

# Availability of LiDAR data in Washington State

*LiDAR Workshop January 3rd 2008*

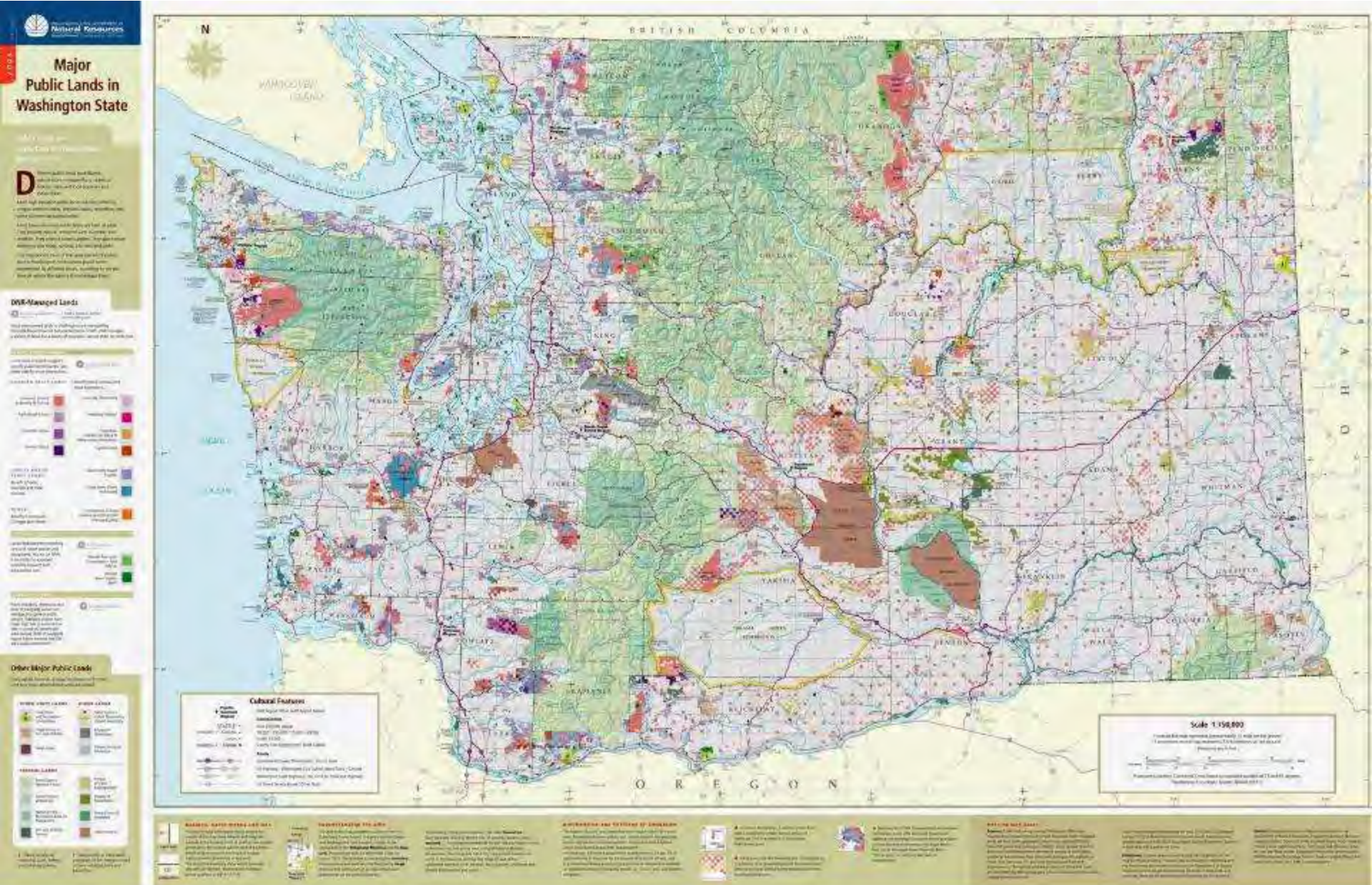
*Terry Curtis, C.P.*

*Photogrammetry Supervisor*

*Wash. Dept. of Natural Resources*

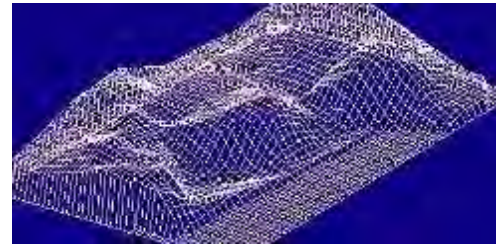
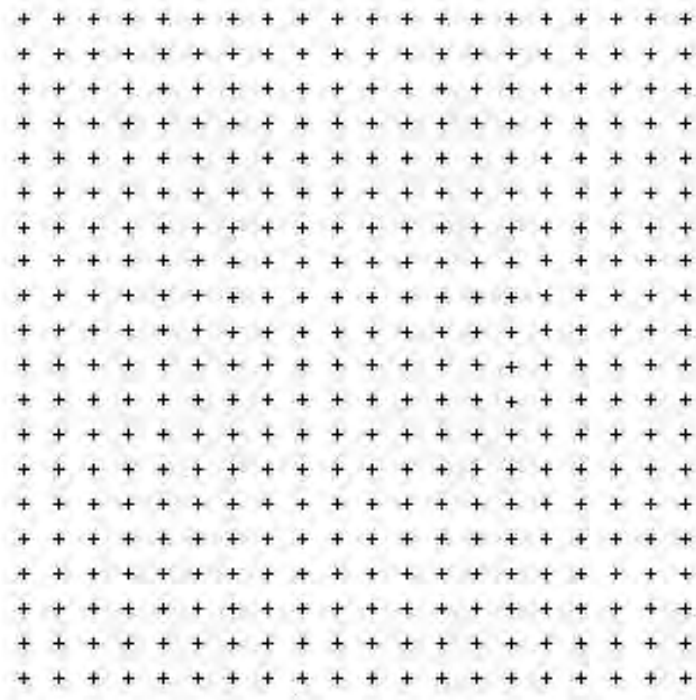
# DNR - Land Management and Regulation

## 5 Million acres of Trust Lands

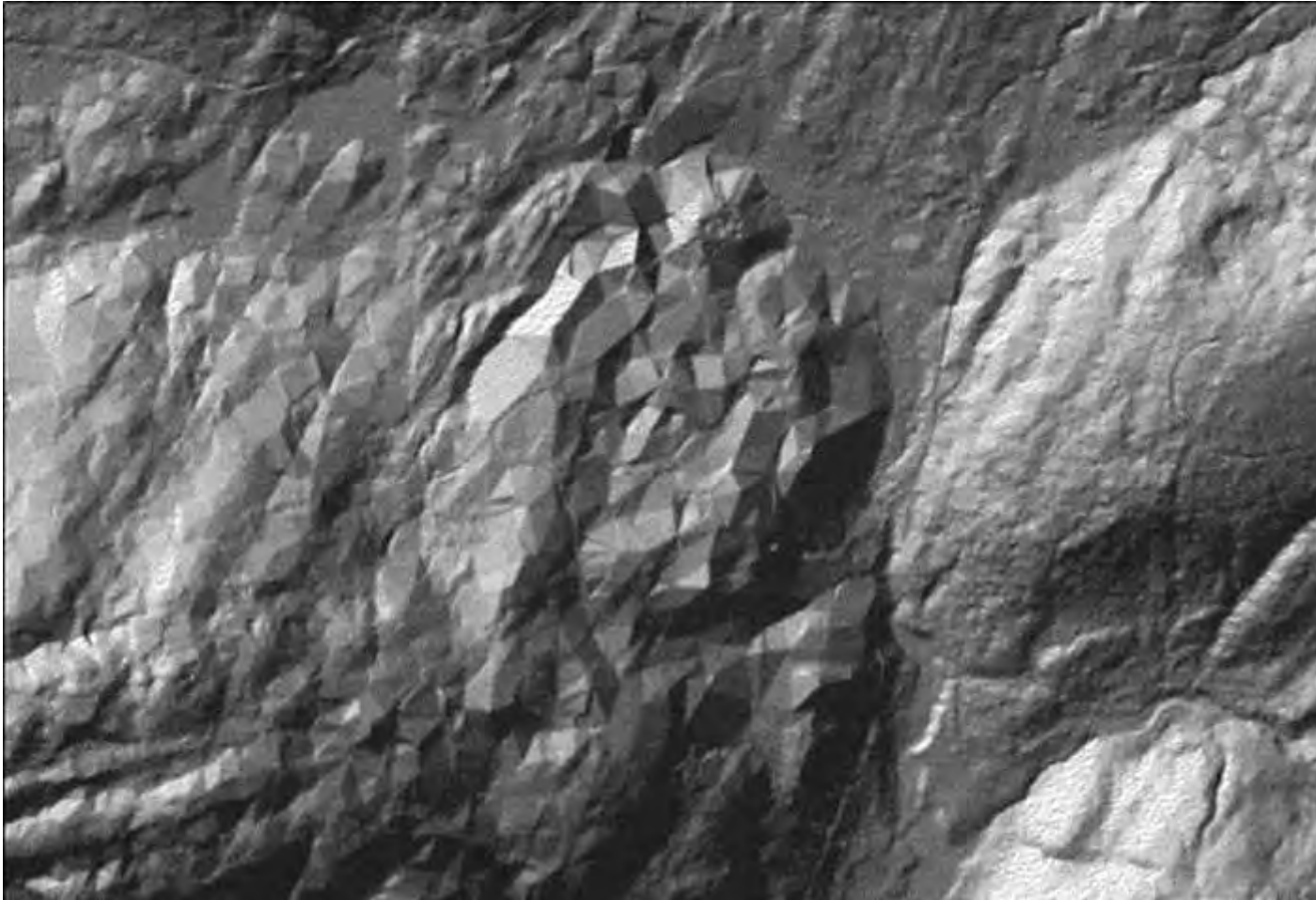


# Some LiDAR Misconceptions

- LiDAR data is **NOT** “Imagery”
- It’s just a bunch of elevation POINTS.....

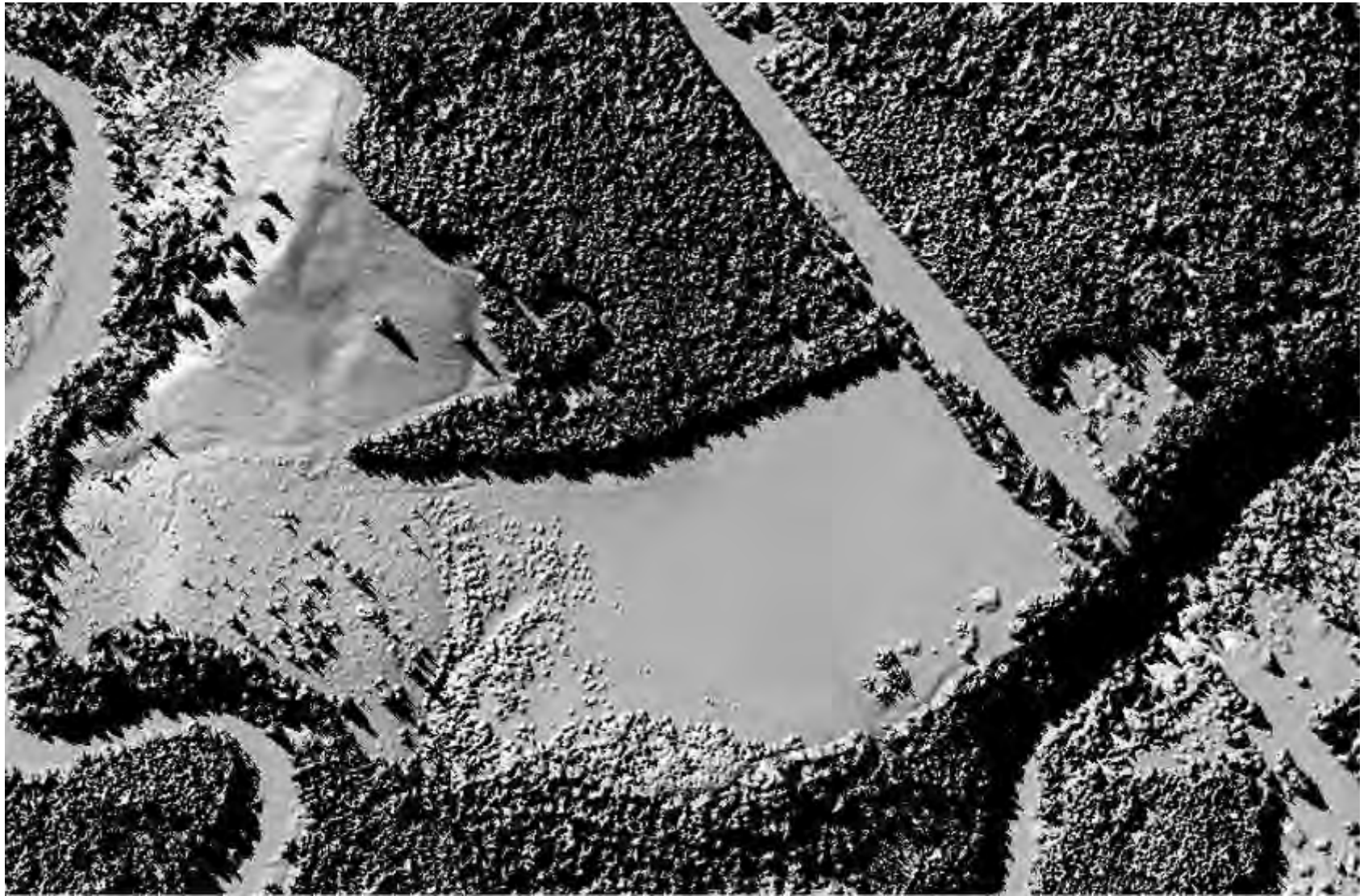


- LiDAR data is NOT “perfect”...
- Vegetation is the enemy



- **LiDAR does NOT replace Aerial Photography**
- Aerial photography contains true SPECTRAL information and actual IMAGERY, and should be used in conjunction with LiDAR.







- **LiDAR data isn't "FREE"**

- Yes, there is some Publicly available or Public Domain data
- SOMEONE had to pay for it initially
- LiDAR is EXPENSIVE !!

Puget Sound Lidar Consortium

**Approx Pricing for *CONTIGUOUS, BLOCKED-UP* project areas**

Also subject to additional 10% fee for Contract Admin and data QC

Collection size	per acre	per sq mile	sample proj size	cost
>50 sq mi	\$1.34	\$857.60	75 sq mi	\$64,320.00
>100 sq mi	\$1.00	\$640.00	125 sq mi	\$80,000.00
>150 sq mi	\$0.84	\$537.60	175 sq mi	\$94,080.00
>200 sq mi	\$0.74	\$473.60	225 sq mi	\$106,560.00
>250 sq mi	\$0.67	\$428.80	275 sq mi	\$117,920.00



# WHERE can I obtain existing LiDAR data ??

- Counties
- Federal Agencies (USGS, NOAA)
- Other Public Agencies
- Private Companies (good luck!)
- **Puget Sound LiDAR Consortium (PSLC)**

## Puget Sound Lidar Consortium

*public-domain high-resolution topography for western Washington*

[Data!](#)

[About  
LiDAR](#)

[About  
the  
PSLC](#)

[Uses of  
LiDAR  
Data](#)

[Links](#)

[Contact  
Us](#)



Seattle  
Public  
Utilities



PRISM



Oblique view of south end of Rockaway Beach,  
SE Bainbridge Island.

[More examples of LiDAR topography](#)





















USGS  
science for a changing world



WASHINGTON STATE DEPARTMENT OF  
Natural Resources

# History of LiDAR in DNWR 1996 - Present

## July 10, 2007

-  PSLC 2007
-  PSLC 2006
-  PSLC 2005
-  PSLC 2004
-  PSLC 2003
-  PSLC 2002
-  PSLC 2001
-  PSLC 2000
-  Clallam Co. 2001
-  KPUD 1996-97
-  PSLC2007 - Not Complete
-  Snohomish County 2006
-  NASA USGS 2003-2004
-  King County 2003
-  USGS Snoqualmie Survey
-  Washington Counties
-  Oregon Counties
-  canada\_spn83

**KPUD Bainbridge Island survey:** Flown winter 1996-1997. About 1 pulse/m<sup>2</sup>. Only Bare earth DEM and last returns available. \*

**USGS Snoqualmie Valley Survey:** Flown in late September-early October 1998, largely reflown in early September 1999. About 0.3 pulse/m<sup>2</sup>. Only last returns available. \*

**PSLC 1st-year contract (2000):** Flown early 2000 and early 2001. About 1 pulse/m<sup>2</sup>, up to 4 returns/pulse, all-return data available. \*

**PSLC 2nd-year contract (2001):** Flown early 2001, with early 2002 rework. Pulse spacing varies from 0.5 to 1 pulse/m<sup>2</sup>, up to 4 returns/pulse, all-return data is available. \*

**Clallam County contract (2001):** Flown under separate contract and includes coverage of area around Forks.\*

**PSLC 3rd-year contract (2002):** Flown early in 2002. About 1 pulse/m<sup>2</sup>, up to 4 returns/pulse, all-return data is available. \*

**PSLC 4th-year contract (2003):** Datasets for Snohomish Co., Yakima Co. and Lewis Co. were flown early in 2003. The Pierce County data was flown during winter in 2004. About 1 pulse/m<sup>2</sup>, up to 4 returns/pulse, all-return data is available. \*

**PSLC 5th-year contract (2004):** Datasets for Portland, Oregon was flown winter 2004. About 1 pulse/m<sup>2</sup>, up to 4 returns/pulse, all-return data is available. The Lower Columbia River and other surrounding areas will be flown winter 2005. \*

**PSLC 6th-year contract (2005):** The Lower Columbia River and other surrounding areas were flown winter 2005. About 1 pulse/m<sup>2</sup>, up to 4 returns/pulse, all-return data is available. \*

**PSLC 7th-year contract (2006):** More Lewis County Data was flown in late winter of 2006. The project was not completed and data collection will be resumed fall06/winter07. The data that was completed in early 2006 is available. About 4.5 pulse/m<sup>2</sup>, up to 4 returns/pulse, all-return data is available. \*\*

**PSLC 8th-year contract (2007):** Part of the 2006 Lewis county project was flown and the rest will be flown in fall 2007. A series of river corridors in Eastern Washington and Easter Oregon where completed and are available. The Portland Metro area put together one large project of about 1,600 square miles. A large section of this was flown in the winter of 2007. This data will be available late in 2007. The rest of the project will be flown in fall 2007. About 6.5 pts/m<sup>2</sup>, up to 4 returns/pulse, all-return data is available. \*\*

**King County 2003 Data:** This dataset was contracted by King County GIS. The PSLC is not distributing this data. Contact King County GIS at [www.metrokc.gov/gis/](http://www.metrokc.gov/gis/).

**Snohomish County 2006 Data:** This dataset was contracted by Snohomish County. The specifications for this project are very similar to the PSLC. The PSLC was provided with the data for general distribution. It can be found in the Consortium's main data download page under "LiDAR Data from other Agencies (Non-PSLC contract)". \*

\* Data collected by TerraPoint.

\*\* Data collected by Watershed Sciences.



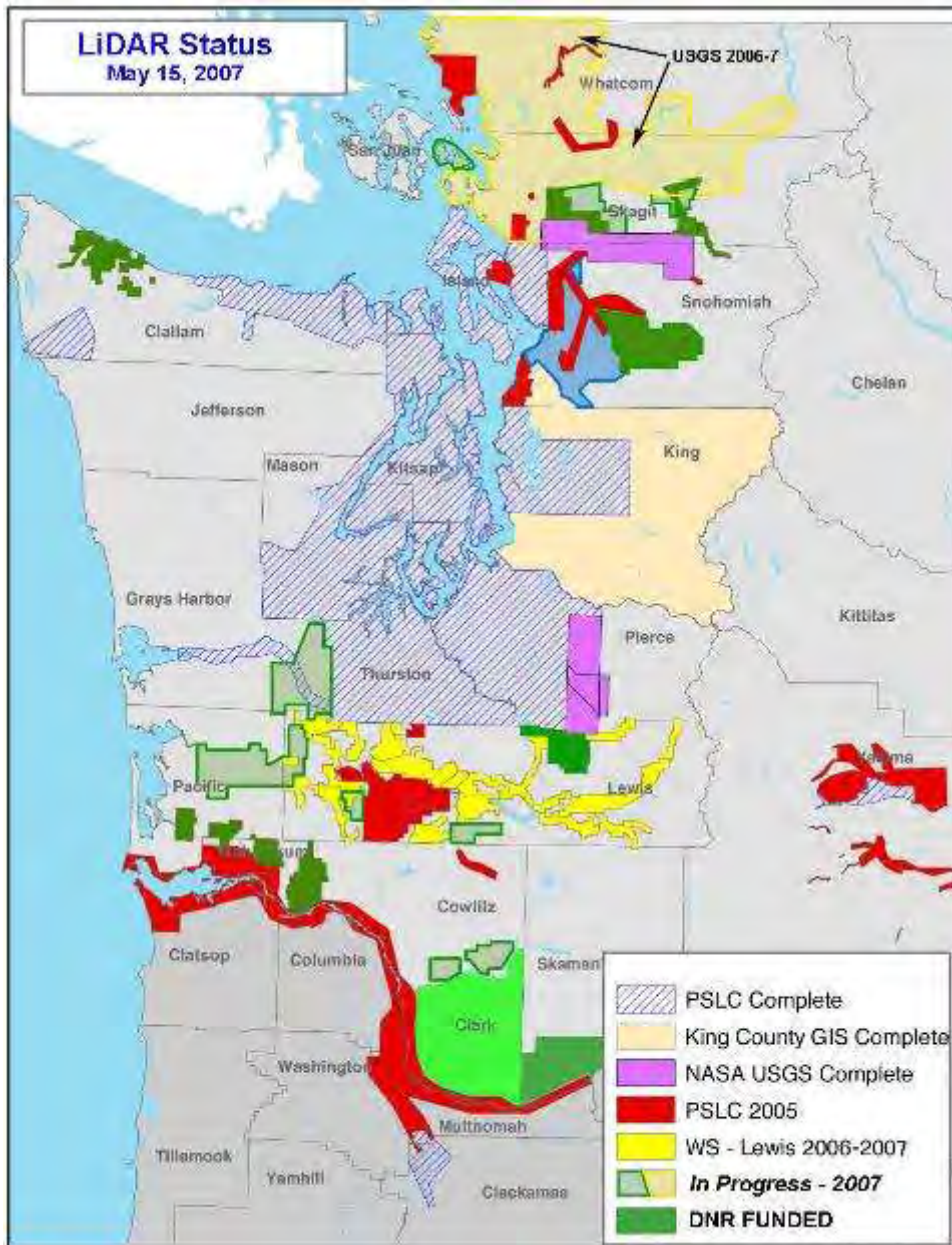
# Current BASIC data specifications

## Watershed Sciences – Puget Sound Lidar Consortium Lidar Survey Specifications

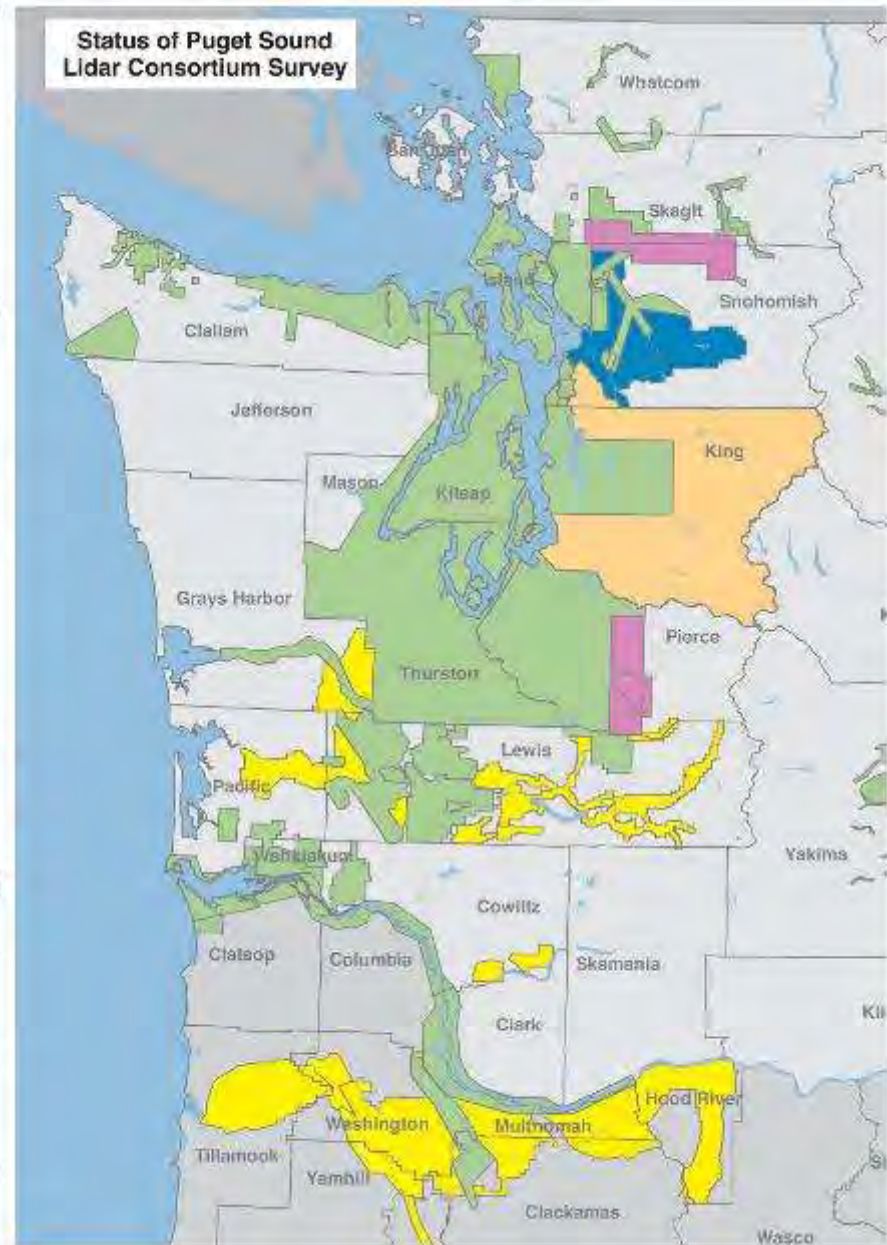
<b>Data acquisition</b>	<i>Survey Design</i>	<i>Minimum requirements<sup>1</sup></i>
Laser pulse rate	Up to 116,000 pulses per second	
Returns per pulse	Up to 4	First and last (up to 2)
On-ground laser beam diameter	approx 25 cm	Between 10 cm and 100 cm
Scan angle	+13 degrees	≤ +20 degrees
Aircraft altitude	800 m above ground	
Aircraft speed	105 knots	
Ground swath width	<500 meters	
Swath overlap	50% sidelap (100% overlap)	No voids between swaths. No voids because of cloud cover or instrument failure. <20% no-overlap area per project. No arbitrary 1 km x 1 km square with >50% no-overlap area
Aggregate pulse density	>8/m <sup>2</sup>	Barring non-reflective areas (e.g., open water, wet asphalt): <ul style="list-style-type: none"> <li>• ≥85% design pulse density for entire project area.</li> <li>• Within areas of swath overlap, no 30m x 30m area with &lt;50% design pulse density</li> </ul>
Flight line direction	Opposing	
GPS base-line length	≤24 km	
GPS PDOP	≤3.0, ≥6 satellites in view	≤3.5, ≥6 satellites in view
Survey conditions		Leaf-off and no significant snow cover at discretion of Puget Sound Lidar Consortium
<b>Accuracy</b>	<i>Survey Design</i>	<i>Minimum requirements</i>
Absolute accuracy	<13 cm vertical, <10 cm horizontal (RMSE) <sup>2</sup>	≤20 cm vertical (RMSE) <sup>3</sup>



**LiDAR Status**  
May 15, 2007



**Status of Puget Sound Lidar Consortium Survey**

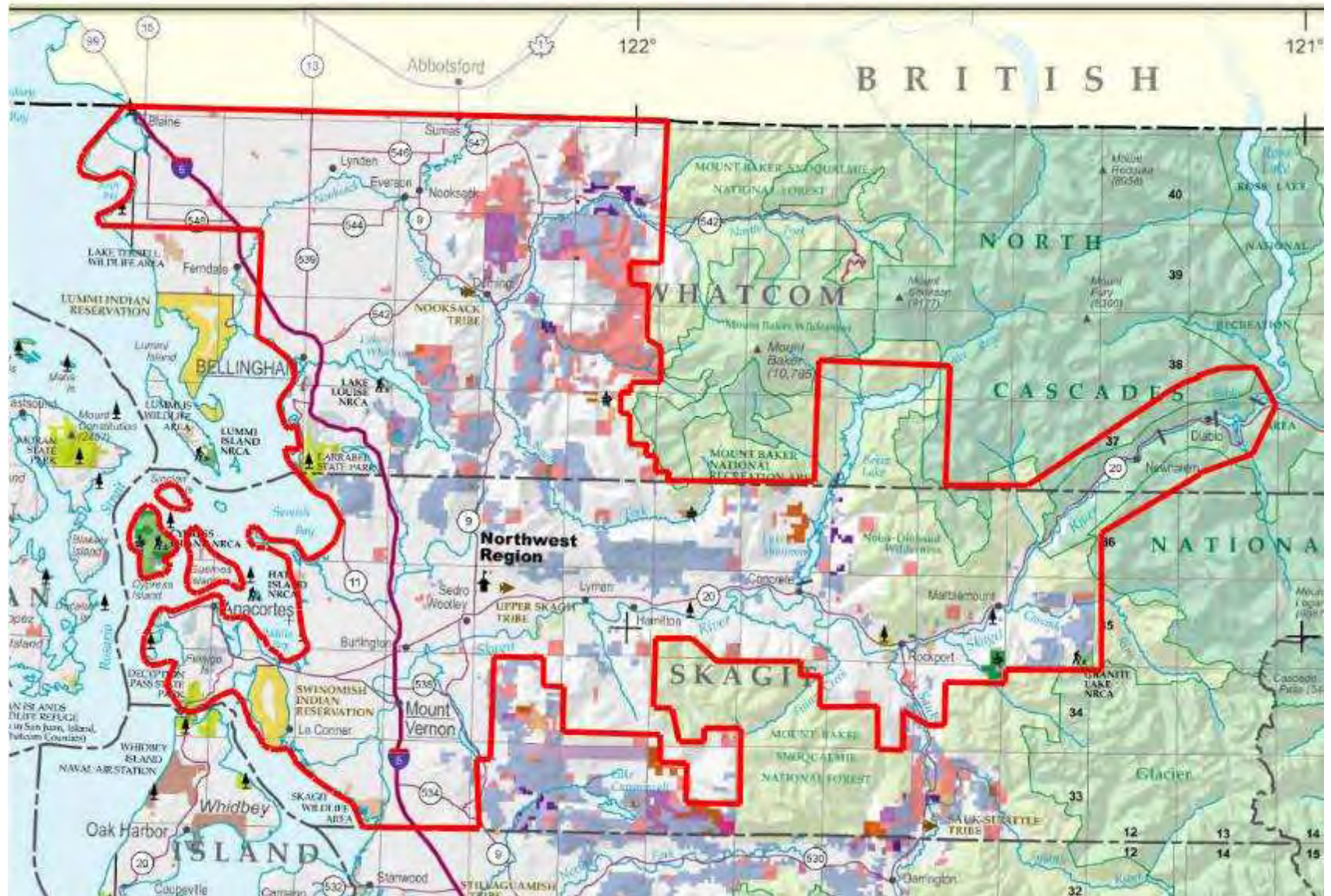


# Known NON-PSLC Data Available, Planned, or In Progress

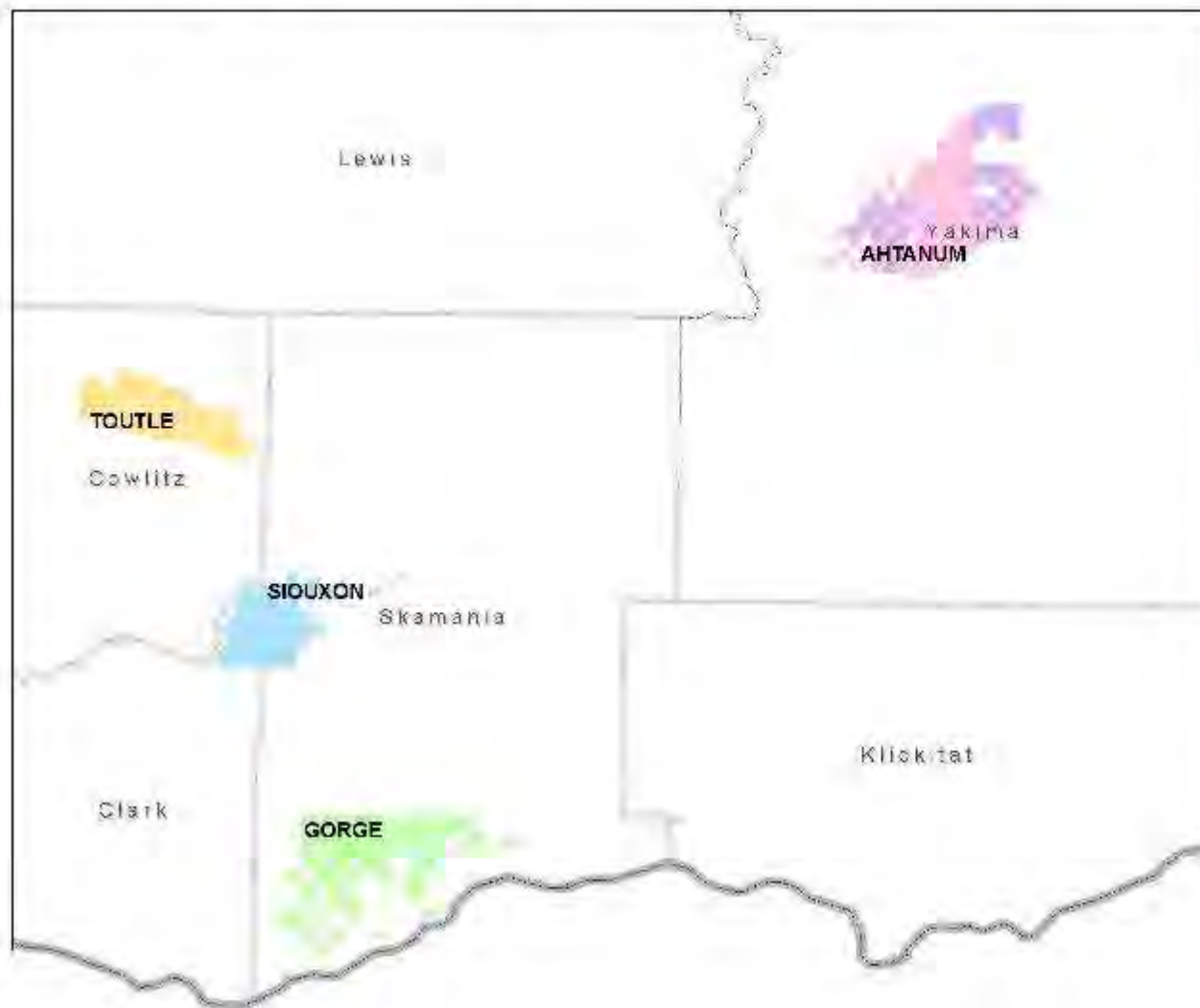
- USGS/DNR Skagit/Whatcom Project
- DNR Forest Inventory Blocks
- San Juan County
- Spokane County/Avista



# USGS/DNR Skagit / Whatcom LIDAR 2006-2007



# DNR - ImageTree LiDAR Inventory Project 2006



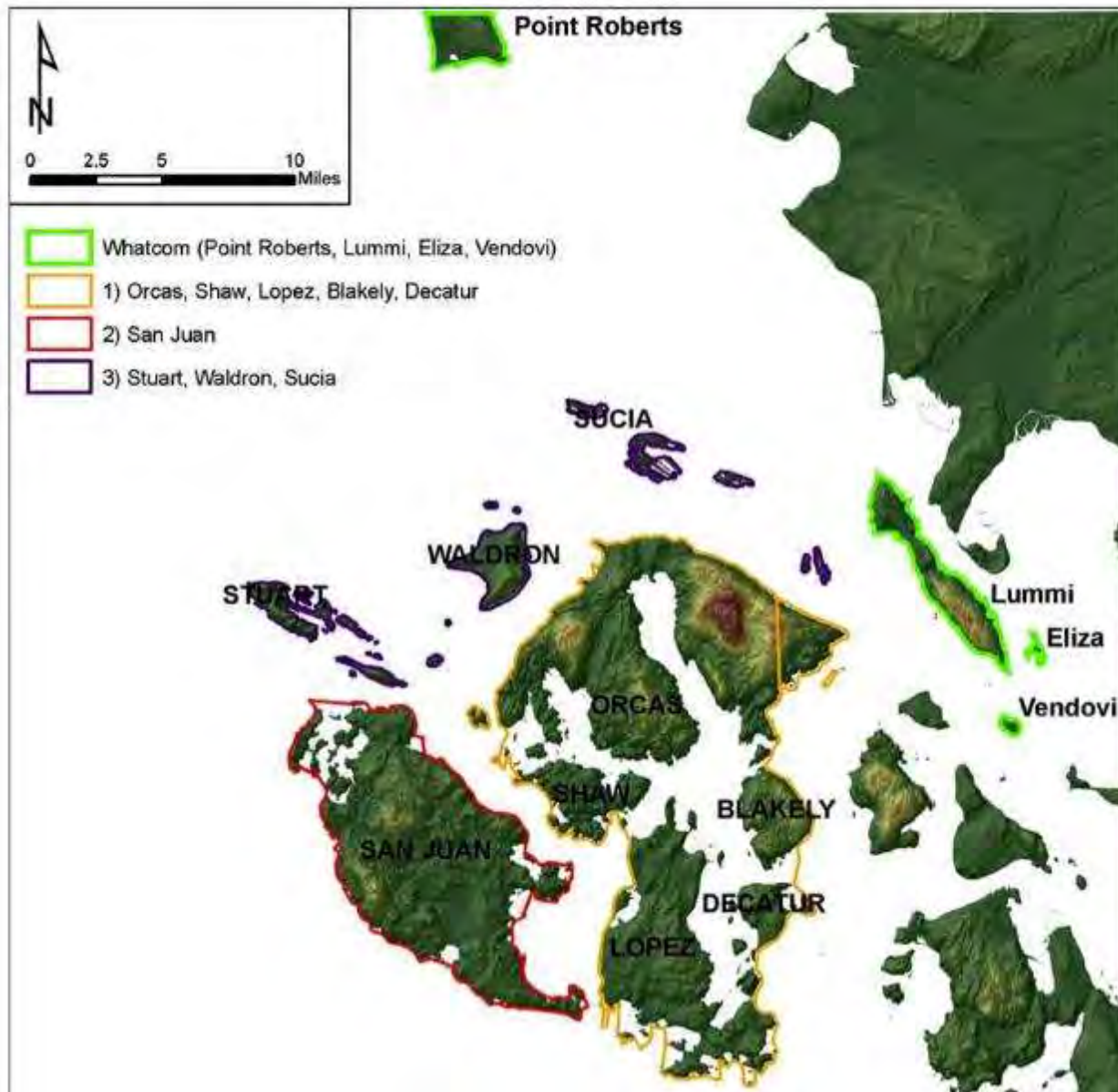
## Legend

### Block\_name

- AHTANUM
- GORGE
- SIOUXON
- TOUTLE
- Ahtanum\_Exchange
- County Boundaries

Block	Acres (rev 9/20/06)
Gorge	54,835
Siouxon	33,224
Toutle	37,405
Ahtanum	58,101
Ahtanum Exchange	21,755
TOT	205,320

# Proposed LiDAR data acquisition areas in the San Juan Islands.



# What if no LiDAR data exists for my project ?

- Issue your own RFP for LiDAR acquisition
- Look for PARTNERS to reduce costs
- Economy of scale - larger area = lower unit cost
- **PLAN AHEAD** - a MINIMUM of one full year
- Few local vendors or vendors with WA experience
- Be wary of low-cost proposals
- **Can use PSLC/Kitsap County CONTRACT**

Established specs and pricing

They do the contract admin and QA/QC

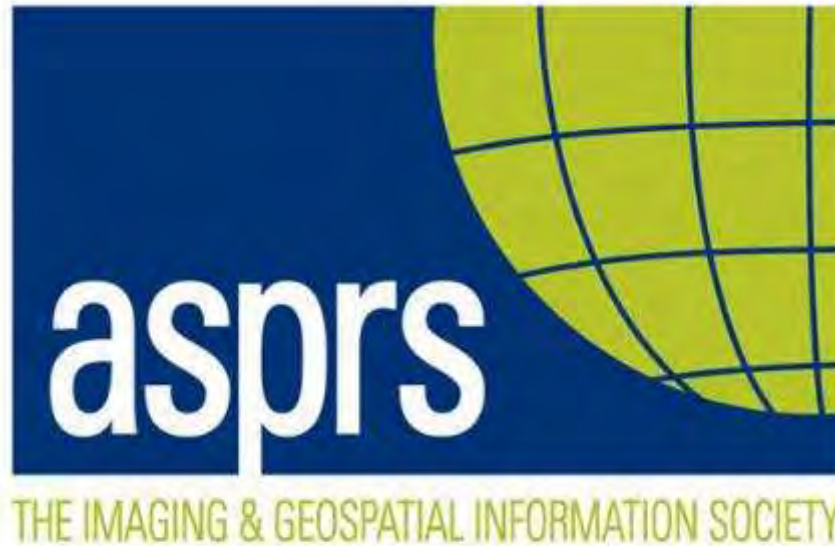
Proven track record - knowledgeable scientists and staff

***Where can I learn more about ....***

***LiDAR Technology ?***

***LiDAR Applications ?***

***LiDAR Vendors ?***

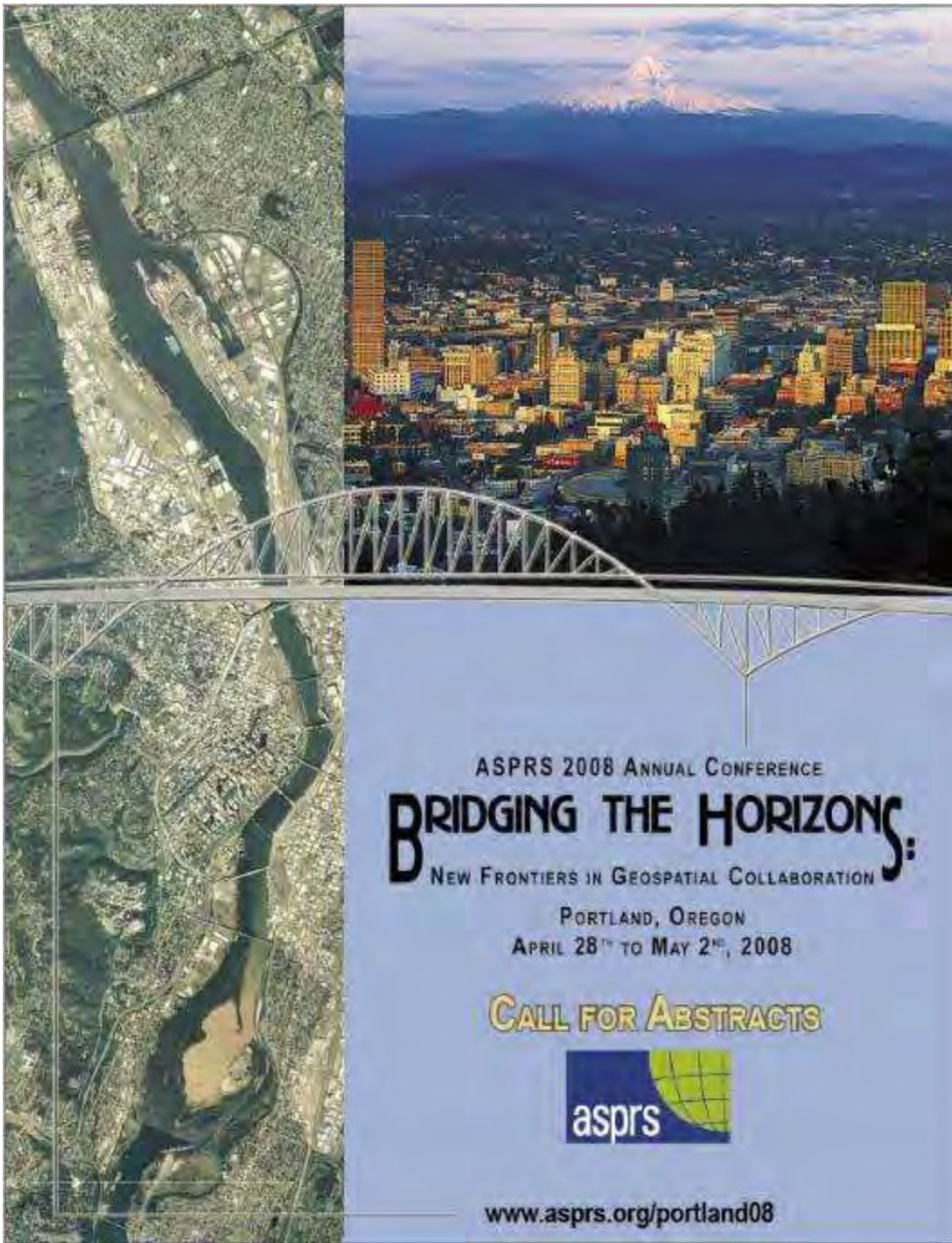


***American Society for Photogrammetry and Remote Sensing***

***[www.asprs.org](http://www.asprs.org)***



Caring for  
your natural resources...  
now and forever



ASPRS 2008 ANNUAL CONFERENCE

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NEW FRONTIERS IN GEOSPATIAL COLLABORATION

PORTLAND, OREGON

APRIL 28<sup>TH</sup> TO MAY 2<sup>ND</sup>, 2008

**CALL FOR ABSTRACTS**



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