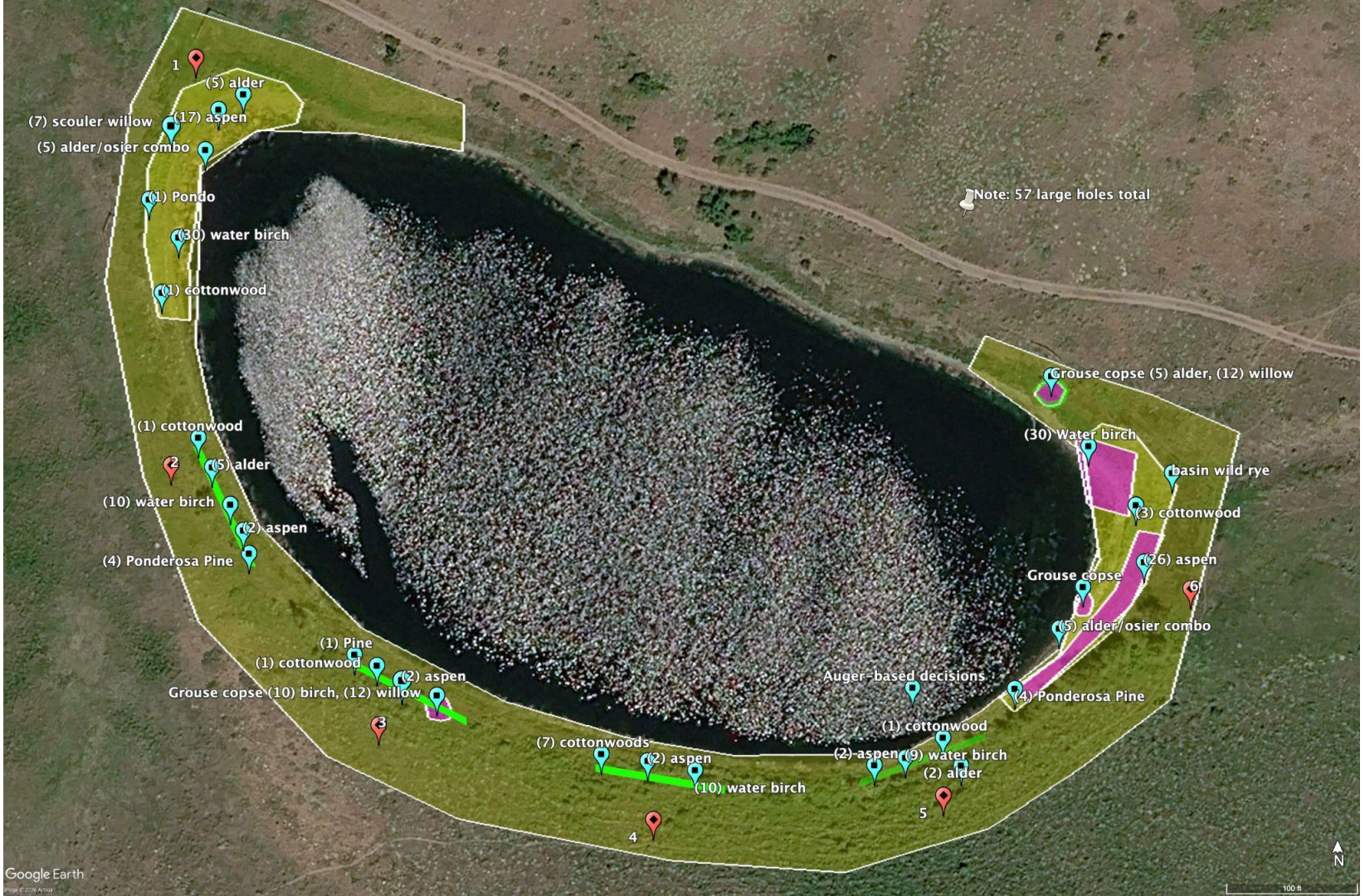
2026: Before restoration activities begin

Sharp-Tailed Grouse Winter Shelter Example:

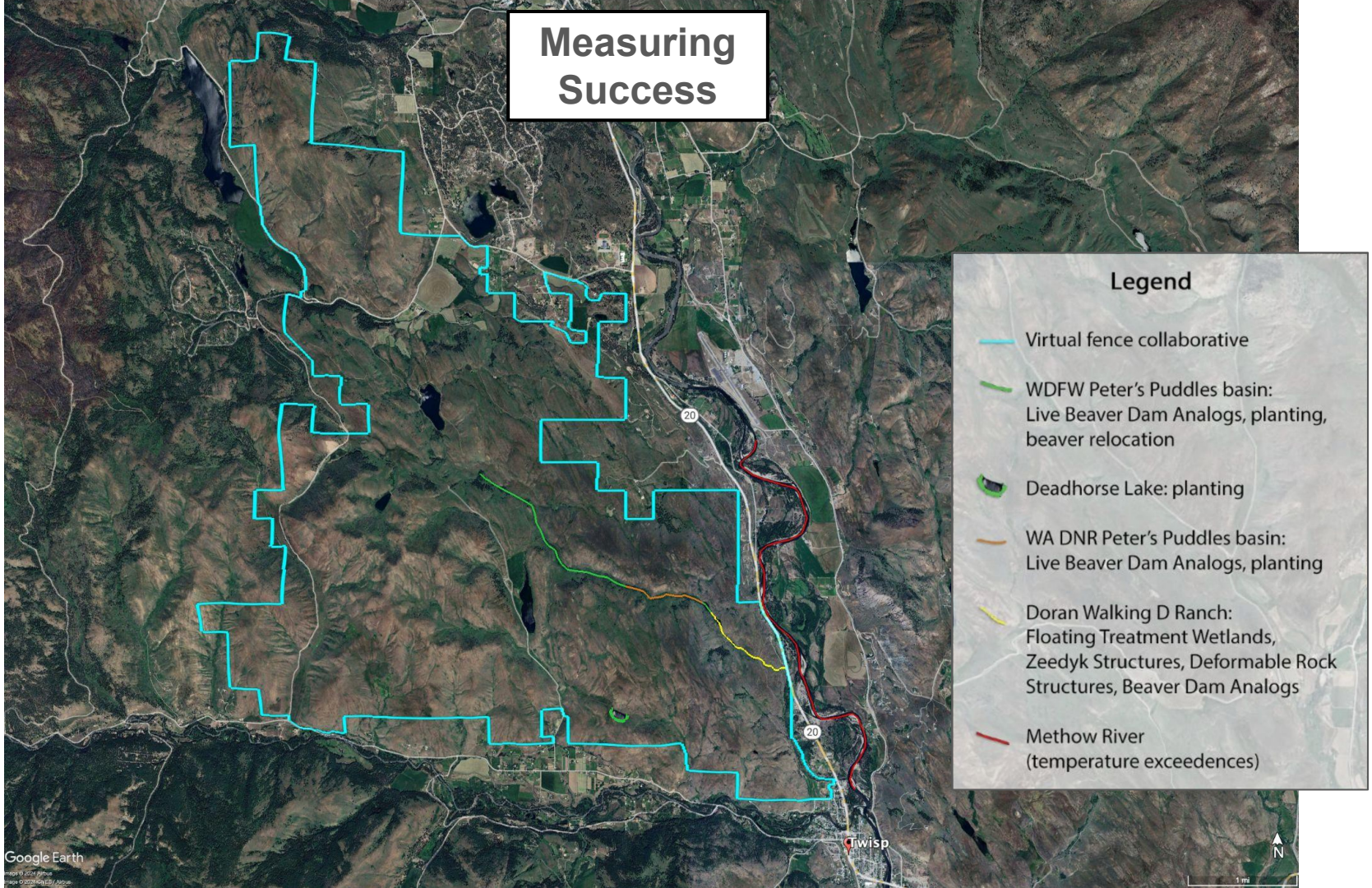


"Grouse copse"

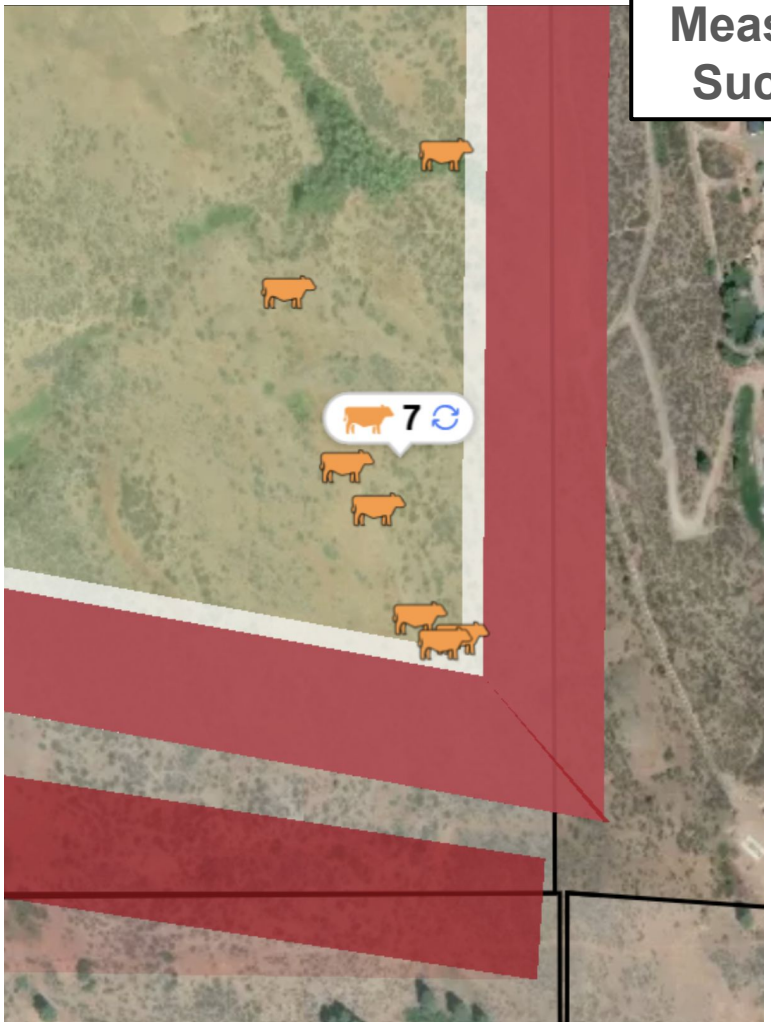

Dead Horse Lake
N

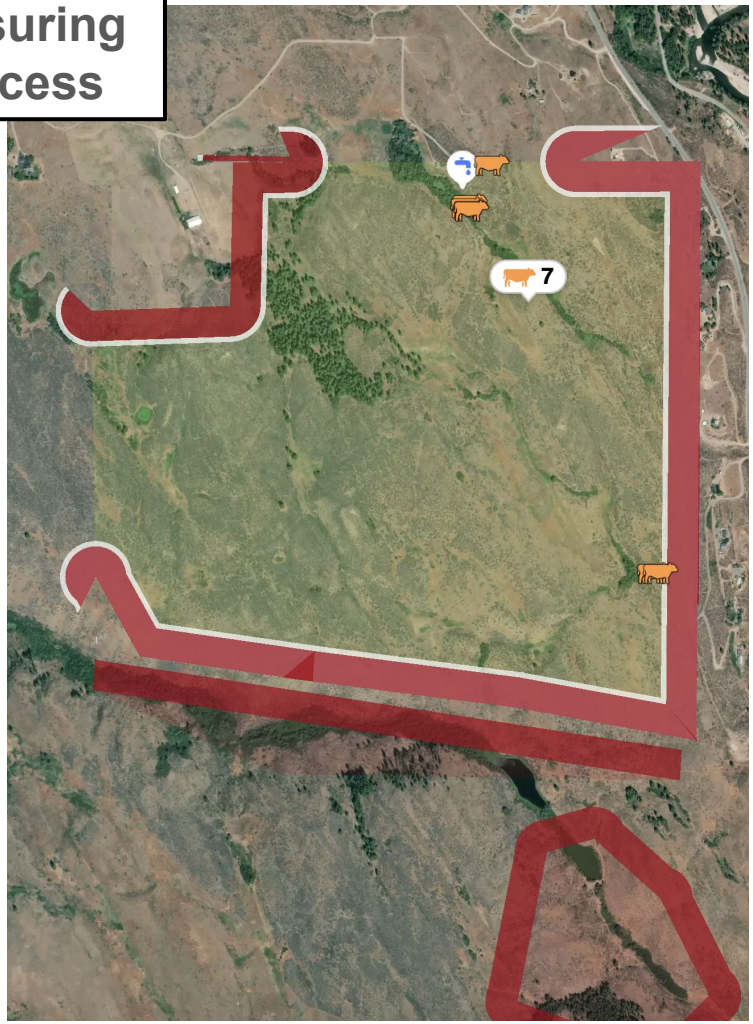

1
(5) alder
(7) scouler willow
(17) aspen
(5) alder/osier combo
(1) Pondo
(30) water birch
(1) cottonwood
Note: 57 large holes total
Grouse copse (5) alder, (12) willow
(30) Water birch
basin wild rye
(3) cottonwood
(26) aspen
Grouse copse
6
(5) alder/osier combo
(1) cottonwood
2
(5) alder
(10) water birch
(2) aspen
(4) Ponderosa Pine
(1) Pine
(1) cottonwood
(2) aspen
Grouse copse (10) birch, (12) willow
3
Auger-based decisions
(4) Ponderosa Pine
(1) cottonwood
(7) cottonwoods
(2) aspen
(2) aspen
(9) water birch
(2) alder
(10) water birch
5
4
Google Earth
N
100 ft

Measuring Success



Measuring Success





Keeping cattle in rotational grazing pastures and out of sensitive areas – without additional physical fencing

Measuring Success

Twisp Uplands Bird Survey Summary

Shannon-Wiener Diversity Index - By Date

	Diversity Index 5/30/24	Diversity Index 6/15 and 6/20/24	Diversity Index 5/13/25	Diversity Index 6/1/25	Diversity Index 6/12/25	Diversity Index 5/17/26	Diversity Index 5/30/26	Diversity Index 6/13/26
Reach 1 (Lost Boy Gulch)	2.29	1.52	2.3	1.72	1.98	2.3	2.15	1.73
Reach 2 (Doran's Scott Canyon)	2.83	2.78	2.49	2.84	2.47	2.91	2.9	2.34
Reach 3 (Doran and WDFW Ponds)	2.91	3.12	2.63	2.85	2.64	2.86	3.22	3.07
Reach 4 (DNR Peter's Puddles basin above ponds)	3.17	3.15	2.7	2.9	2.85	2.81	3.01	2.71

Twisp Uplands Bird Survey Summary

Shannon-Wiener Diversity Index - By Year

	2024	2025	2026
Diversity Index	3.571	3.457	3.515
Evenness	0.843	0.822	0.802
Richness (number of species)	67	67	80
Average population size	8.254	10.134	10.963

Increasing biodiversity

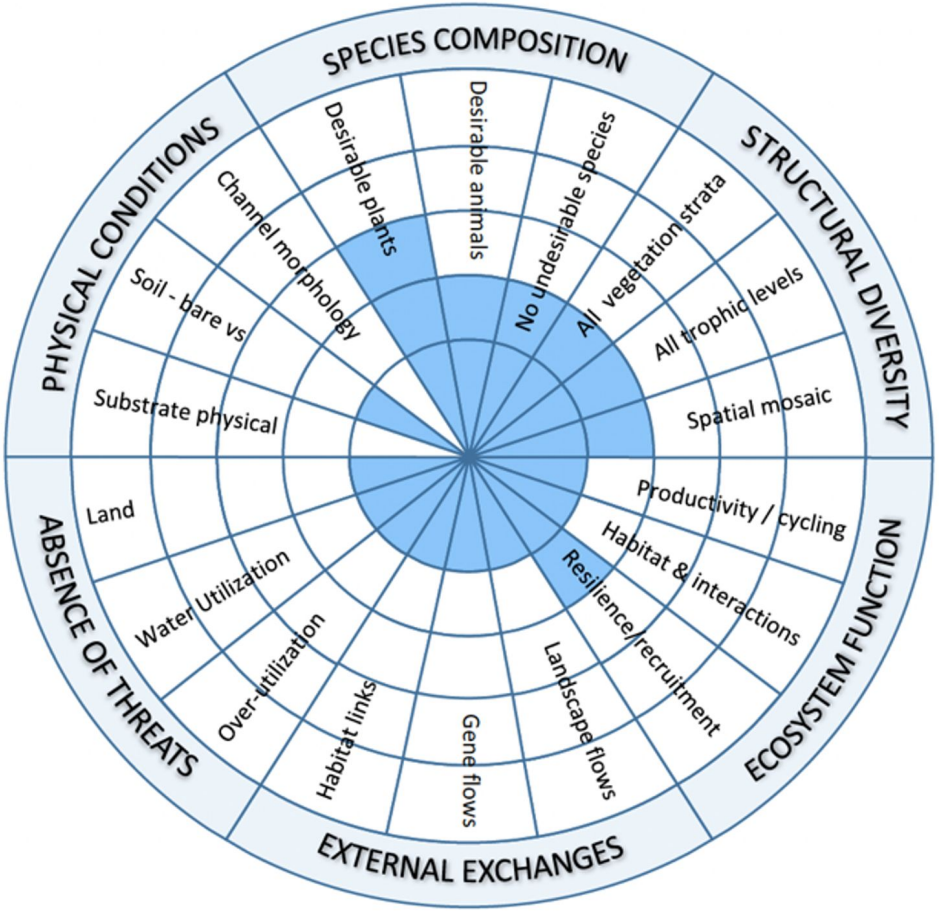


2024-2026 Bird Survey Data

Measuring Success



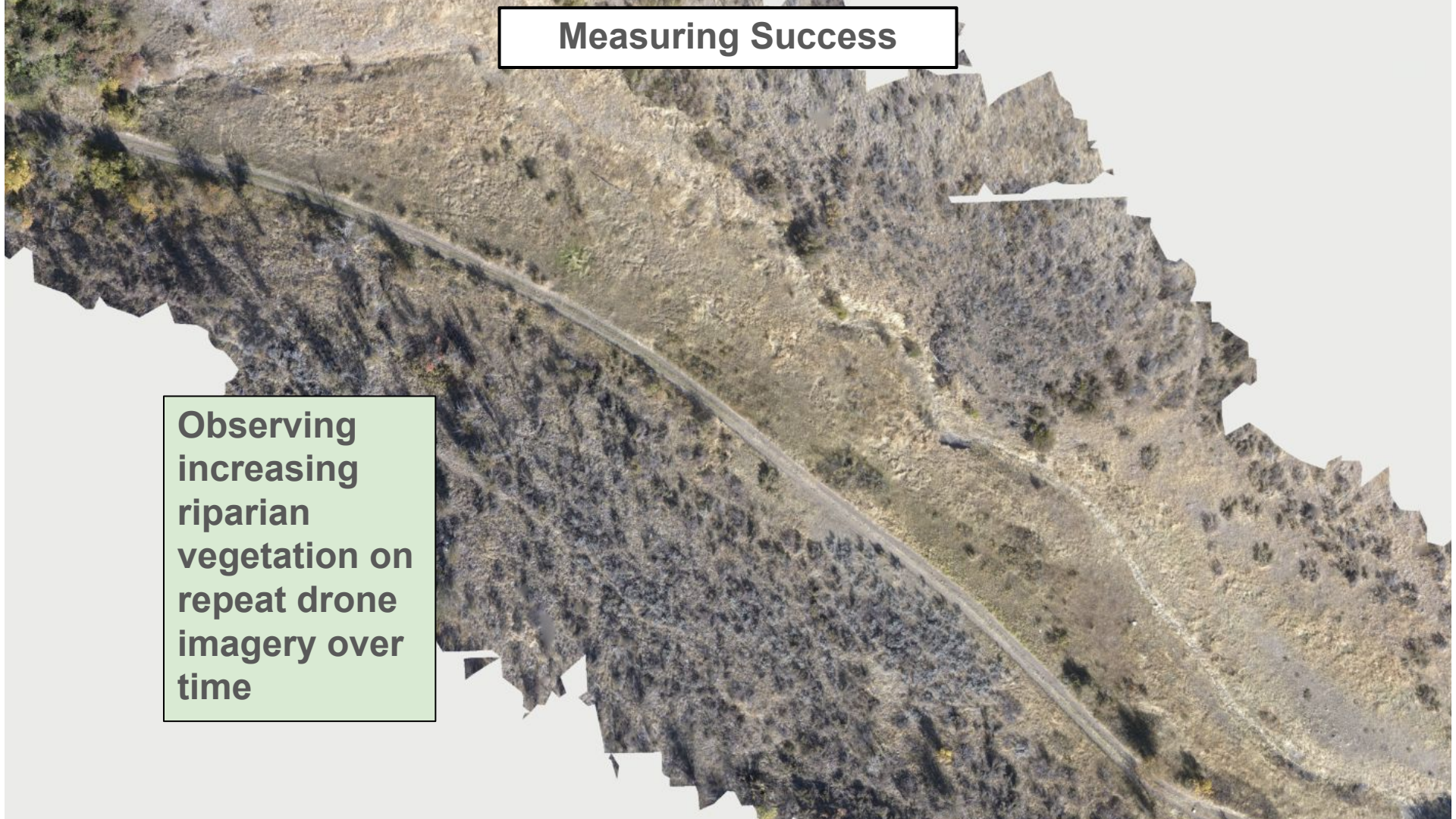
Measuring Success



Increasing Ecological Recovery Wheel ratings over time

(Tool developed by the Society for Ecological Restoration)

Measuring Success



Observing increasing riparian vegetation on repeat drone imagery over time

Twisp Uplands Ecological Restoration Project



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