TRUE-COLOR ORTHOPHOTOGRAPHS

WEISER RIVER BASIN • IDAHO

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IDAHO DEPARTMENT OF WATER RESOURCES

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TRUE-COLOR ORTHOPHOTOGRAPHS
AIRBORNE DATA ACQUISITION AND PROCESSING:
WEISER RIVER BASIN, ID

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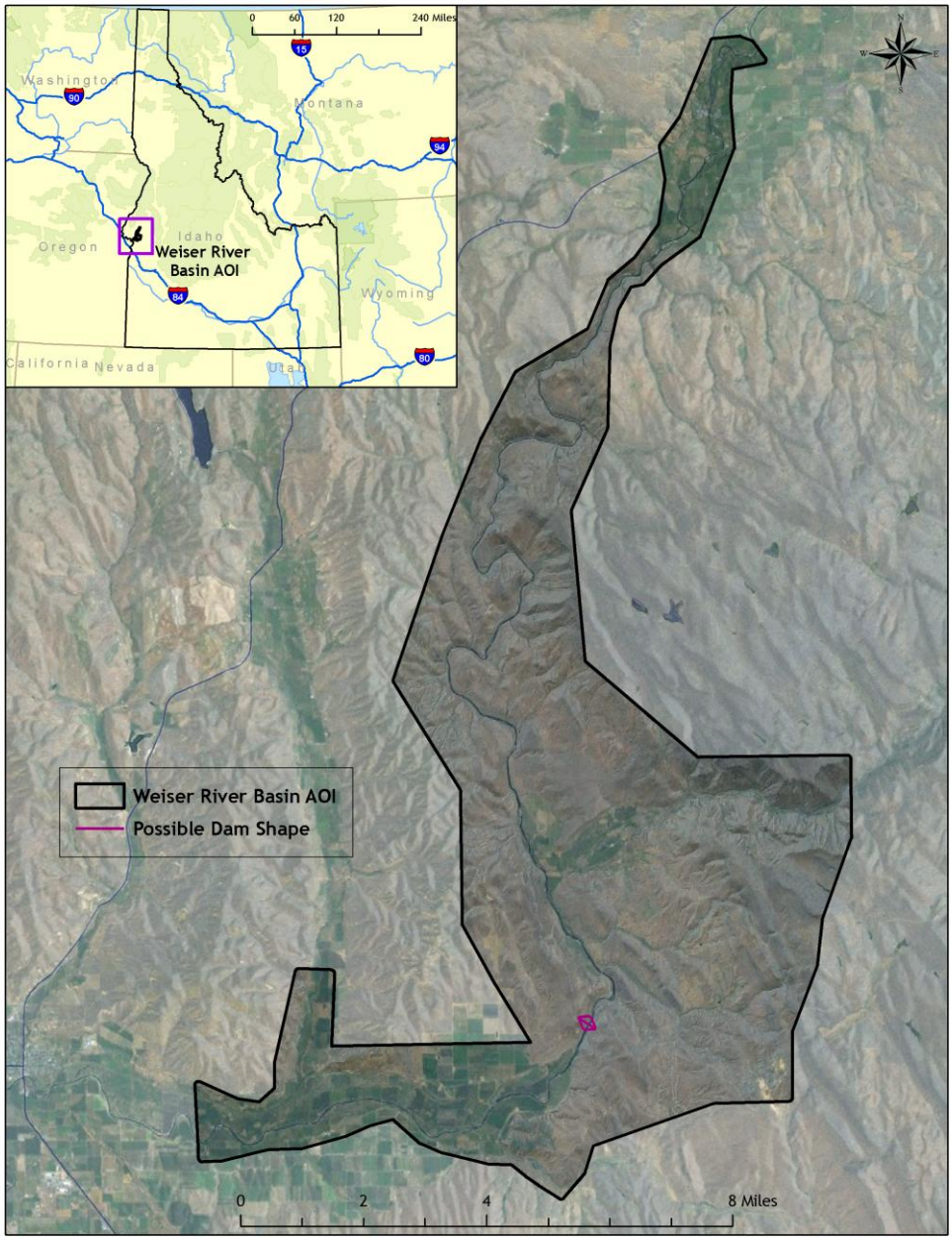
1. Overview

Watershed Sciences, Inc. (WS) initially collected Light Detection and Ranging (LiDAR) data for the Weiser River Basin on December 9th and 10th, 2011. On December 12th, 2011, 3DI West (GeoTerra Mapping Group) collected and then processed orthoimagery for the Weiser River Basin Survey area. This report documents the data acquisition, accuracy assessment, and deliverables for those photos.

Figure 1. *Weiser River Basin survey area.*



2. Orthophoto Acquisition

All photos were acquired as 3-band RGB TIF format. The photo acquisition parameters are summarized in Table 1.

Table 1.

Date Flown:	December 12th, 2011
	Day 346
Camera:	Vexcel Ultra Cam X
Calibrated Focal Length:	100.500 mm
Photo Overlap	60%
Photo Sidelap	30%
Pixel Resolution	0.3 meters

3. Orthophoto Processing and Results

3.1 Processing

All imagery was orthorectified to the bare earth LiDAR surface produced by 3DI. LiDAR intensity images were used to identify checkpoints used to measure photo accuracy and ensure co-registration with the LiDAR. (**Figure 2**) Individual image frames were combined into one seamless mosaic then subset into tiles to make the file size more manageable. (**Figure 5**)

3.2 Accuracy

3DI has produced the resulting orthoimagery to meet the National Map Accuracy Standards summarized below:

- Horizontal Accuracy: 1:2400 not more than 10% of all well-defined planimetric features are in error by more than 1.219 m
- Optimal viewing at 1:2400
    - Performing quality control or plotting images at scales larger than 1:1200 is not recommended.
    - Anomalies observable only at scales larger than 1:1200 are considered to fall outside the specifications of this project.

To assess spatial accuracy of the orthophotographs they are compared against checkpoints identified from the LIDAR intensity images. The checkpoints were measured on surface

features such as painted road-lines and fixed high contrast objects on the ground surface. RTK checkpoints were also collected in locations where the ground is clearly visible from the sky during acquisition. The accuracy of the final mosaic, expressed as root mean square error (RMSE), was calculated in relation to the RTK positions and LiDAR-derived control points. The accuracy of the final mosaic, expressed as root mean square error (RMSE), was calculated in relation to the LiDAR-derived checkpoints. **Figure 2** displays the co-registration between orthorectified imagery and LiDAR intensity images.

***Figure 2**. Examples of co-registration of 3DI color images with WSI LiDAR intensity images.*

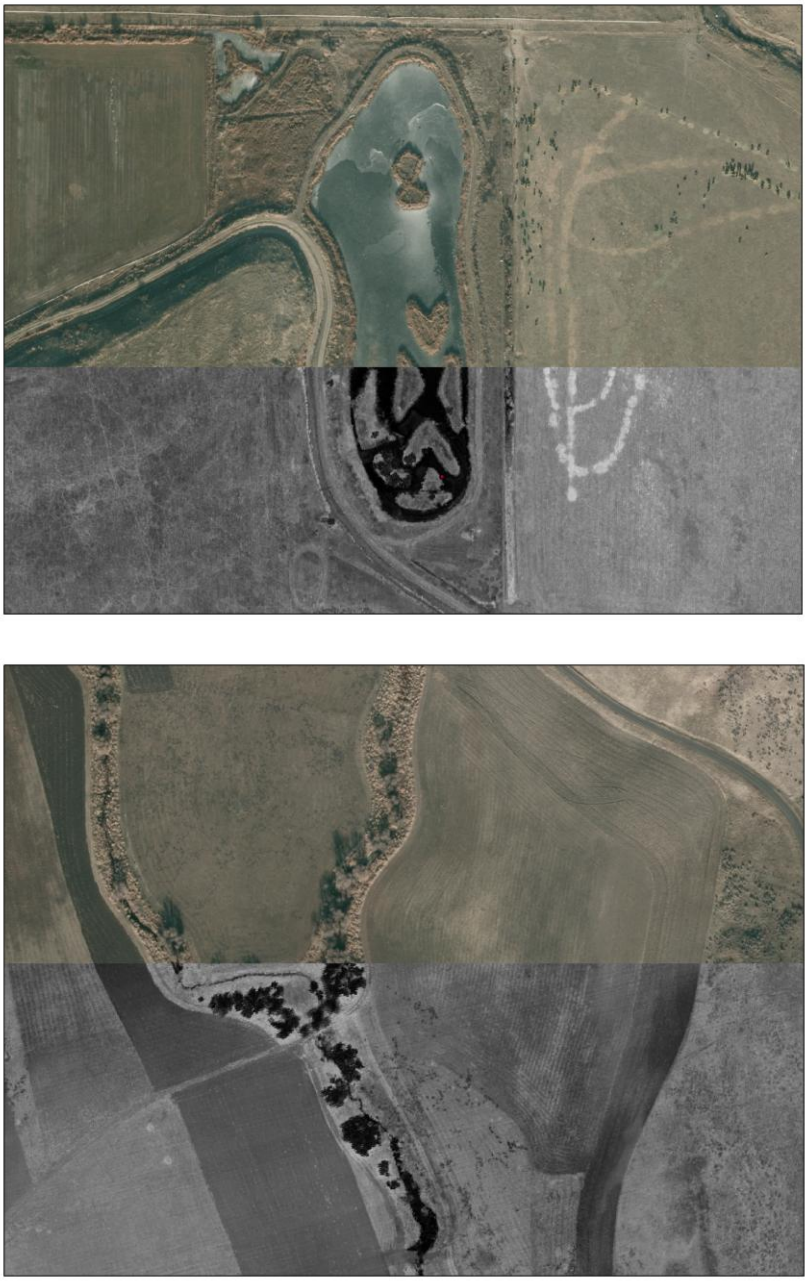


Figure 3. *Orthophotographs for the Weiser River Basin survey area displayed with accuracy checkpoints identified from the LiDAR intensity images.*

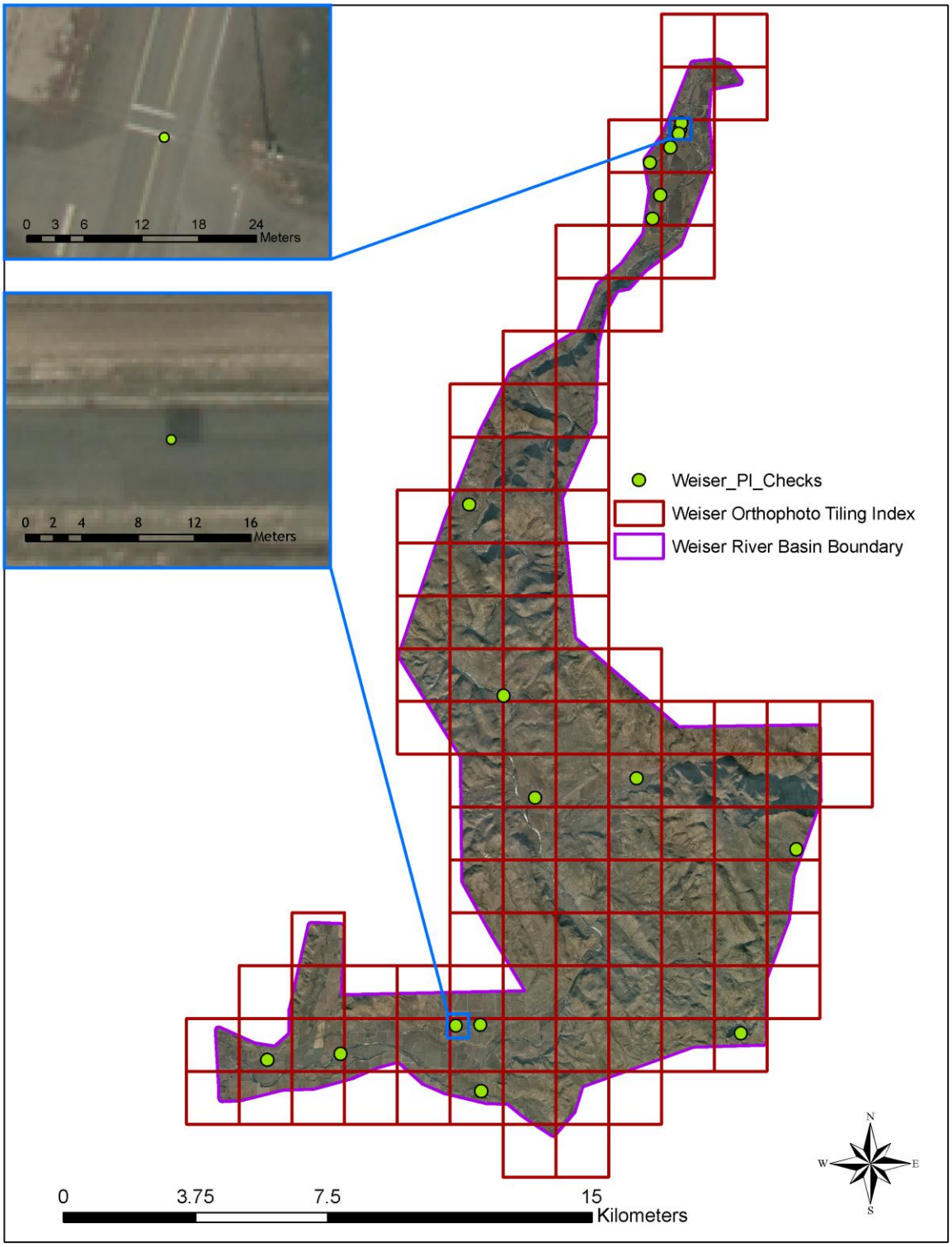
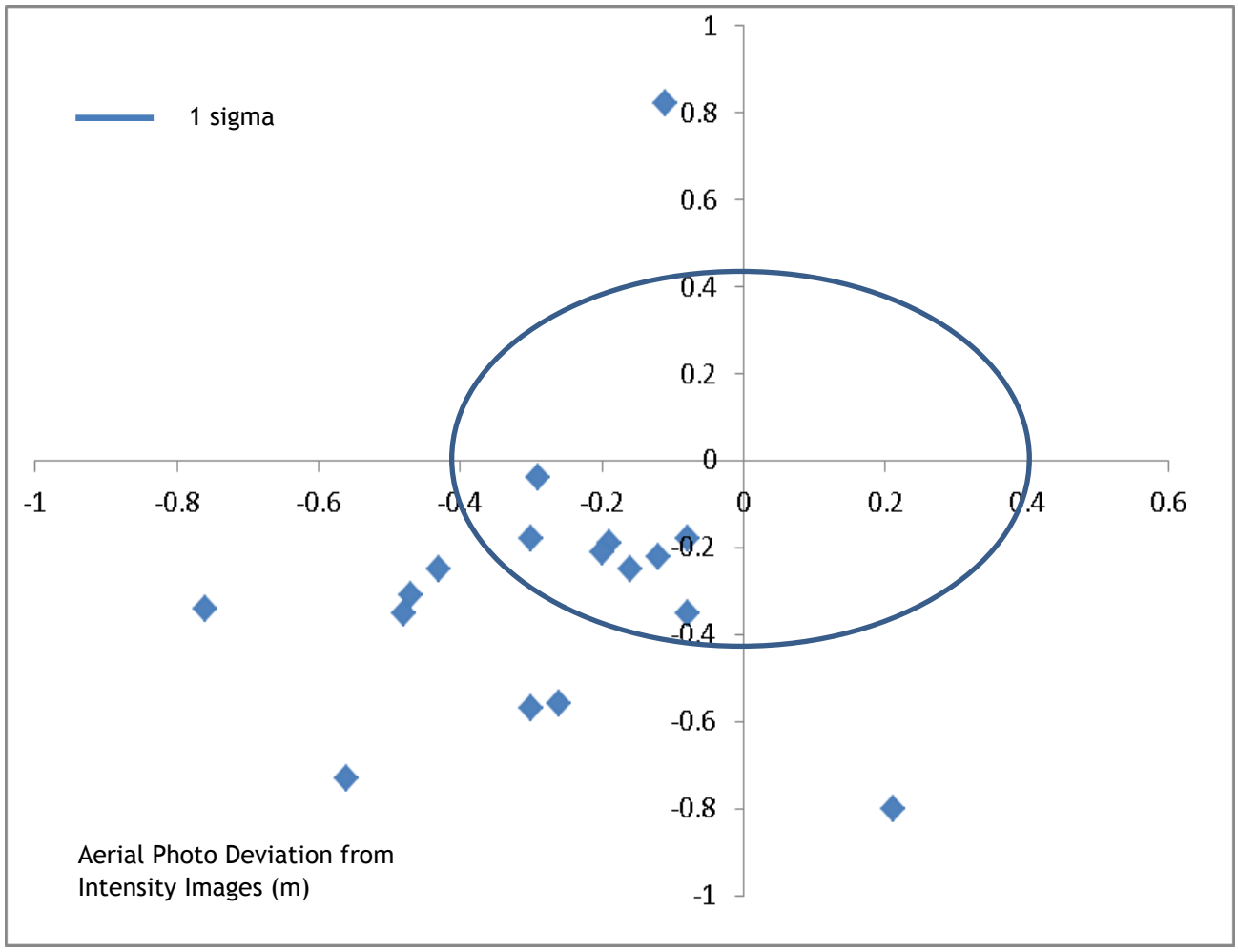


***Table 5**. Deviation between aerial photos and intensity images*

	Mean	Standard Deviation (1 Sigma)	Root Mean Square Error (RMSE)
Weiser River Basin Orthophotos	.39 m	.42 m	.56 m

***Figure 4**. Checkpoint residuals derived from comparing aerial photos to intensity images*



For complete accuracy reports see **Appendix A**

4. Projection/Datum and Units

	Projection:	UTM Zone 11N
Datum	**Vertical:**	NAVD88 Geoid03
	Horizontal:	NAD83 (CORS96)
	Units:	Meters

5. Deliverables

Raster Data:	• Orthophotographs: 0.3m resolution 1500 x 1500 m delineation (GEO Tiff format).
Vector Data:	• Orthophotograph Index: 1500 x 1500 m tile delineation (shapefile format)
Data Report:	• Full report containing introduction, methodology, and accuracy

Appendix A

Aerial Triangulation Report

Aerial Triangulation REPORT

Job #:	11-223	Job Name:	Weiser River Basin			Date:	24-Mar-12
# of Flight Lines:	6	# of Exposures:	110				Color
Aerial Photography by:	Valley Air					Flown on:	12-Dec-11
Camera Type:	Vexcel UltraCam X		F.L.:	100.500	Pixel size:	7.2	*microns*
Planned Ground Sample Distance (GSD):	30.000 *cm*	0.300 *meters*					
Computed Photo Scale:	1:38803	Computed median GSD:	27.938 *cm*	0.279 *meters*			
Ground Control by:	see note			Number of points:	16		
Horizontal Datum:	NAD 83		Vertical Datum:	?			
Coordinate System:	UTM		Zone:	11N			
Units:	meters		Projection:	Transverse Mercator			
AGPS by:	Valley Air			# of antenna points:	110		

ANALYSIS

Standard Deviation settings used:

Auto image points:	0.002	Image points:	0.002	Control (H):	0.10	Control (V):	0.20
ABGPS (XYZ):	1.00	1.00	1.50	IMU (OPK):	0.01	0.01	0.01

Redundancy:

# of observations:	36550	redundancy:	23698	redundancy factor:	0.65

Sigma Naught achieved :	1.300	*microns*	0.200	*pixels*	0.056	*meters*	

PRECISION *(Root Mean Square Values of Residuals)*:

	# of readings:	X:	Y:	XY:	Z:
Automatic Points (microns):	17668	0.900	1.000	*1.345*	
Manual Points (microns):	246	1.300	1.400	*1.910*	
Control Points (meters):	16	0.114	0.091	*0.146*	*0.248*
ABGPS (meters):	110	0.573	1.674	*1.769*	*0.980*
IMU (OPK degrees):	110	*0.023*	*0.014*	*0.005*	

ACCURACY (all values below, except percentages, in meters):

Mean value of standard deviation from adjustment:	X:	0.055	Y:	0.052	H:	*0.076*	V:	*0.127*

COMMENTS

2 HV points from base stations, 2 V points from base stations, all others derived from LIDAR