Utilizing LiDAR as a Survey Tool on Buckhorn Mountain

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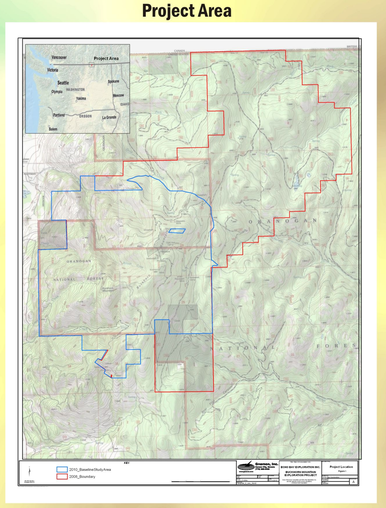
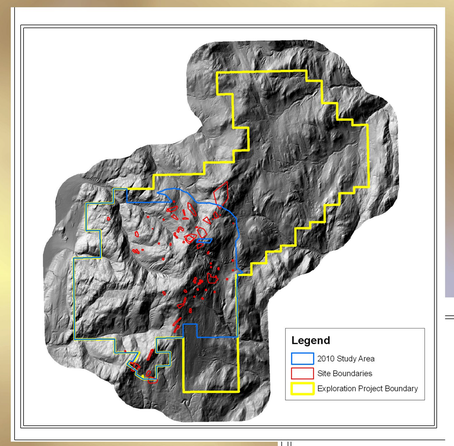
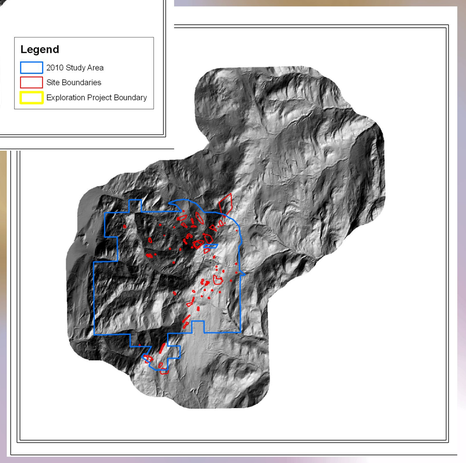
Project Area

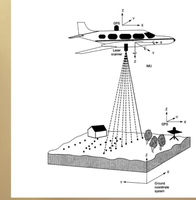


Hillshades Derived from LiDAR





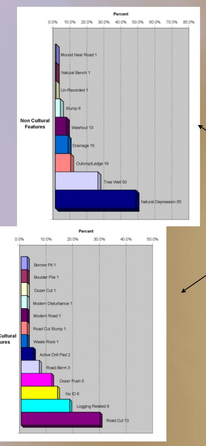
HOW LiDAR DATA IS COLLECTED

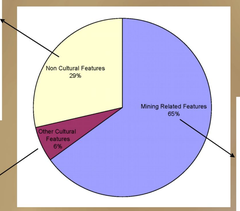


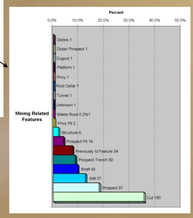
LiDAR Results

- Project area 18,803 acres (100 meter buffer around project boundary
- Collected September 2009 by Watershed Sciences, Inc. Corvallis, OR.
  - Cessna Caravan
  - Leica ALS50 Phase II Laser system
- Flight data indexed to real-time kinematic (RTK) and ground indexed GPS control
- Post processed by Tetra Tech Geomatic Technologies Group
- 505,172,545 points collected
- 8.5 points/square meter
- 7.2 cm vertical accuracy
- Better than 1 meter resolution
- Reveals old roads and cultural features obscured by trees

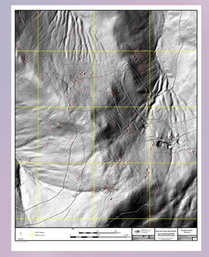
Preliminary Analysis







Analytical Methods

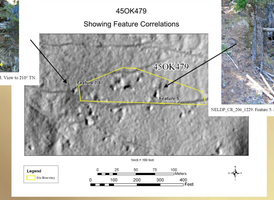


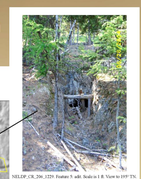
- 2009/2010 Project areas arbitrarily divided into 1000 foot grids
- Each grid visually inspected for surface anomalies
- GIS point placed in center of each anomaly
- 847 LiDAR features identified

Preliminary Assessment of LiDAR Efficacy

Site	Previously Recorded Features	Features Identified with LiDAR	% LiDAR Accuracy	New LiDAR features	Total LiDAR Features	% Increase
45OK479	14	11	78.6%	5	16	14.3%
45OK480	7	6	85.7%	1	7	0.0%
45OK481	4	2	50.0%	1	3	-25.0%
NELDP-0269	1	1	100.0%	0	1	0.0%
NELDP-0270	2	0	0.0%	2	2	0.0%
NELDP-0276	1	1	100.0%	1	2	100.0%
NELDP-0279	24	21	87.5%	22	43	79.2%
NELDP-0281	8	5	62.5%	1	6	-25.0%
NELDP-0282	1	1	100.0%	5	6	500.0%
NELDP-0283	2	1	50.0%	5	6	200.0%
NELDP-0284	2	1	50.0%	2	3	50.0%
NELDP-0285	13	12	92.3%	4	16	23.1%
Total	79	62	78.5%	49	111	40.5%

Feature Correlation





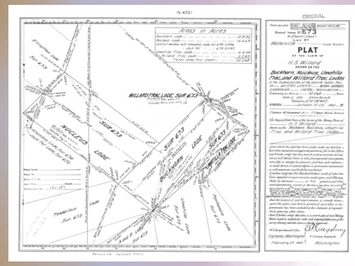
Environmental Constraints

- Steep Slopes
- Heavy Vegetation
- Poor Surface Visibility
- Crew Safety
- Closed Areas/Limited Access

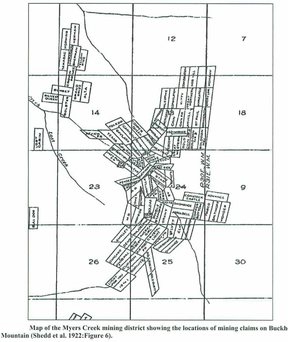
Survey Considerations

- Numerous mining related features were previously identified
- Previous features need to be re-evaluated within a regional Context
- Additional mining related features Expected
- Ground conditions present a hazardous environment and obscure many features
- How can we…
  - Efficiently update existing records;
  - Identify the range of mining related features obscured by vegetation;
  - Accurately record feature and site location;
  - Understand the exploration history and spatial patterning within claim blocks and mining operations?

Mining History

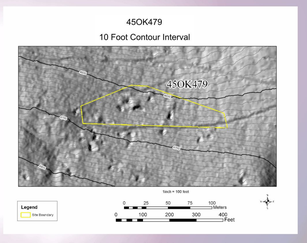


- Placer gold discovered and mined by Chinese prospectors in 1896
- Lode claims followed in uplands
- Myers Creek Mining District
- Peak production between 1900 and 1922



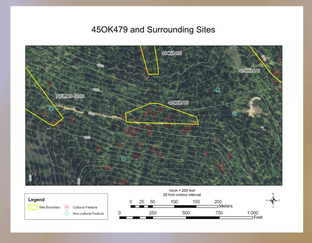
Map of the Myers Creek mining district showing the locations of mining claims on Buckhorn Mountain (Shedd et al. 1922:Figure 6).

Detailed Contour Mapping

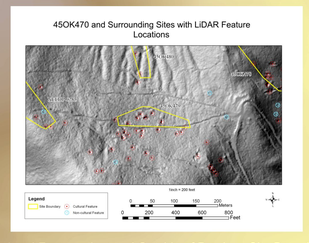


Provides Detailed Hypsography

Masking due to Vegetation and Slope



Larger Recordation Issue



Cultural Features Located Outside of Previous Site Boundaries

Conclusions

- Reliably displays features
- Provides field archaeologist with sufficient information to locate features
- Field verification and maping accuracy aids planning and management efforts
- Cost effective
  - Results can be used by a number of disciplines
  - Around $3.00 per acre
  - Economy of scale
- **LiDAR is an effective tool for locating historic mining features especially in areas of poor surface visibility**

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TETRA TECH

Watershed Sciences

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