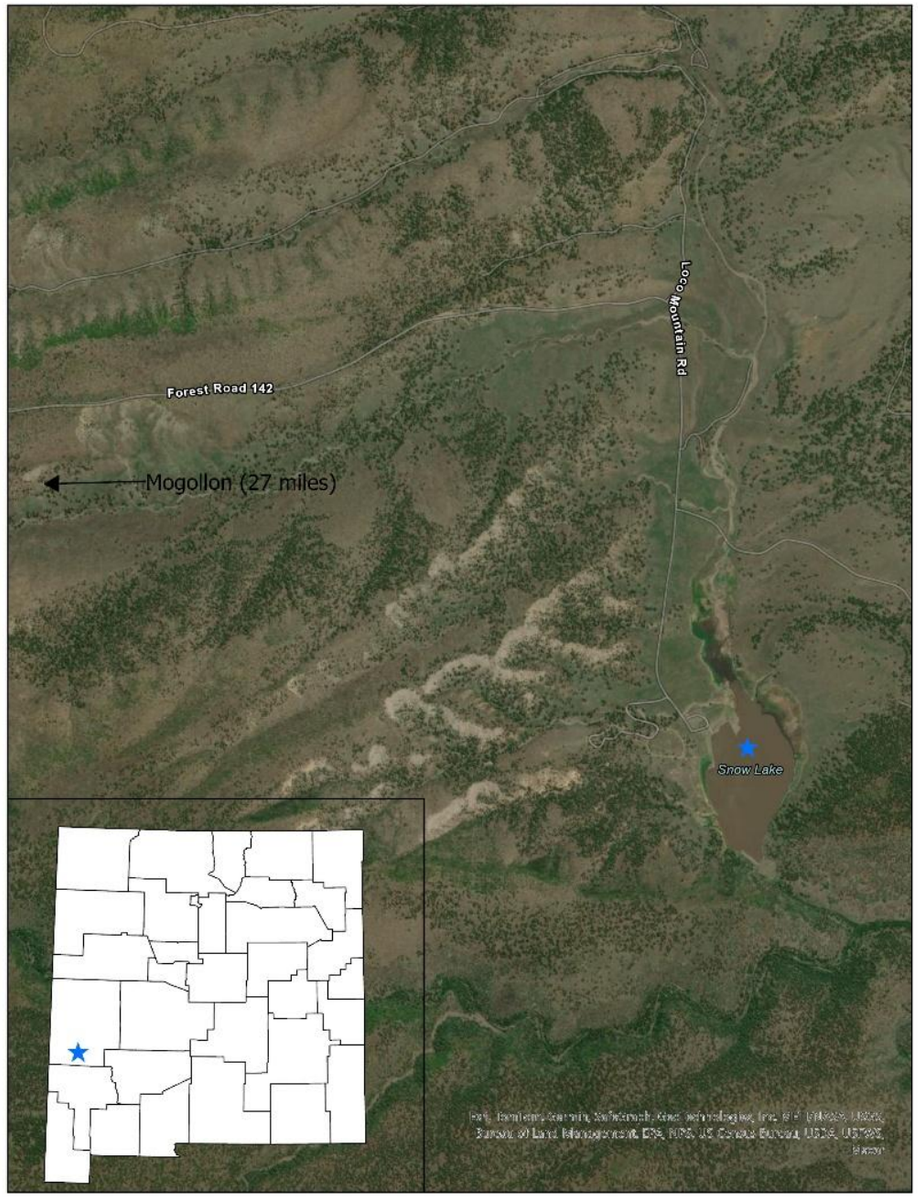
FY2025
Fisheries Habitat Restoration Project Opportunity

Snow Lake Dredge Evaluation



Snow Lake Dredge Evaluation

Background Information

- 72-acre lake located in the Gila National Forest approximately 27 miles from Mogollon, NM
- Drains into Gilita Creek to form the Middle Fork of the Gila River
- Lake has filled in with sediment over time affecting the water quality (temperature, dissolved oxygen). This has limited stocking to the winter months
- Dredging can be an expensive operation. Conducting this evaluation will help the provide the necessary information to companies to provide cost estimate to complete restoration
- Once restored, the goal would be to implement a put, grow, take Gila Trout fisheries that provides angling opportunity year-round

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Project Contacts

Department of Game and Fish
Eric Frey
Eric.frey@dgf.nm.gov

Gila National Forest
Eileen Henry, Fish Biologist
Eileen.henry@usda.gov

Proposed Action

- Surveying and mapping the lake to determine current depth, contour, and bottom density
- Determining silt depth and quantify the amount (cubic yards) of sediment deposited in lake since originally constructed. Provide an estimate of how much material would need to be removed to get the lake back to its historic level
- Test composition of sediment for heavy metals, phosphorus and nitrogen
- Provide a report of findings including recommendations to improve lake conditions (e.g. dredging). Documents may be used in future bidding documents to complete lake activities
- **Estimated Budget: $50,000**

Project Name: Snow Lake Dredge Evaluation

Project relation to CAC advice or prioties:

Snow Lake is a popular recreational area in the Gila National Forest currently stocked with Rainbow and Gila trout. The lake has filled in with sediment over time and is not able to sustain a fishery year round. Trout can only be stocked in the winter.

Project Specific Details:

Complete an evaluation that determines the current depth, contour, and bottom density; the silt depth and quantify the amount (cubic yards) of sediment deposited; provide an estimate of how much material would need to be removed; and test composition of sediment for heavy metals and nutrients. This information will be provided to dredging companies to determine the cost to restore lake.

Historical Data:

Over time the lake has filled in with sediment causing water quality issues (increased temperature and decreased dissolved oxygen levels). Due to the water quality, the lake is no longer able to be stocked in the summer.

Itemized Use of Funds:

Lake Evaluation conducted by Tetra Tech: $50,000

Proposal is attached. The proposal includes Fenton Lake, which will be done at a later date and not included in this project.

Comprehensive Project Analysis:

A final report will be provided by Tetra Tech. The report will provide information needed to get cost estimates and to seek funding to restore Snow Lake. See attached proposal and presentation.

Monitoring Plan/ Strategy:

By completing this evaluation we will have a better understanding of how to restore the lake to provide better angling opportunities.

Project Emphasis Species:

Once restored, the goal would be to implement a put, grow, take Gila Trout fisheries that provides angling opportunity year-round.

Snow Lake Dredge Evaluation

Gila National Forest

Photo credit: https://www.outdoorproject.com/nm/snow-lake

Snow Lake Dredge Evaluation
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Eileen Henry

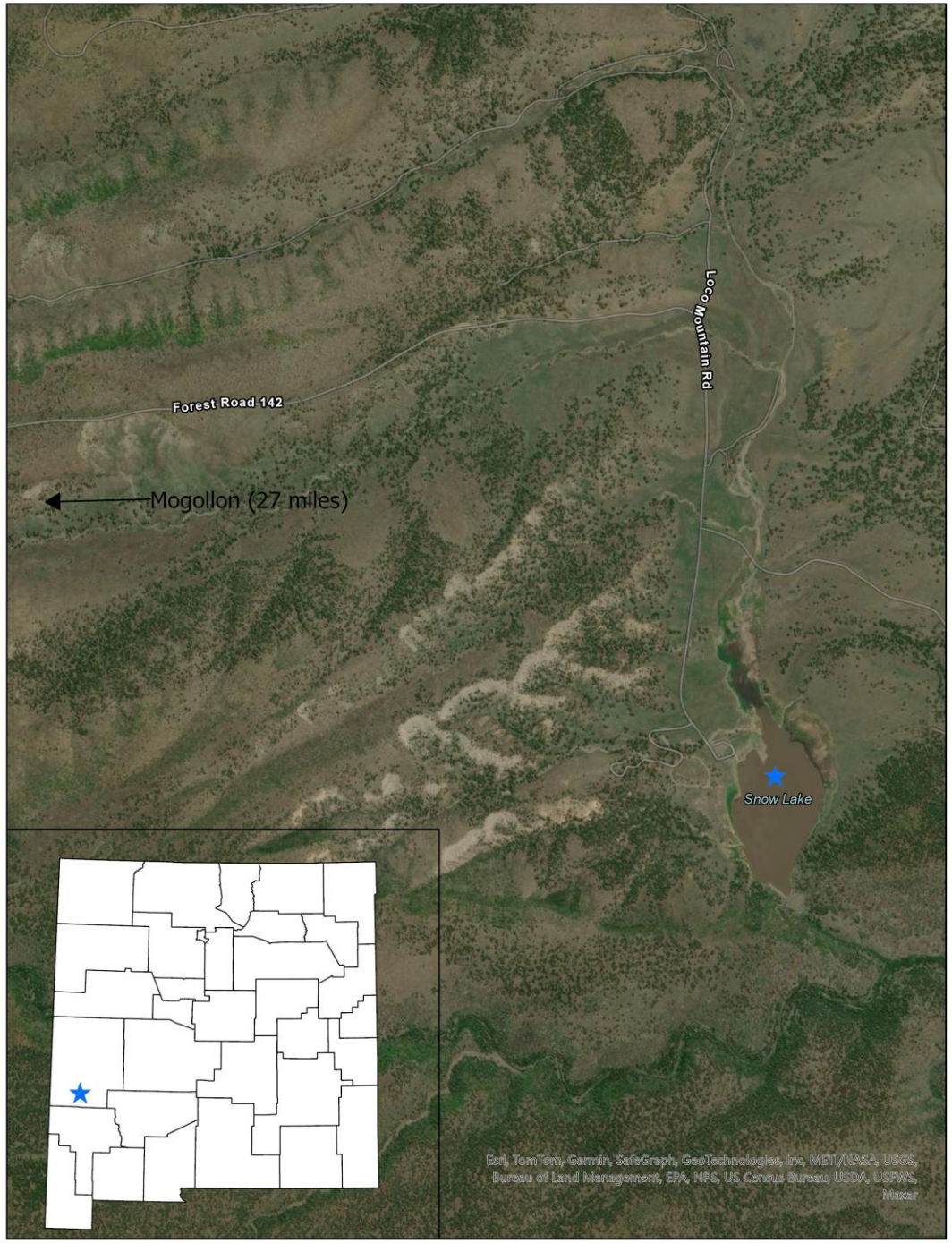
Fish Biologist, Gila National Forest

eileen.henry@usda.gov

Eric Frey

Sportfish Program Manager

Eric.frey@dgf.nm.gov



Snow Lake

- 72-acre lake located in the Gila National Forest approximately 27 miles from Mogollon, NM
- Lake drains into Gilita Creek to form the Middle Fork of the Gila River
- Lake has filled in with sediment over time affecting the water quality (temperature, dissolved oxygen).
- Historically was stocked year-round with trout, is now only able to be stocked in the winter
- Once restored, the goal would be to implement a put, grow, take Gila Trout fisheries that provides angling opportunity year-round.

Why an Evaluation?

Dredging companies need more detail on the lake to provide an accurate quote for dredge

Quotes are based on quantity of sediment and dimensions of the lake

Beyond dredging we must have information on the composition of the material as it will need to be removed from site

Use the evaluation and quotes to seek funding to complete dredging (multi-million-dollar project)

Summary of Project- Total Cost: $50,000

1. Survey and map the lake to determine current depth, contour, and bottom density

2. Determine silt depth and quantify the amount (cubic yards) of sediment deposited in the lake since originally constructed. Provide an estimate of how much material would need to be removed to get the lake back to its historic level

3. Test content of sediment for heavy metals, phosphorus and nitrogen

4. Provide a report of findings including recommendations to get the lake back to historic conditions (e.g. dredging). Documents may be used in future bidding documents to complete lake activities

TETRA TECH

Bathymetric Survey and Reconnaissance sediment sampling of Fenton and Snow Lake, NM.
Scope of Work
November 8, 2023

The New Mexico Department of Game and Fish (NMDGF) requests information regarding sediment levels at Snow Lake and Fenton Lake. The request included the following:

- Map the current bathymetry of the two lake for general evaluation of water depth/habitat
- Provide an estimate of how much sediment material has accumulated since original construction
- Collect sediment samples (shallow cores or surface grabs) to identify sediment type/composition and possible contamination.
    - Test samples for heavy metals, phosphorous and nitrogen
- Provide a report of findings including recommendations to get the lake back to historic conditions (e.g. dredging). Documents may be used in future bidding documents to complete lake activities.

A. Bathymetry

A single-beam bathymetric survey of navigable portions of the lakes would be conducted using:

- Outboard motorized Jon boat which would require a waiver for gas powered motor from New Mexico State Parks/NMDGF
- A Realtime Kinematic RTK GPS and a single-beam echosounder with single or with dual-frequency transducer would be utilized to give some indication of soft/flocculant surface sediments/ vegetation
- A single, durable survey control point would be set (or utilized if there is one existing) for RTK Base Station and for elevation adjustment using static GNSS Survey and OPUS processing
- Single beam survey lines would be spaced ~ 50 feet with a total of approximately 25 line miles of survey collection
- Two people would operate the boat and the equipment

Survey Assumptions:

- Ground control locations suitable for use as GPS base station locations exist or can be installed
- A suitable boat launch is available for use within the survey area.
- NMDGF will procure a waiver to allow use of gasoline powered vessel for survey and sampling
- TT will have unrestricted access to all areas requiring survey within the survey area
- Sufficient water depth will exist in all survey areas for collection of data and for safe operation of the TT survey vessel
- The fieldwork will be completed at a reasonable time (season) based on suitable weather and ground conditions.
- Fieldwork will only take place in areas where the terrain and vegetation allow safe and practical access.
- Tetra Tech will operate to a minimum safe depth under the sonar dictated by conditions, but generally no shallower than 1-2ft under-sonar clearance.
- Maximum water depth in the survey area does not exceed 40ft.
- No additional safety clearances or trainings beyond the Tetra Tech standard are required for these works, and no Boating Restricted Zone or other permits are required.

- Equipment and vessel may vary from proposed based on availability and time of project execution and date of project award.
- Costs include one vessel mobilization and one demobilization effort.

Sediment Sampling

A hand corer (small hand push corer - 2.5" diameter x 5-6 feet core tube) with 20-feet of push rod would be used. A hand operated petite ponar surface sediment grab sampler would be used to collect samples. Cores would be collected (if possible) by the 2-person crew. The Tetra Tech Albuquerque Office will provide chain of custody of the samples and handling during transfer to the lab where they will be taken for analysis. Three sampling locations per lake (depth stratified after bathymetry) will be taken.

Option

A bottom "drop-camera" would be utilized to take imagery of substrate, woody debris, aquatic vegetation. This is a GoPro with battery power video lights on the lowering frame that shoots time-lapse imagery, time synchronized with GPS for video location overlay and GIS integration. This would take approximately an additional day on each lake.

Proposed Survey Schedule:

Contract/Notice to Proceed from NMDGF (30 days prior)
Day 1: On site mobilization, Begin SBE bathymetric survey at Fenton Lake;
Set survey control point/RTK – Base Station/ OPUS/ perform 4 Hours of SBE survey
Day 2: Finish SBE Survey Fenton Lake, Sediment sampling Fenton Lake
Optional bottom camera video of Fenton Lake.
Day 3: Demob Fenton Lake, Travel partially to Snow Lake
Day 4: On site mobilization, Begin SBE bathymetric survey at Snow Lake
Set survey control point/RTK – Base Station/ OPUS/ perform 4 Hours of SBE survey
Day 5: Finish SBE Survey
Day 6: Finish Sediment sampling at Snow Lake
Optional bottom camera video of Snow Lake.
Day 7: Demob Snow Lake
Day 8: Deliver samples to lab

Report summarizing findings, lab results and recommendations – 45 days from receipt of lab results

Deliverables

- Bathymetric digital elevation model DEM approximate 10x10ft grid scale
- Depth contours (or elevations in NAVD88 datum) relative to local survey control. CAD-compatible XYZ points, gridded XYZ digital elevation model, and *.DXF contours, and color hillshade GEOTIFF *.tif image of the each lake
- Lab testing results
- Report summarizing findings including recommendations to get the lake back to historic conditions based upon modeling and lab results