

# 30-years of Hydrographic Data Collection on the Middle Rio Grande and its Applications for River Monitoring and Endangered Species Habitat Restoration

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# Introduction

1. Overview of types of hydrographic data
2. Uses of hydrographic data in the MRG
3. History of hydrographic data collection on the MRG
4. Future of hydrographic data collection on the MRG







# What is Hydrographic Data

- **River Cross Section Surveys**
- **Bathymetric Surveys**
- **Water Surface Elevations**
- **Topographic Surveys**
- **Vegetation Surveys**
- Geomorphic Characterizations of Bed Forms
- Suspended Sediment Samples (point and integrated)
- Bedload Samples
- Bed Material Samples
- Lidar







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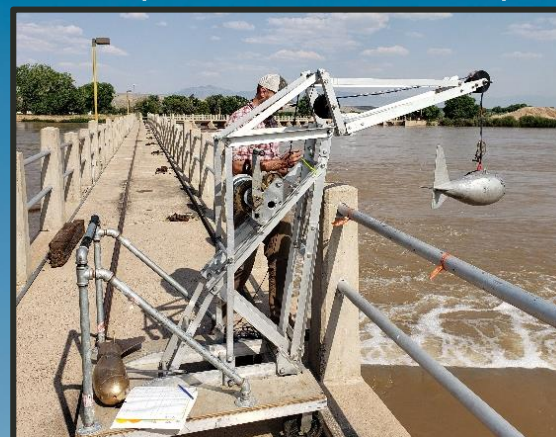
Bed Load Sampling



Suspended Sediment Sampling



Point Suspended Sediment Sampling



Bed Material Sampling

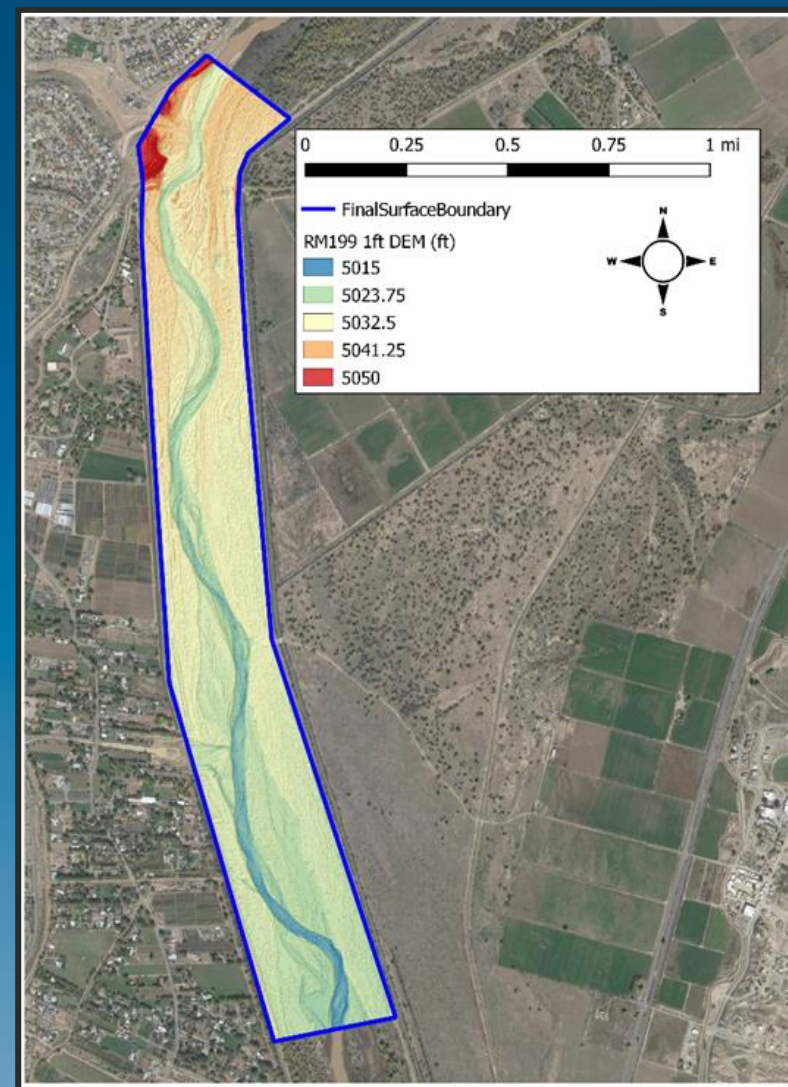






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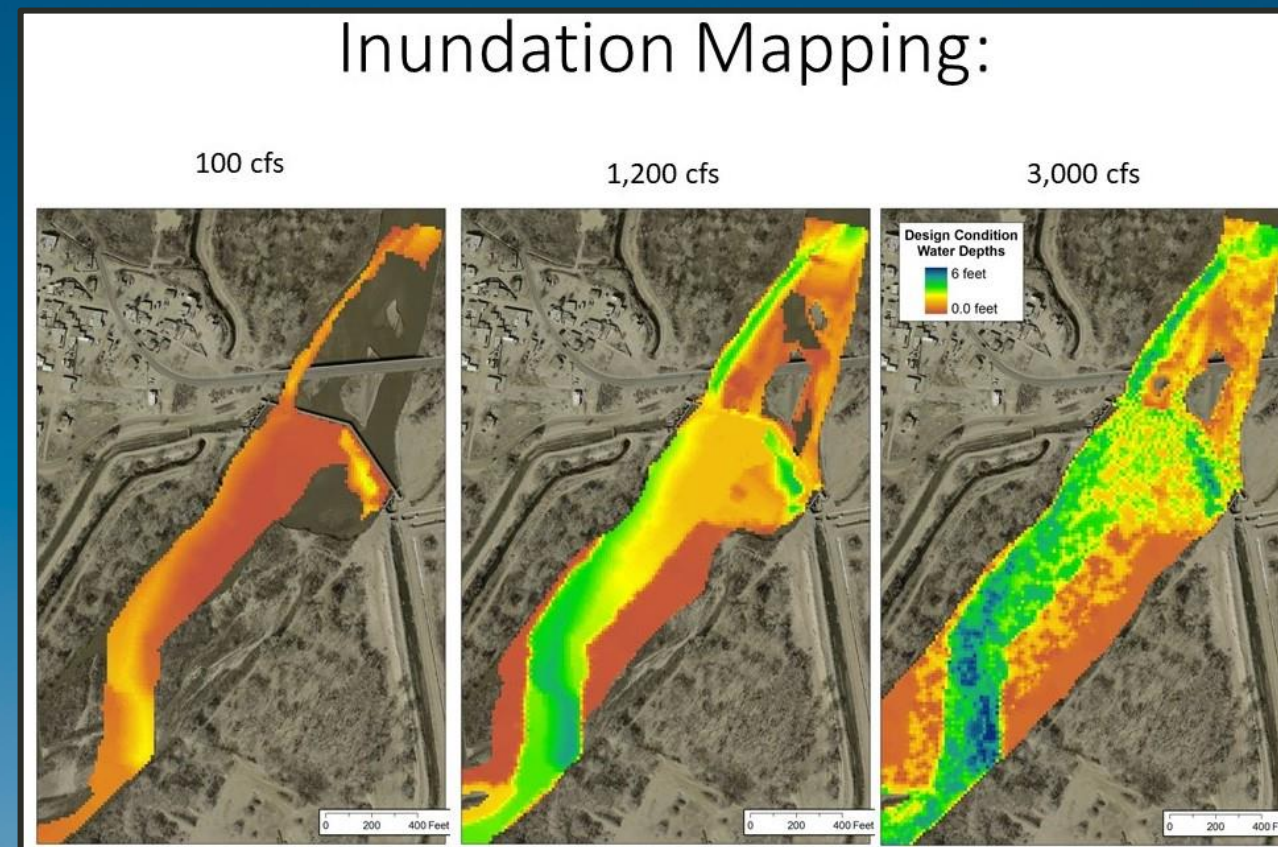
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# How Hydrographic Data is used for Habitat Restoration Projects in the MRG

- **Reach Wide and Site-Specific Habitat Restoration Plans**
  - Floodplain reconnection
  - High flow channels
  - Fish passage
- **Long Term Monitoring**
- **Monitor Geomorphic Change**
  - Bed incision or aggradation
  - Evolution from flat-bottom channel to thalweg channel



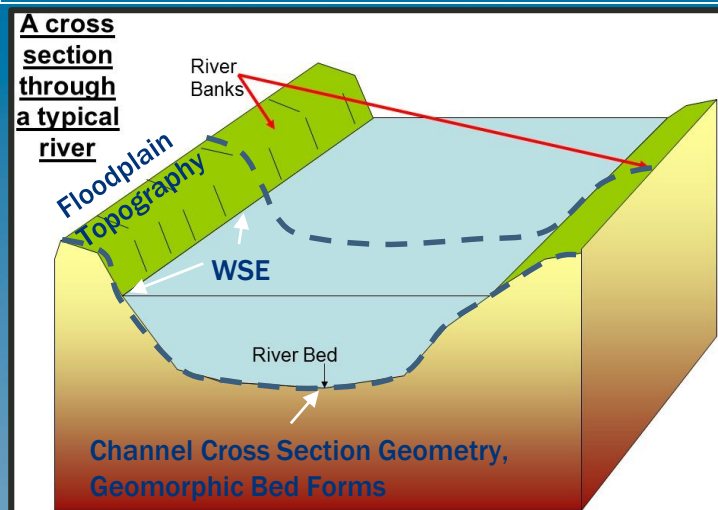




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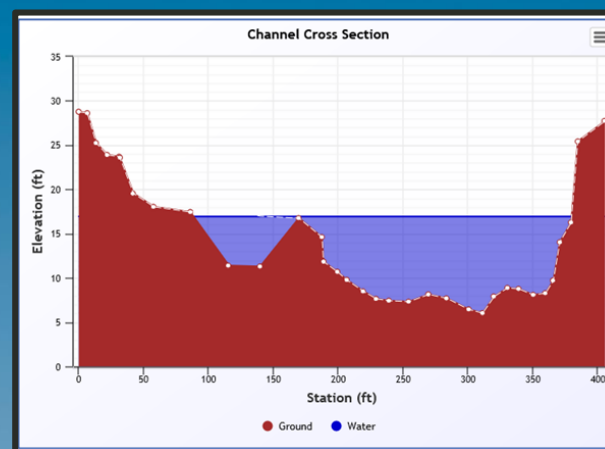
## Data

- XS Geometry
- Floodplain Topography
- Bathymetry
- Water Surface Elevations
- Roughness:
  - Vegetation type/cover
  - Bed material size
  - Geomorphic bed forms



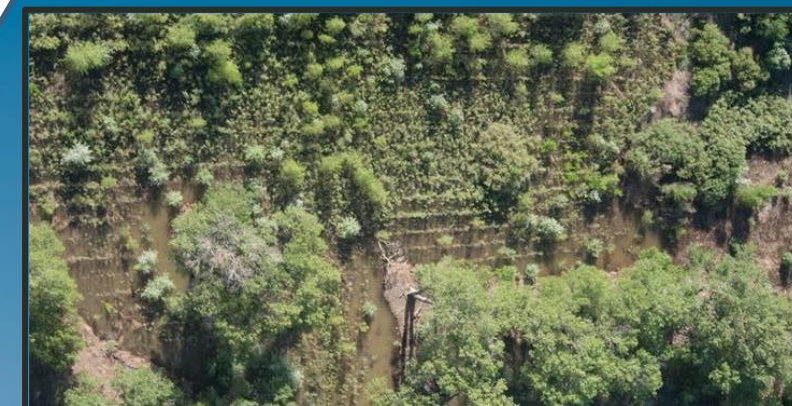
## Tools

- Develop/Calibrate Hydraulic and Sediment Transport Models
- Habitat Models
  - HEAT
  - HEP
  - NMRAM



## Results/Management Implications

- Hydraulic Characteristics
  - Velocity and depth
  - Inundation Extents
  - Habitat Restoration Design
- Fish Passage Evaluations
- Sediment/Erosion Management
- Test Alternatives/Options
- Reduce Uncertainty





# Example Project: Corrales River Mile 199

*Project to reduce meander erosion risk to levees and improve habitat on north side of Corrales*



## Alternative Analysis

Task: Build 2-dimensional hydraulic model to evaluate alternatives for habitat creation and reduction of hydraulic forces

### Data Used

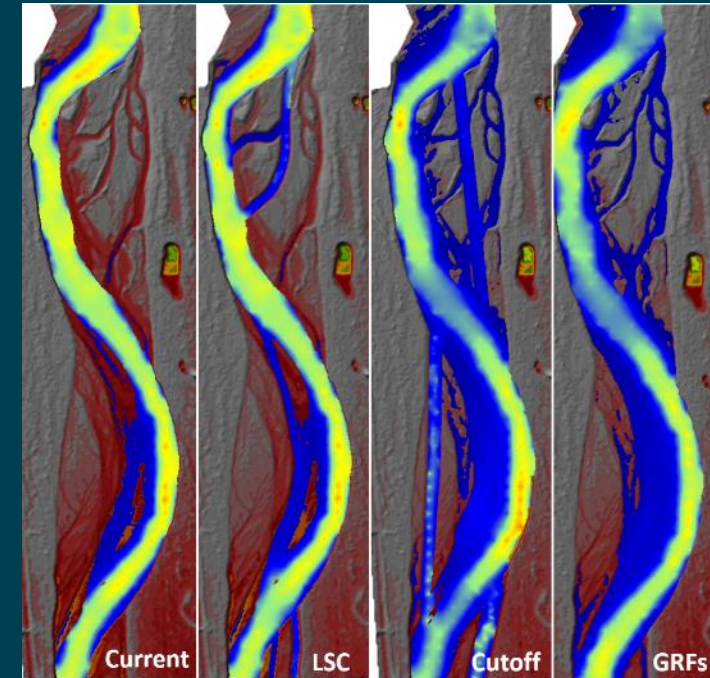
- LiDAR
- Bathymetry (RTK-GPS and sonar)
- Measured water surface elevations (WSEs)

## Reducing Uncertainty

Task: Build 1-dimensional sediment model to reduce uncertainty of preferred alternative's longevity and downstream sediment impacts

### Data Used

- Suspended sediment measurements
- Bed material sample gradations
- Historical cross section changes



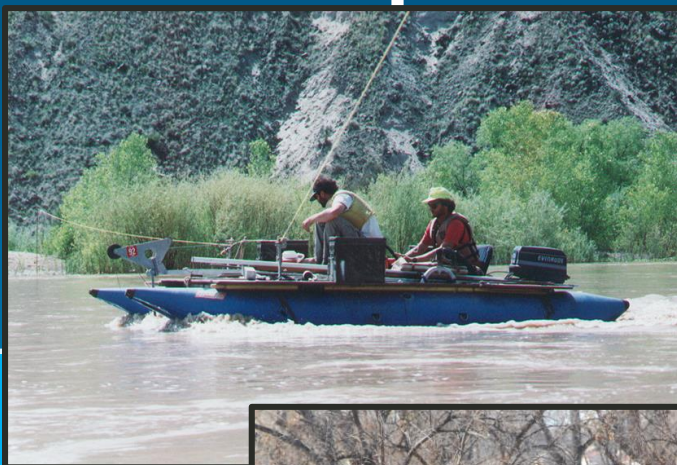




# Hydrographic Data Collection on the Rio Grande

Tag line and level

1990



GPS

2000



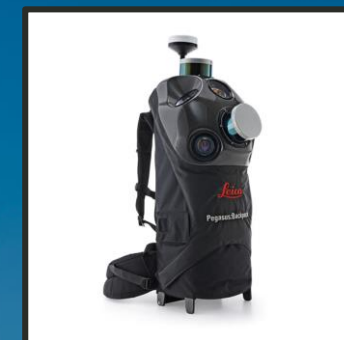
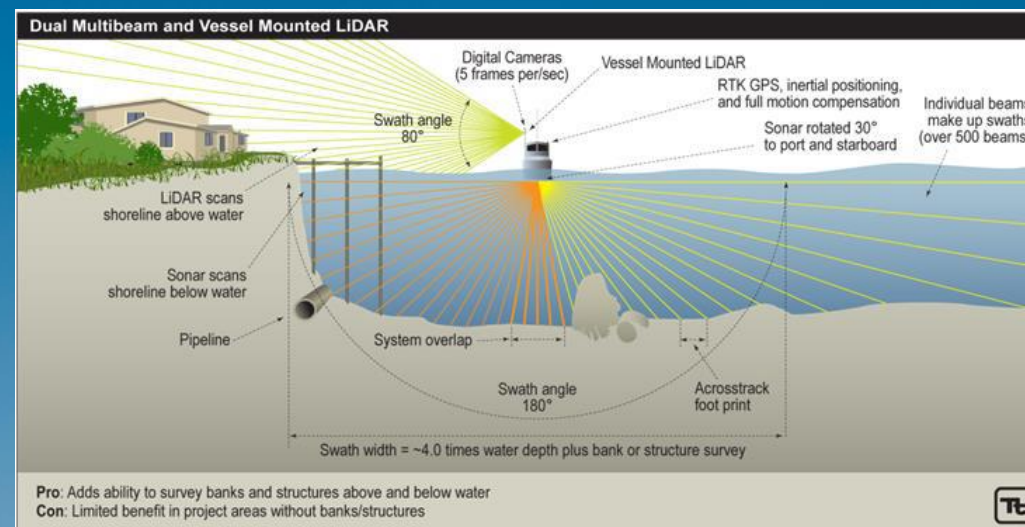




# The **Future** of Hydrographic Data Collection

## LiDAR – Light Detection and Ranging

- Airborne
  - Terrestrial
  - Bathymetric
    - Uses infrared light and green laser
- Terrestrial
  - Mobile – mounted to vehicle, boat, train, or person
  - Static – tripod, scans in all directions
- Combined Lidar and Dual Multi-Beam Sonar



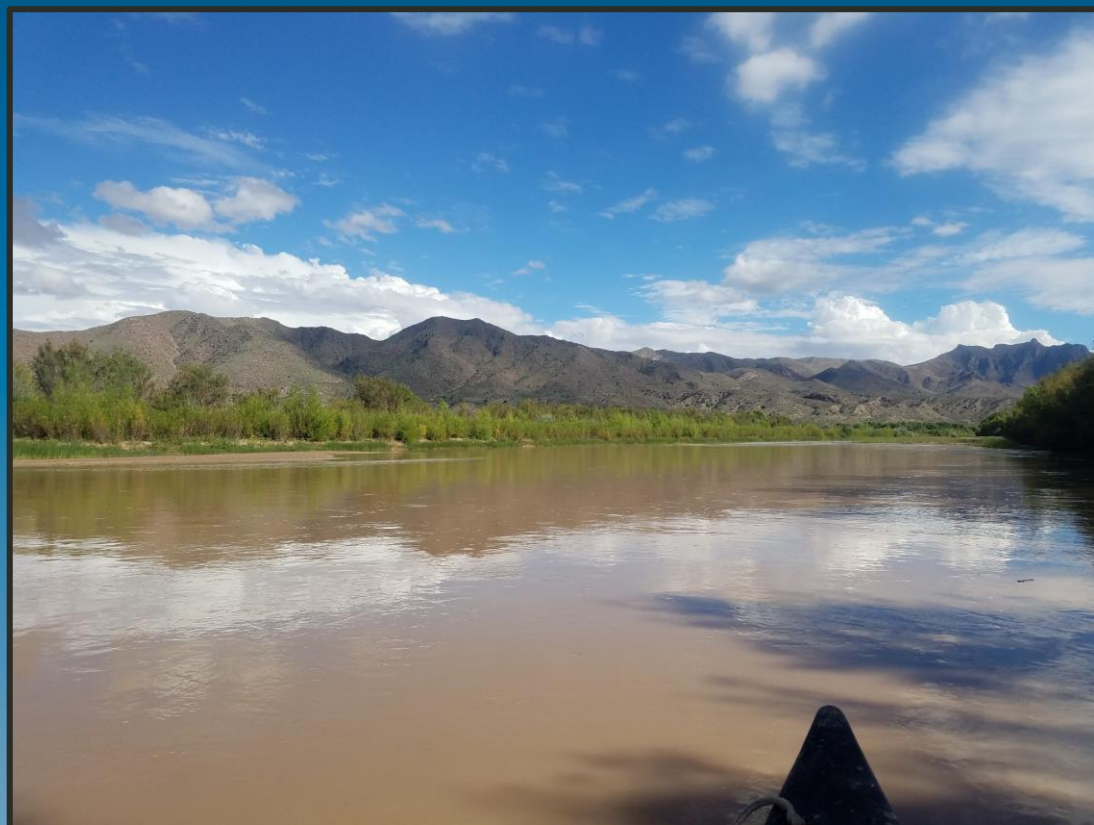




# The **Future** of Hydrographic Data Collection

- **Drawbacks:**

- LiDAR can't penetrate water with high sediment loads



Need to collect bathymetry using on the ground methods (GPS and fathometer)







# Summary

- Hydrographic data in a variety of restoration efforts in the MRG
- Consistent dataset that spans over 30 years
- Data collection techniques have evolved
  - More efficient
  - Can collect more data faster
- MRG requires combination of current and traditional methods







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