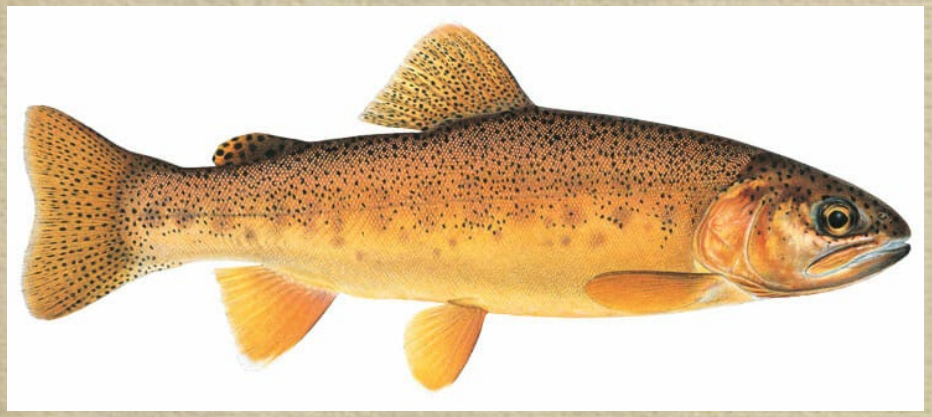
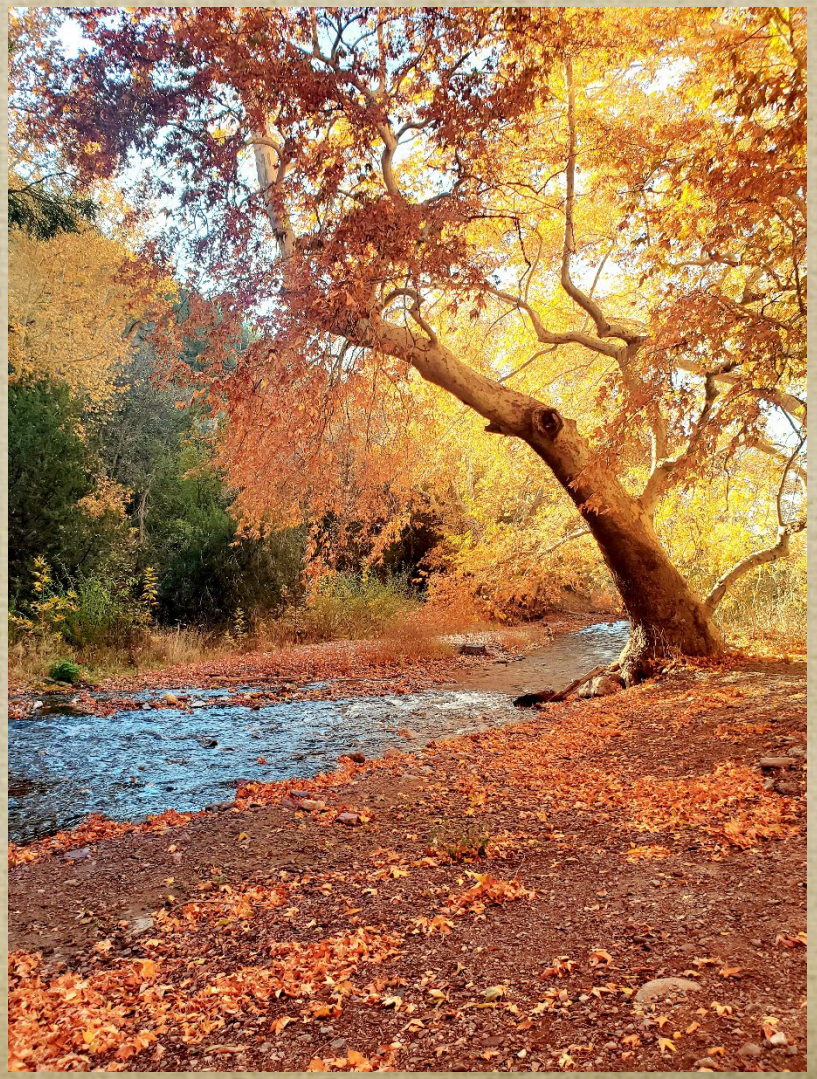
Whitewater Creek Habitat Restoration Project





New Mexico Department of Game & Fish

Whitewater Creek Habitat Restoration Project


Jill Wick and Gila Trout. Photo courtesy of New Mexico Dept. of Game and Fish

New Mexico Department of Game & Fish

Project Contacts:

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Sandy Taylor
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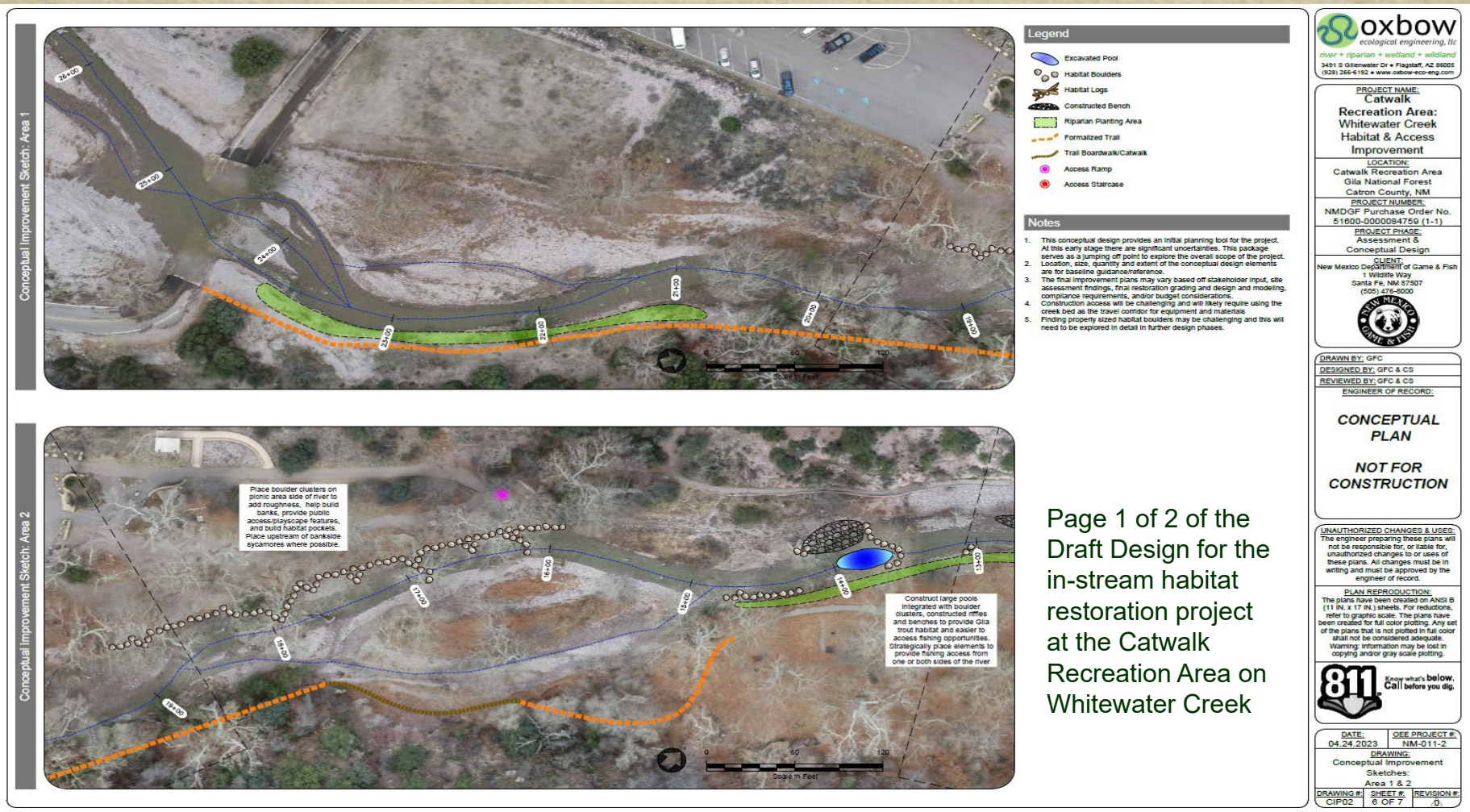
The Catwalk Recreation Area along Whitewater Creek is a popular site for fishing and general recreation. This area is also one of the most visited sites by people and anglers in the state of NM. Whitewater Creek is open to angling for Gila trout.

However, fish habitat was heavily impacted by massive floods after the Whitewater Baldy fire of 2012. After the Whitewater Baldy Fire, the Department and it's partners restored Gila Trout to Whitewater Creek, one of the largest and most complex drainages available for Gila Trout conservation. In order to continue this work, the Department, along with the Forest Service, would like to create in-stream complexity to promote a more robust Gila Trout population and provide better angler access. Last HSP cycle, the CAC funded an conceptual design for Whitewater Creek at the Catwalk Recreation Area. The final engineered design will be completed soon, the draft design is showcased below.



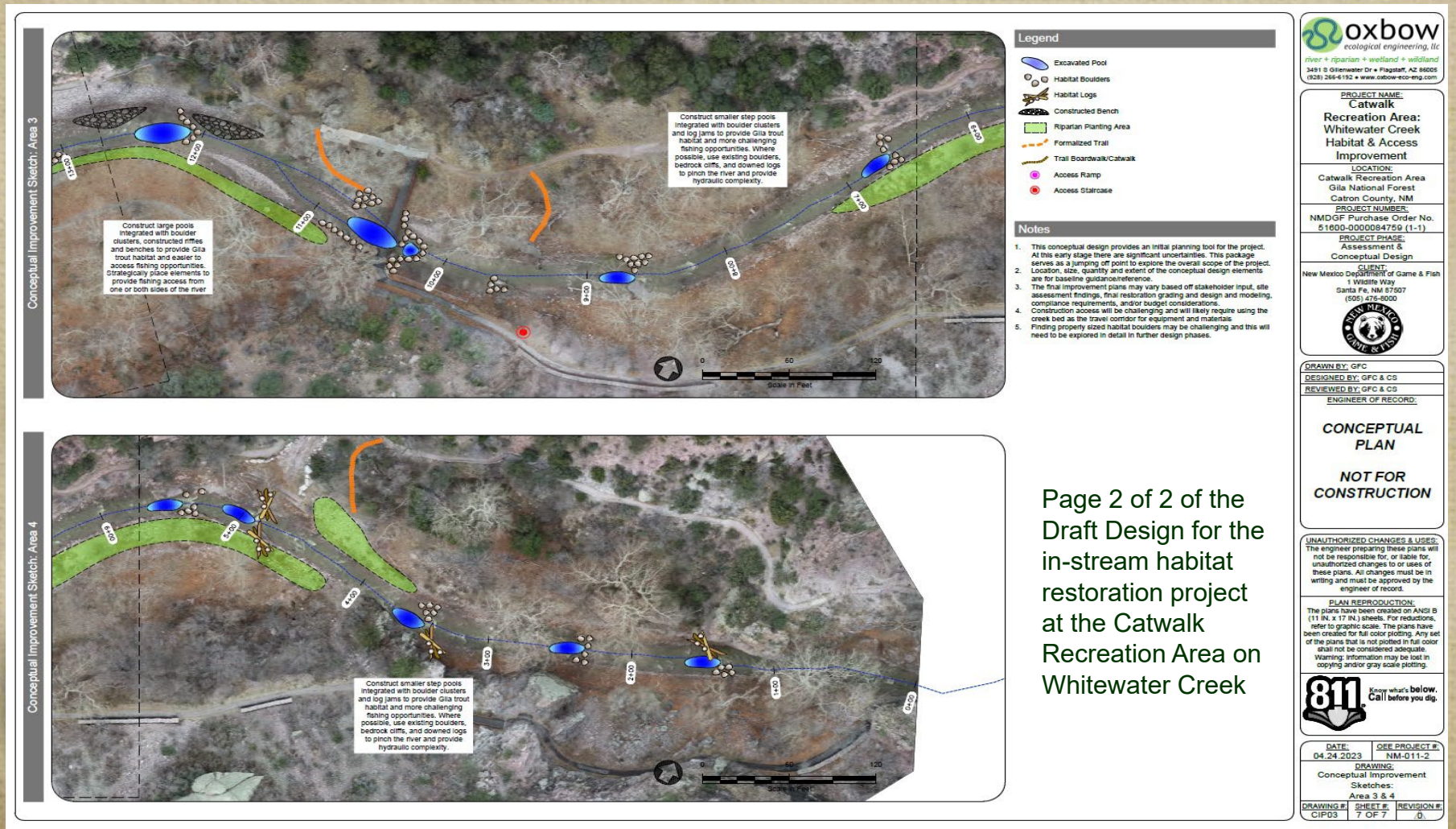
Page 1 of 2 of the Draft Design for the in-stream habitat restoration project at the Catwalk Recreation Area on Whitewater Creek

New Mexico Department of Game & Fish

The conceptual design includes multiple structures placed in the stream and along the banks, to create pools and complexity which will improve trout habitat, especially in low-flow conditions. The project reach is about a half mile of Whitewater Creek starting at the parking lot of the Catwalk Restoration Area and heading upstream.

The next steps will include compliance (NEPA, formal consultation, and a cultural evaluation). In order for the Forest Service to have this project on their priority list to complete compliance, we would like to ensure there are funds for implementation ready and available to them.

This project is a multi-phase project and the funds will extend over a multi-year period. Construction for this project will involve a lot of heavy boulders being placed in the stream, a possible constructed bench in the stream, native plantings along the banks, excavated pools and possible ADA access near the parking lot.



Page 2 of 2 of the Draft Design for the in-stream habitat restoration project at the Catwalk Recreation Area on Whitewater Creek

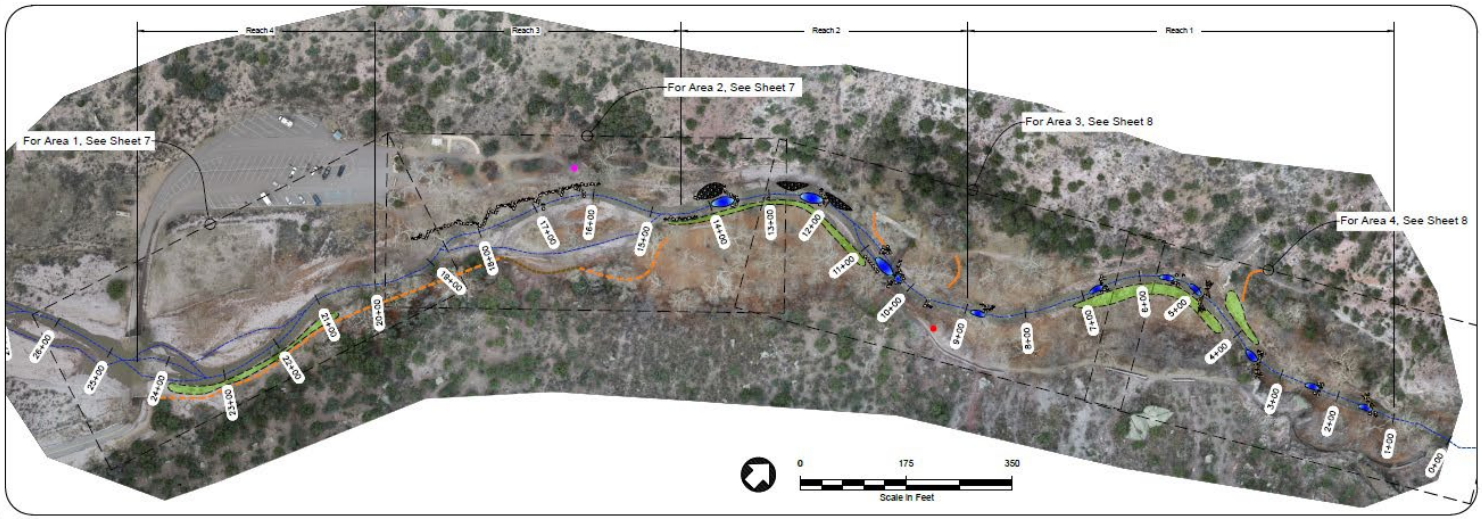
New Mexico Department of Game & Fish

Summary of Project

½ mile in-stream work to be completed

Budget estimate: $450,000
Budget estimate is for implementation only
Compliance will be completed by the USFS

Conceptual Improvement Plan: Project Area Overview



Conceptual Improvement Plan: Objectives & Approach

Conceptual Restoration Objectives

- Increase hydraulic diversity and shelter habitat for trout
- Increase pool frequency and depth
- Reduce width-to-depth ratio wherever possible
- Reduce streambank erosion potential
- Increase channel shading with native riparian vegetation
- Increase public access for angling and recreation

Restoration Approach

Based on the inventory and assessment for the project, a set of conceptual, site specific practices was developed to meet the project objectives outlined above. This "restoration toolbox" includes measures that, if implemented holistically, could help to improve trout habitat and public access. This sheet includes some examples of restoration practices. The remainder of the sheets in this drawing set show the placement of these conceptual design elements within the stream corridor.

Conceptual Design Notes

1. This conceptual design provides an initial planning tool for the project. At this early stage there are significant uncertainties. This package serves as a jumping off point to explore the overall scope of the project.
2. Location, size, quantity and extent of the conceptual design elements are for baseline guidance/reference.
3. The final improvement plans may vary based off stakeholder input, site assessment findings, final restoration grading and design and modeling, compliance requirements, and/or budget considerations.
4. Construction access will be challenging and will likely require using the creek bed as the travel corridor for equipment and materials
5. Finding properly sized habitat boulders may be challenging and this will need to be explored in detail in further design phases.

Design Element Legend: River

- Excavated Pool
- Habitat Boulders
- Habitat Logs
- Constructed Bench
- Riparian Planting Area

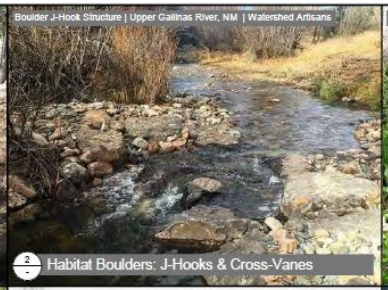
Design Element Legend: Access

- Formalized Trail
- Trail Boardwalk/Catwalk
- Access Ramp
- Access Staircase

Conceptual Improvement Plan: Example Design Elements


Paired Boulder Clusters & Pool | Upper Gallinas River, NM | Watershed Artisans

1 - Habitat Boulders: Clusters & Pool


Boulder J-Hook Structure | Upper Gallinas River, NM | Watershed Artisans

2 - Habitat Boulders: J-Hooks & Cross-Vanes


Boulder Clusters | John Denver Sanctuary, CO | Andre Salvail - Aspen Times

3 - Habitat Boulders: Playscape


Constructed Log Jam | LTPBR of Riverscapes | Joe Wheaton

4 - Constructed Log Jam


Willow Pole Plantings | Colorado River Delta, MX | Oxbow Ecological Engineering

5 - Native Riparian Plantings


Typical Catwalk | Catwalk Recreation Area, NM | Oxbow Ecological Engineering

6 - Material/Style Reference for Access Features

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river + riparian + wetland + wildland
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(928) 266-6192 • www.oxbow-eco-eng.com

PROJECT NAME:
Catwalk Recreation Area: Whitewater Creek Habitat & Access Improvement

LOCATION:
Catwalk Recreation Area
Gila National Forest
Catron County, NM

PROJECT NUMBER:
NMDGF Purchase Order No. 51600-0000084759 (1-1)

PROJECT PHASE:
Assessment & Conceptual Design

CLIENT:
New Mexico Department of Game & Fish
1 Wildlife Way
Santa Fe, NM 87507
(505) 476-8000

DRAWN BY: GFC
DESIGNED BY: GFC & CS
REVIEWED BY: GFC & CS

ENGINEER OF RECORD:

CONCEPTUAL PLAN

NOT FOR CONSTRUCTION

UNAUTHORIZED CHANGES & USES:
The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes must be in writing and must be approved by the engineer of record.

PLAN REPRODUCTION:
The plans have been created on ANSI B (11 IN. x 17 IN.) sheets. For reductions, refer to graphic scale. The plans have been created for full color plotting. Any set of the plans that is not plotted in full color shall not be considered adequate. Warning: information may be lost in copying and/or gray scale plotting.

811 Know what's below. Call before you dig.

DATE:	OEE PROJECT #:
04.24.2023	NM-011-2

DRAWING:
Conceptual Improvement Plan: Overview & Objectives

DRAWING #:	SHEET #:	REVISION #:
CIP01	5 OF 7	0

New Mexico Department of Game & Fish

Whitewater Creek Habitat Restoration Project

Background Information

- Last HSP cycle, the CAC prioritized an engineering analysis and design to be completed on Whitewater Creek at the Catwalk Recreation Area for the benefit of Gila Trout. The final engineered design will be completed soon. With the final design, the Forest Service will be able to complete the necessary compliance.
- The Glenwood RD will be able to prioritize the completion of the EA if funds are ear-marked for this project.
- This project is multi-phased and will be completed over a couple of years. Implementation will include the installment of heavy boulders, and benches within Whitewater Creek at the Catwalks Recreation Area, along with native plant plantings along the banks.
- See the presentation for a visual of the draft design, along with a longer explanation of what in-stream work will happen.

Project Contacts

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Gila National Forest
Glenwood Ranger District
Sandy Taylor
Sandra.Taylor1@usda.gov

Proposed Management Action

- NMDGF, along with the USFS, will contract out the construction of the final design once the USFS has completed compliance.
- Cost $450,000

Google Earth Link

Project Name: Whitewater Creek Habitat Restoration Project

Project relation to CAC advice or priorities:

This is a fisheries project in a highly visible area.

Project Specific Details:

This will be a multi-year, multi-phased project that will implementation of in-stream habitat restoration techniques to improve the habitat for Gila Trout. The in-stream work will include placing heavy boulders in the stream, excavating pools, constructing a bench in-stream, as well as, native plantings such as willows and cottonwoods.

Historical Data:

Whitewater Creek was heavily affected by the Whitewater Baldy fire in 2012. The Department, along with the GNF and USFWS, restored Gila trout to the stream after Whitewater Baldy; including completing a mutli-year project to remove nonnatives from the stream followed by stocking Gila trout to a self-sustaining population.

Itemized Use of Funds:

Funds will be used to complete the installation of the final design of in-stream work, including but not limited to placing heavy boulders, excavating pools, and planting native plants along the banks. The habitat improvement will cover roughly 1/2 mile of Whitewater Creek starting at the Catwalk Recreation Area and heading upstream.

Comprehensive Project Analysis:

Last year, an engineering analysis and design was created for in-stream restoration work in Whitewater Creek along the Catwalk Area. That work has been completed and with those designs, we would like to move on the compliance and implementation phases

Monitoring Plan/ Strategy:

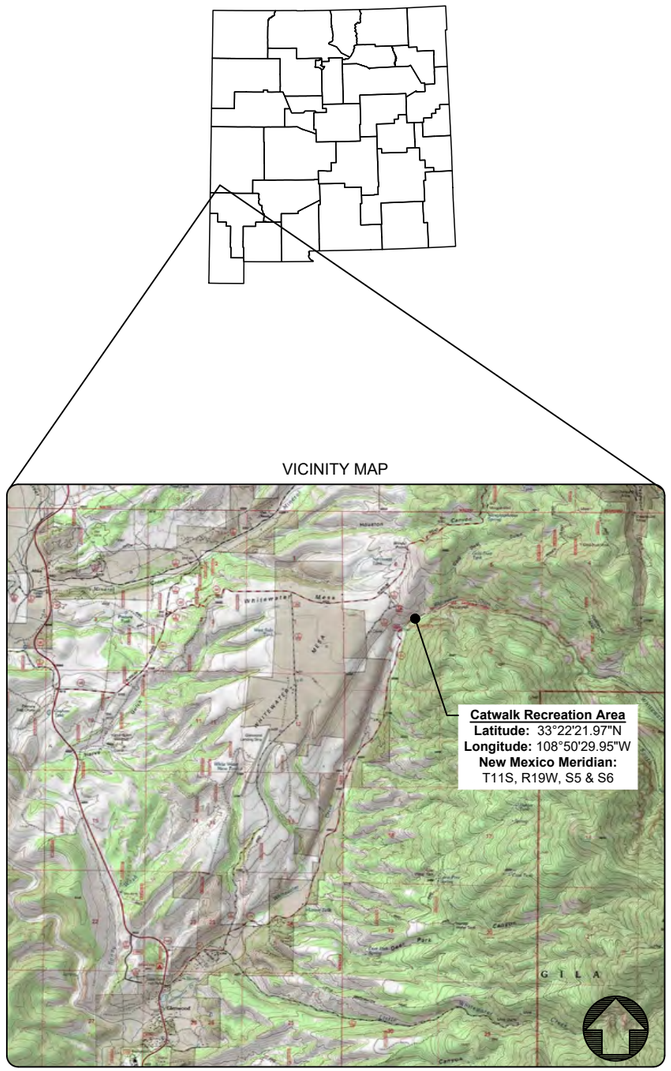
This project will be monitored for its success by multiple Gila Trout surveys. The Department conducts Gila Trout surveys in Whitewater Creek often and will continue to do so. The Forest Service will also conduct visits to the site to monitor if the heavy boulders and pools remain intact throughout flood events.

Project Emphasis Species:

The primary species that will be impacted by the project is the Gila Trout.

Catwalk Recreation Area
Whitewater Creek Habitat & Access Improvement
Assessment & Conceptual Design

Gila National Forest, Glenwood Ranger District
Catron County, New Mexico



VICINITY MAP

Whitewater Creek - Photo by OEE, March 23, 2023

SUBMITTED TO

CLIENT:
New Mexico Department of Game & Fish (NMDGF)
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(505) 476-8000

PROJECT PARTNER:
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Glenwood Ranger District
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(575) 539-2481

SUBMITTED BY

CIVIL/ECOLOGICAL PROJECT ENGINEER:
Oxbow Ecological Engineering, LLC (OEE)
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RESTORATION TECHNICAL ADVISOR:
Watershed Artisans, Inc. (WAI)
1000 Cordova Place, #832
Santa Fe, New Mexico
(505) 577-9625

SHEET INDEX

DRAWING REVISIONS

NUMBER	DATE	BY	REVISION DESCRIPTION
0	4/24/2023	GFC	Assessment & Conceptual Design

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(928) 266-6192 ● www.oxbow-eco-eng.com

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Catron County, NM

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NMDGF Purchase Order No. 51600-0000084759 (1-1)

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Santa Fe, NM 87507
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DRAWN BY: GFC
DESIGNED BY: GFC & CS
REVIEWED BY: GFC & CS
ENGINEER OF RECORD:

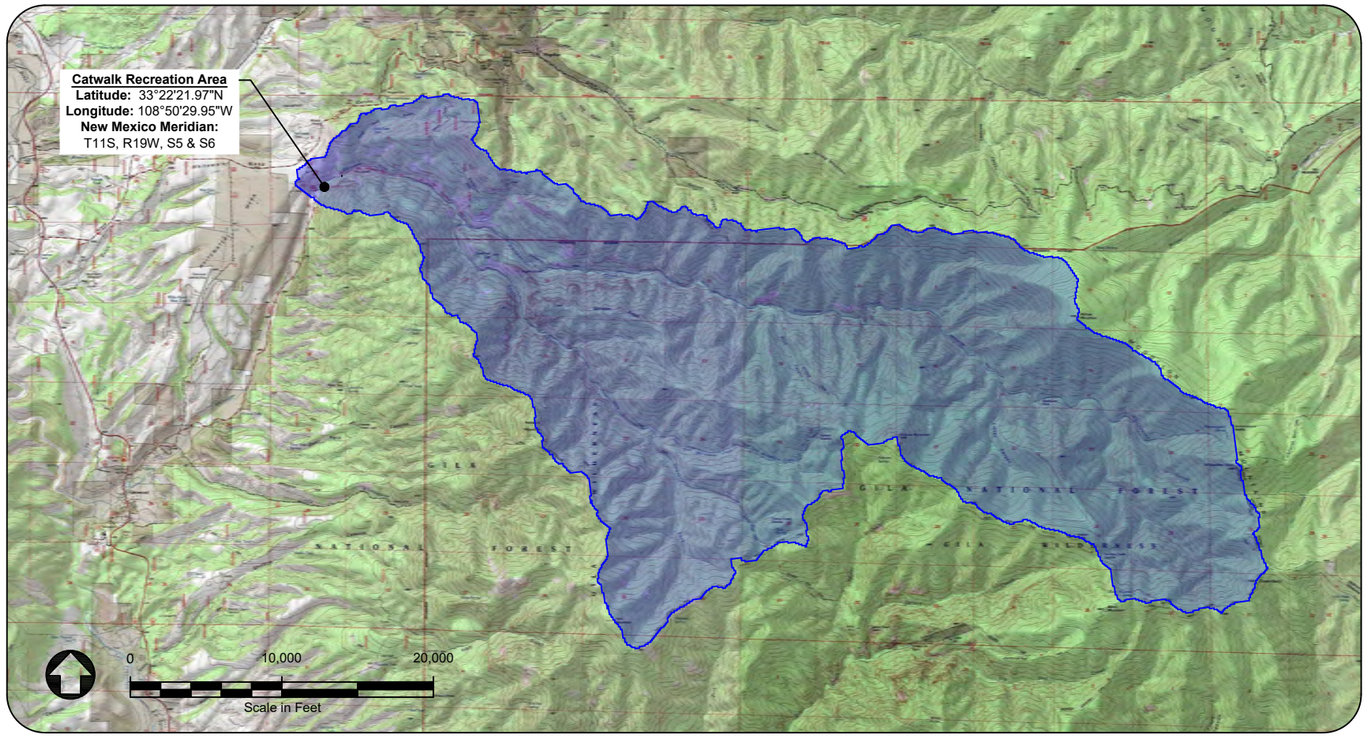
CONCEPTUAL PLAN

NOT FOR CONSTRUCTION

DATE: 04.24.2023
OEE PROJECT #: NM-011-2
DRAWING: Cover Sheet

DRAWING #:	SHEET #:	REVISION #:
CVR01	1 OF 7	0

Watershed Map



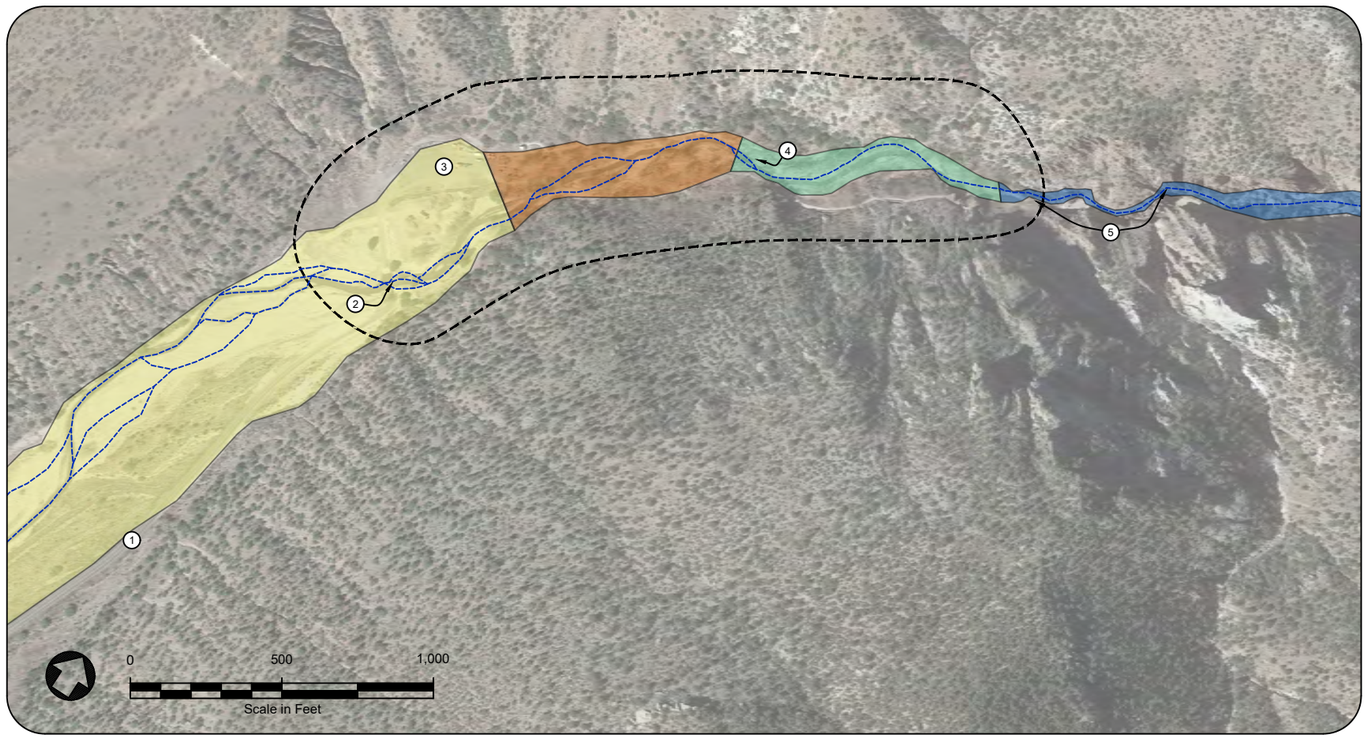
Hydro-Geomorphic Data Summary

Basin Characteristics (StreamStats v4.14.0)	
Drainage Area	37 MI^2
Mean Basin Slope	55%
Mean Annual Precipitation	33.2 IN.
Mean Basin Elevation	8,198 FT
Recent Wildfires	Whitewater-Baldy Complex (2012)

Peak Flow Statistics (StreamStats v4.14.0 - Peak 2008 5119 SW Desert Flood Region 7)	
50-Percent AEP Flood	753 CFS
20-Percent AEP Flood	1,500 CFS
10-Percent AEP Flood	2,170 CFS
4-Percent AEP Flood	3,220 CFS
2-Percent AEP Flood	4,170 CFS
1-Percent AEP Flood	5,280 CFS
0.2-Percent AEP Flood	8,590 CFS

Bankfull Characteristics (Regional Relationships for Bankfull Stage [Moody et al. 2003]: Central & Southern Arizona Sites)	
Bankfull Discharge	485 CFS
Bankfull Area	84 FT^2
Bankfull Width	50 FT
Mean Bankfull Depth	1.7 FT
Maximum Bankfull Depth	2.8 FT
Width to Depth Ratio	29 FT/FT

Valley Map



Valley Characteristics

General Legend

- Study Area
- Whitewater Creek Flowline(s)

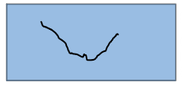
Landmarks

1. New Mexico Highway 174
2. Low Water Crossing
3. Catwalk Recreation Area Parking Lot
4. Pedestrian Bridge
5. Catwalk

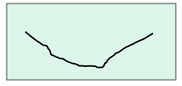
Study Area Context

The Catwalk Study Area is positioned in an area of transition, between a narrow box canyon and a wide depositional plain. It will be critical that any habitat and access improvements work with the natural processes inherent in this dynamic context.

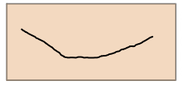
Valley Zones & Representative Cross Sections



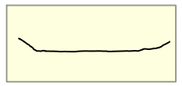
Zone 1
Type: Steep Box Canyon
Channel: Narrow/Slot, Confined, Straight, Bedrock Bottom, Bedrock Walls
Floodplain: Narrow/Slot, Confined, Bedrock Bottom, Bedrock Walls
Sediment: Transfer Zone



Zone 2
Description: Alluvial Gulch Fill
Channel: Entrenched, Low Width-to-Depth, with Some Sinuosity
Floodplain: Narrow
Sediment: Transfer Zone



Zone 3
Description: Alluvial Fill
Channel: High Width-to-Depth, Mid-Channel/Side Bars, Moderate Channel Scrolling
Floodplain: Wider, Numerous Flood Channels
Sediment: Transitional Transfer/Depositional Zone



Zone 4
Description: Depositional Plain
Channel: Braided, Actively Scrolling
Floodplain: Broad, Coarse Alluvial Material Deposits
Sediment: Depositional Zone

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ENGINEER OF RECORD:

CONCEPTUAL PLAN

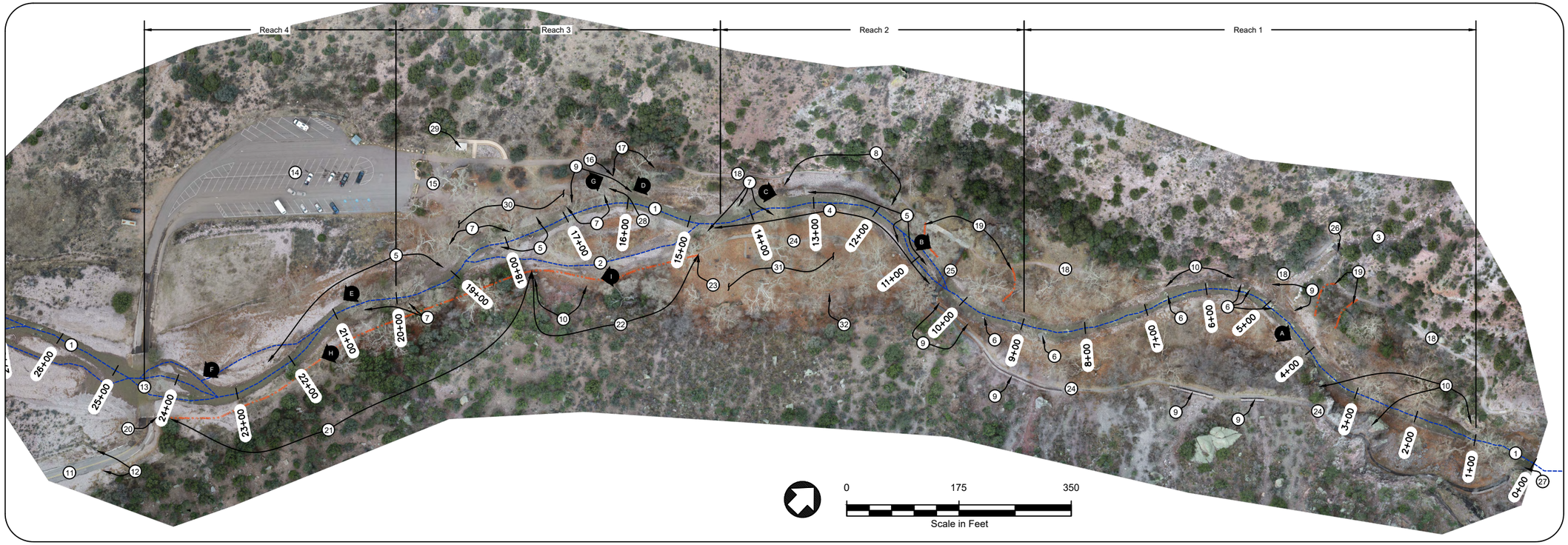
NOT FOR CONSTRUCTION

DATE:	OEE PROJECT #:
04.24.2023	NM-011-2

DRAWING: Existing Conditions: Watershed & Valley Characteristics

DRAWING #:	SHEET #:	REVISION #:
EXC01	2 OF 7	0

Existing Conditions Map: Study Area



Existing Conditions: Feature Legend

Legend

- Whitewater Creek Flowline(s)
- Informal Trails

Riverscape Features

1. Whitewater Creek
2. Floodplain Channel
3. Tributary Drainage
4. Streambank Erosion
5. New Channel Bar Formation
6. Large Instream Boulders/Logs
7. Sycamores on Streambank Edge
8. Engineered Streambank/Slope Protection
9. Gabion Walls
10. Cliff Face

Access Features

11. U.S. Highway 174
12. Entrance Gate
13. Low Water Crossing
14. North: Parking Lot
15. North: Entrance Features/Interpretive Signage
16. North: Trailhead
17. North: Steep Ramp Section at Trialhead
18. North: Formal/Surfaced Trail
19. North: Informal River Access Trail(s)

Access Features (Continued)

20. South: Informal Trailhead
21. South: Informal Trail Through Uplands
22. South: Informal Trail Through Creek Bottom
23. South: Informal/Paved Trail Connection
24. South: Formal Paved Trail
25. Pedestrian Bridge: Whitewater Creek
26. Pedestrian Bridge: Tributary Drainage
27. Begin Catwalk
28. Bridge Footing Remnant

Other Site Features

29. Restroom
30. North: Picnic Area
31. South: Picnic Area
32. Outdoor Classroom/Seating Area

Multimedia

- On-the-Ground Photos from 3/23/23 (See Photos on Sheet 4)
- Drone Flyover Footage (https://youtu.be/P91NTGcruYk)

Site Assessment Briefing

Background
NMDGF is working with the U.S. Forest Service - Glenwood Ranger District on a potential fish habitat project on a 0.25 mile reach of Whitewater Creek within the Glenwood Catwalk Recreation Area near Glenwood, NM. The project focus is improving habitat for Gila trout, including instream channel improvements, creation of pool habitats, and various stream bank stabilization actions. In addition, improved angler and public access will be explored.

Oxbow Ecological Engineering visited the Catwalk Recreation Area and the 2,400-foot long study reach/corridor of Whitewater Creek between March 22 - 24, 2023. Follow the link for a video derived from a UAS flyover of the site conducted March 23, 2023: https://youtu.be/P91NTGcruYk. Sheet 4 includes representative pictures of pertinent site features.

Riverscape Assessment
The goal of this site reconnaissance was to get a preliminary read of the landscape, understand the factors contributing to riverscape impairment and degradation, to gather data to evaluate the feasibility of improving Gila trout habitat in the study area, and to inform conceptual improvement plans. The information from the field visit was combined with existing topographic information, recent drone derived and historic aerial photos, and literature review to develop a broad-level picture of the watershed context and characteristics and the restoration potential of the this portion of the Whitewater Creek riverscape. This brief assessment provides initial impressions of river condition and access.

The Catwalk Study Area is positioned in an area of transition, between a narrow box canyon and a wide depositional plain (see previous sheet for valley map/characteristics and discussion). The site appears to have 4 sub-reaches that roughly correlate with the transitional features of the valley.

Reach 1 [STA 1+00 to 9+00]
Description: Slightly sinuous single thread, entrenched channel with ~2.0% slope and lower relative width-to-depth ratio, running along the toe of an alluvial fan from a tributary drainage. Multiple large colluvial boulders and some downed logs create some pocket habitat, but deeper pool features are lacking. Some mature sycamores in this reach, but could potentially use additional riparian plantings to increase shading and stabilize streambanks.
Relative Potential to Improve Gila Trout Habitat: Highest. Potential opportunity to improve trout habitat by strategic placement of habitat boulders and logs to augment existing structure and excavating deep step pools.
Public River Accessibility (North): Difficult. Access to the north side involves navigating steep slopes with thick vegetation. Two potential informal trail locations/drainages were mapped that could be formalized.
Public River Accessibility (South): Difficult. Access to south side of the river is limited to navigating steep, loose slope near the pedestrian bridge.

Reach 2 [STA 9+00 to 14+50]
Description: Slightly sinuous single thread channel with ~1.8% slope and higher relative width-to-depth ratios. Recent floods have created fresh middle-channel and bank attached bars throughout. The north side of the river is stabilized with an engineered gabion mat. The south side of the river along the picnic area has sections of actively eroding streambanks and some mature Sycamores directly on the bank edge could be compromised if erosion progresses. There are some mature sycamores in this reach, but could potentially use additional riparian plantings to increase shading and stabilize streambanks.
Relative Potential to Improve Gila Trout Habitat: Moderate. Potential opportunity to improve trout habitat by constructing inner-berm benches to reduce width-to-depth ratios, placing habitat boulders to create hydraulic complexity and roughness and stabilize streambanks, and excavating deep pools.
Public River Accessibility (North): Moderate. Access to the north side is easiest near the pedestrian bridge where an informal trail leads down to the river, but this area could be formalized for angler/public access.
Public River Accessibility (South): Easy. There is access to the river along the entire south side of Reach 2 in the picnic area, although eroding cutbanks may compromise this access.

Reach 3 [14+50 to 20+00]
Description: Slightly sinuous channel with ~1.8% slope and higher relative width-to-depth ratios. There is a large flood channel that parallels the main channel in this reach. Recent floods have created fresh middle-channel and bank attached cobble bars throughout that have filled pool pocket habitat that was observed the previous year. This section of channel appears to be migrating toward the picnic area to the north based off comparisons to historic topography and aerial photos. Multiple mature Sycamores directly on the bank edge could be compromised if erosion progresses. The bank edge receives high foot traffic and is trampled/compacted along most of the reach.
Relative Potential to Improve Gila Trout Habitat: Low. This reach of river is a transitional depositional zone that will be prone to channel braiding and scrolling making it a higher risk to install instream habitat. That said, potential stream stabilization measures along the northern picnic area, including adding large boulders, could create some pocket habitat over time that could hold fish.
Public River Accessibility (North): Very Easy. This reach is close to the parking lot and receives high foot traffic.
Public River Accessibility (South): Moderate. There is an informal trail that runs along the south side of the river that allows some access.

Reach 4 [20+00 to 24+50]
Description: Braided channel with ~1.6% slope and higher relative width-to-depth ratios. Recent floods have created fresh middle-channel and bank attached cobble bars throughout. This section of channel is at the upstream end of a wide depositional plain, characterized by braided, migrating channels and coarse alluvial deposits. Riparian vegetation is limited to sparse willow copses.
Relative Potential to Improve Gila Trout Habitat: Very Low. Given the actively evolving nature of this depositional area, this area has a low potential for trout habitat improvements but could benefit from some riparian plantings.
Public River Accessibility (North): Moderate. There are no trails along this reach, but overland access along the bank edge is moderately easy.
Public River Accessibility (South): Moderate. There is an informal trail that runs along the south side of the river that allows some access.

Other Access Notes:
Personnel from the Gila National Forest requested special consideration for two locations within the study area to evaluate the feasibility of improving public access.

North Side: ADA Access at the Trailhead
The primary trailhead for the catwalk begins with a short section of trail that is steep (>10% slope) and pinched between a steep hillside and a mature sycamore tree. In addition, there is an interpretive sign and built in benches that may have historic significance (along with remnants of the pedestrian bridge footing that used to be at this location). These constraints would likely make it difficult to re-grade this area to hit ADA compliance targets for slope (<8.33% slope), but it might be feasible to construct an ADA accessible ramp/handrails that could "thread" between these constraints. This ramp could be constructed to mirror the catwalk in materials and style.

South Side: Formalizing High Flow Trail Access
USFS requested an evaluation of the feasibility of creating a new section of trail on the south side of the creek that would allow access to the catwalk during high flows when the low water crossing is impassible. There is currently an informal trail that starts near the low water crossing, crosses a section of uplands, then drops into the creek bottom before connecting up with a paved trail within the southern picnic area. There is the potential to formalize this section of trail, which would involve grading, widening, and surfacing the section of trail through the uplands then potentially creating a short section of raised boardwalk/catwalk that spans the section of trail that is currently in the creek bottom. Upland trail-work could require some significant earthwork and tree removal/brush clearing in areas to meet ADA requirements, but is likely feasible. The boardwalk/catwalk that spans the creek bottom could be constructed to mirror the catwalk in materials and style. Parking improvements along the highway would need to be considered.

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3491 S Gillenwater Dr ● Flagstaff, AZ 86005
(928) 266-6192 ● www.oxbow-eco-eng.com

PROJECT NAME:
Catwalk Recreation Area: Whitewater Creek Habitat & Access Improvement

LOCATION:
Catwalk Recreation Area
Gila National Forest
Catron County, NM

PROJECT NUMBER:
NMDGF Purchase Order No. 51600-0000084759 (1-1)

PROJECT PHASE:
Assessment & Conceptual Design

CLIENT:
New Mexico Department of Game & Fish
1 Wildlife Way
Santa Fe, NM 87507
(505) 476-8000

EXC01

DRAWN BY: GFC
DESIGNED BY: GFC & CS
REVIEWED BY: GFC & CS
ENGINEER OF RECORD:

CONCEPTUAL PLAN

NOT FOR CONSTRUCTION

DATE: 04.24.2023
OEE PROJECT #: NM-011-2

DRAWING:
Existing Conditions: Study Area Overview & Assessment Briefing

DRAWING #: EXC02
SHEET #: 3 OF 7
REVISION #: 1

A - Reach 1: Typical Channel

B - Reach 2/Access: Typical Channel & Pedestrian Bridge

C - Reach 2: Typical Channel

D - Reach 3: Typical Channel

E - Reach 4: Typical Channel

F - Reach 4/Access: Typical Channel & Low Water Crossing

G - Access: North Side - Steep Ramp at Trailhead

H - Access: South Side - Typical Informal Trail Through Uplands

I - Access: South Side - Typical Informal Trail in Creek Bottom

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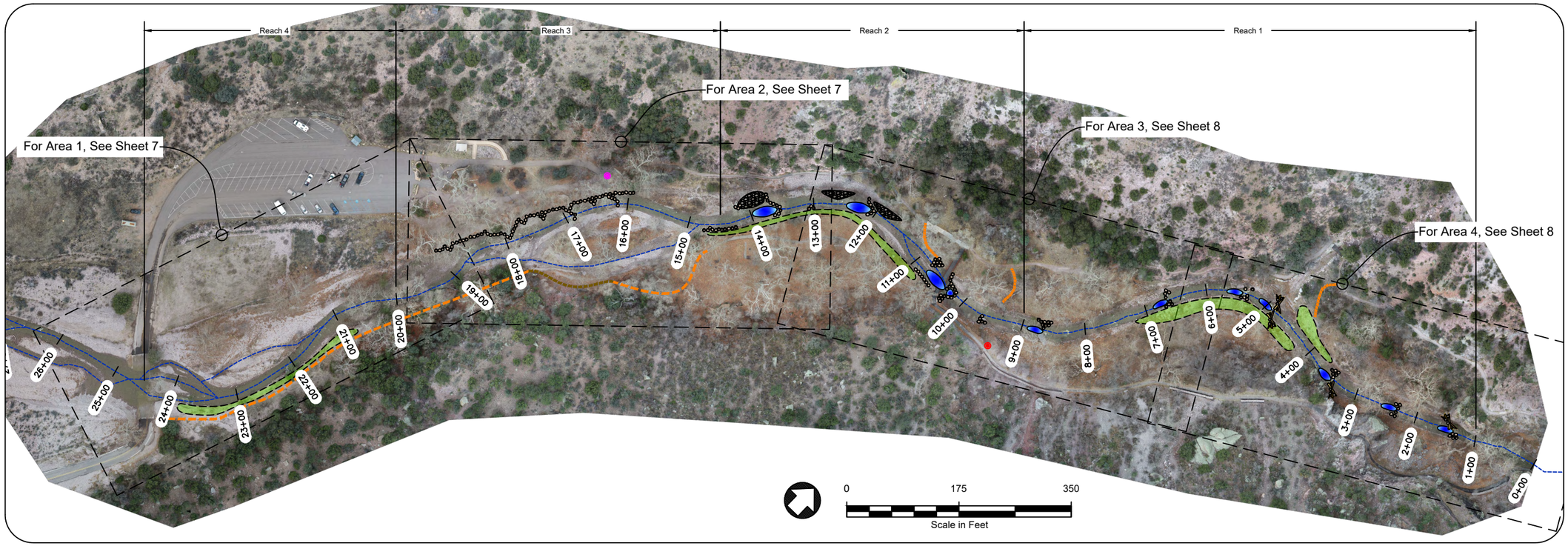
DRAWING: Existing Conditions: Representative Site Photos

DRAWING #: EXC03
SHEET #: 4 OF 7
REVISION #: 1

Conceptual Improvement Plan: Project Area Overview



Conceptual Improvement Plan: Objectives & Approach

Conceptual Restoration Objectives

- Increase hydraulic diversity and shelter habitat for trout
- Increase pool frequency and depth
- Reduce width-to-depth ratio wherever possible
- Reduce streambank erosion potential
- Increase channel shading with native riparian vegetation
- Increase public access for angling and recreation

Restoration Approach

Based on the inventory and assessment for the project, a set of conceptual, site specific practices was developed to meet the project objectives outlined above. This "restoration toolbox" includes measures that, if implemented holistically, could help to improve trout habitat and public access. This sheet includes some examples of restoration practices. The remainder of the sheets in this drawing set show the placement of these conceptual design elements within the stream corridor.

Conceptual Design Notes

1. This conceptual design provides an initial planning tool for the project. At this early stage there are significant uncertainties. This package serves as a jumping off point to explore the overall scope of the project.
2. Location, size, quantity and extent of the conceptual design elements are for baseline guidance/reference.
3. The final improvement plans may vary based off stakeholder input, site assessment findings, final restoration grading and design and modeling, compliance requirements, and/or budget considerations.
4. Construction access will be challenging and will likely require using the creek bed as the travel corridor for equipment and materials
5. Finding properly sized habitat boulders may be challenging and this will need to be explored in detail in further design phases.

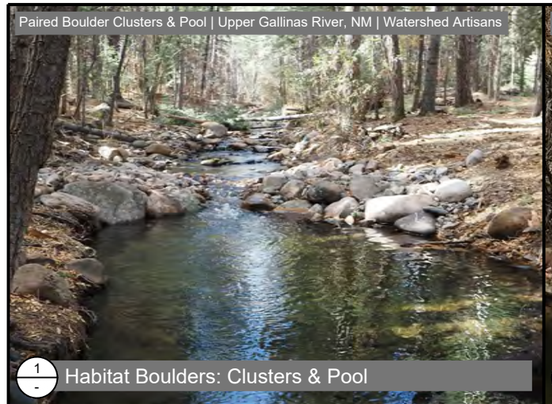
Design Element Legend: River

- Excavated Pool
- Habitat Boulders
- Habitat Logs
- Constructed Bench
- Riparian Planting Area

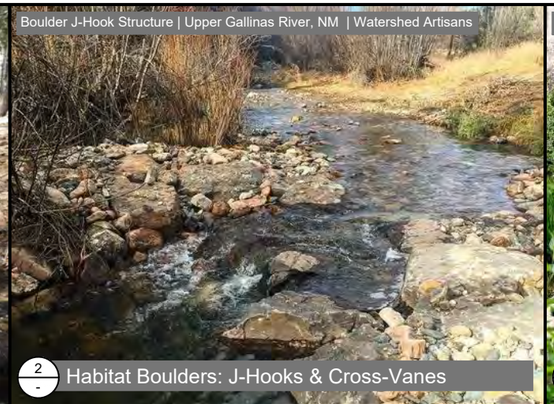
Design Element Legend: Access

- Formalized Trail
- Trail Boardwalk/Catwalk
- Access Ramp
- Access Staircase

Conceptual Improvement Plan: Example Design Elements


Paired Boulder Clusters & Pool | Upper Gallinas River, NM | Watershed Artisans

1 - Habitat Boulders: Clusters & Pool


Boulder J-Hook Structure | Upper Gallinas River, NM | Watershed Artisans

2 - Habitat Boulders: J-Hooks & Cross-Vanes


Boulder Clusters | John Denver Sanctuary, CO | Andre Salvail - Aspen Times

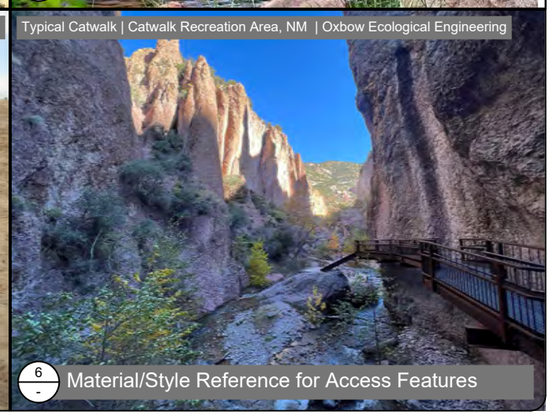
3 - Habitat Boulders: Playscape


Constructed Log Jam | LTPBR of Riverscapes | Joe Wheaton

4 - Constructed Log Jam


Willow Pole Plantings | Colorado River Delta, MX | Oxbow Ecological Engineering

5 - Native Riparian Plantings


Typical Catwalk | Catwalk Recreation Area, NM | Oxbow Ecological Engineering

6 - Material/Style Reference for Access Features

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DATE:	OEE PROJECT #:
04.24.2023	NM-011-2

DRAWING:
Conceptual Improvement Plan: Overview & Objectives

DRAWING #:	SHEET #:	REVISION #:
CIP01	5 OF 7	0

Conceptual Improvement Sketch: Area 1

Legend

- Excavated Pool
- Habitat Boulders
- Habitat Logs
- Constructed Bench
- Riparian Planting Area
- Formalized Trail
- Trail Boardwalk/Catwalk
- Access Ramp
- Access Staircase

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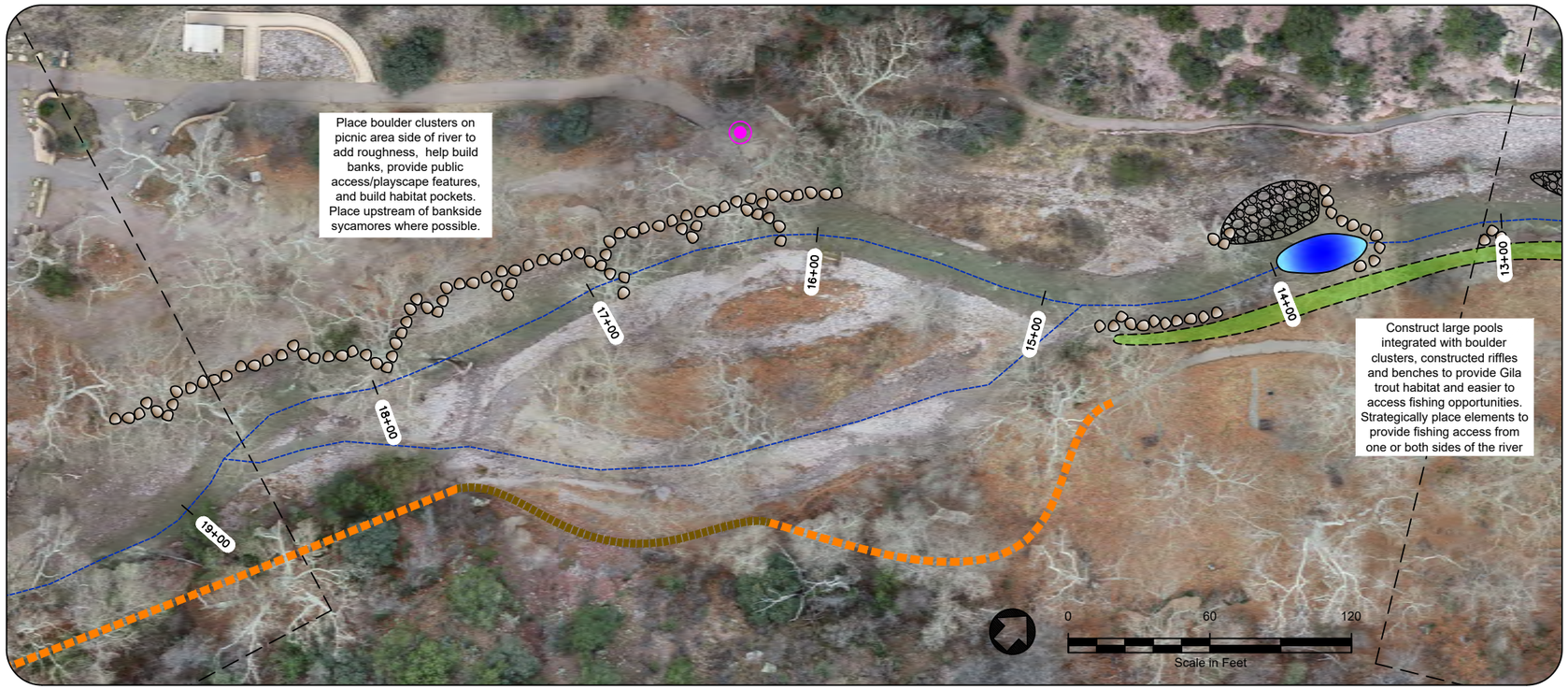
Conceptual Improvement Sketch: Area 2



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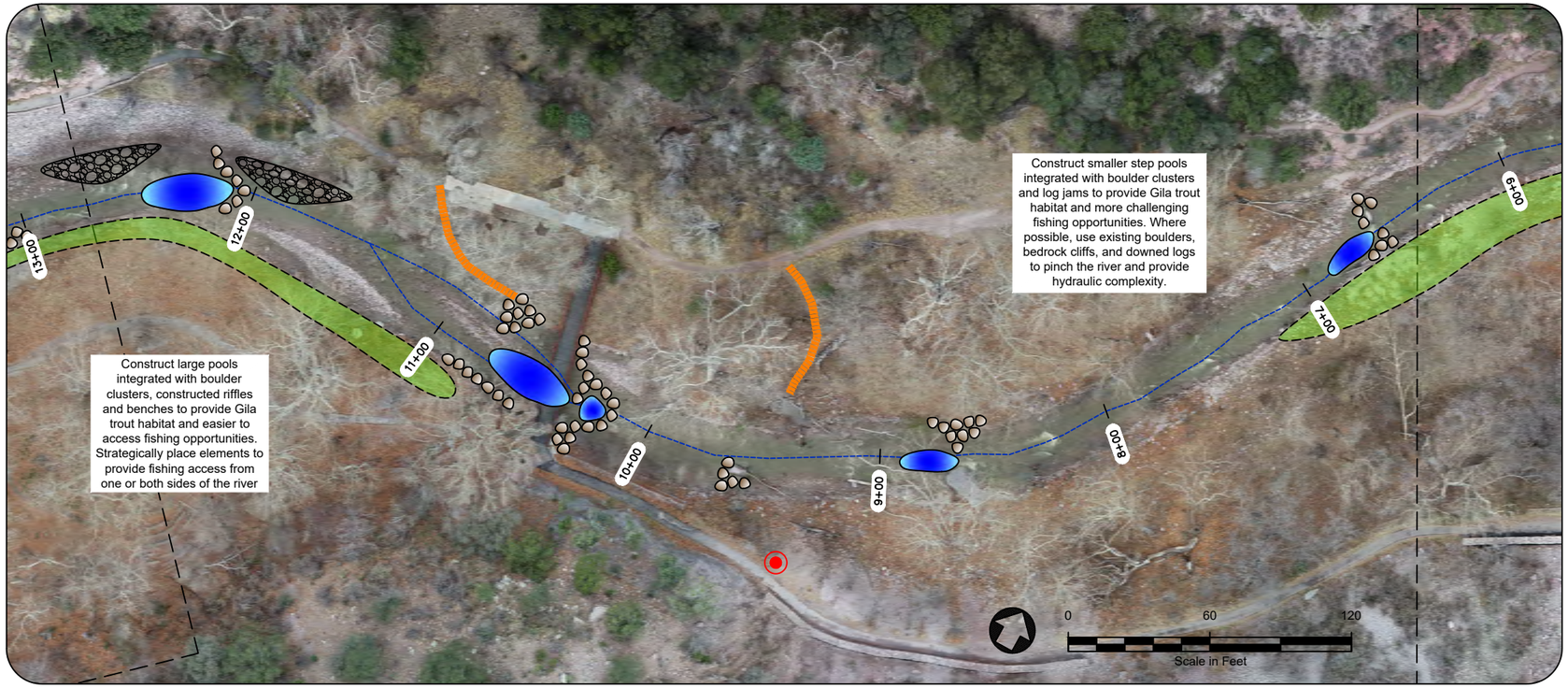
DATE:	OEE PROJECT #:
04.24.2023	NM-011-2

DRAWING:
Conceptual Improvement Sketches:
Area 1 & 2

DRAWING #:	SHEET #:	REVISION #:
CIP02	6 OF 7	0

Conceptual Improvement Sketch: Area 3



Legend

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- Habitat Boulders
- Habitat Logs
- Constructed Bench
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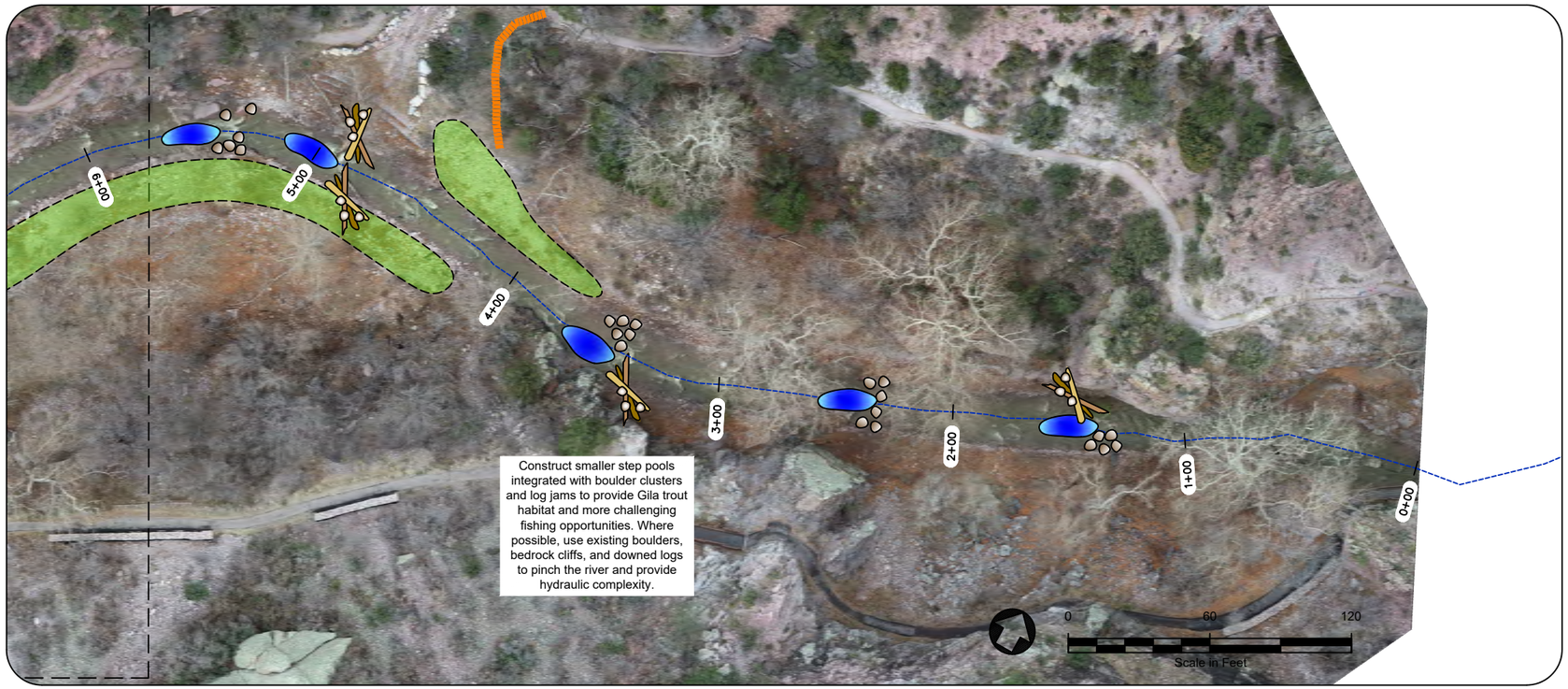
Conceptual Improvement Sketch: Area 4



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04.24.2023	NM-011-2

DRAWING:
Conceptual Improvement Sketches:
Area 3 & 4

DRAWING #:	SHEET #:	REVISION #:
CIP03	7 OF 7	1