

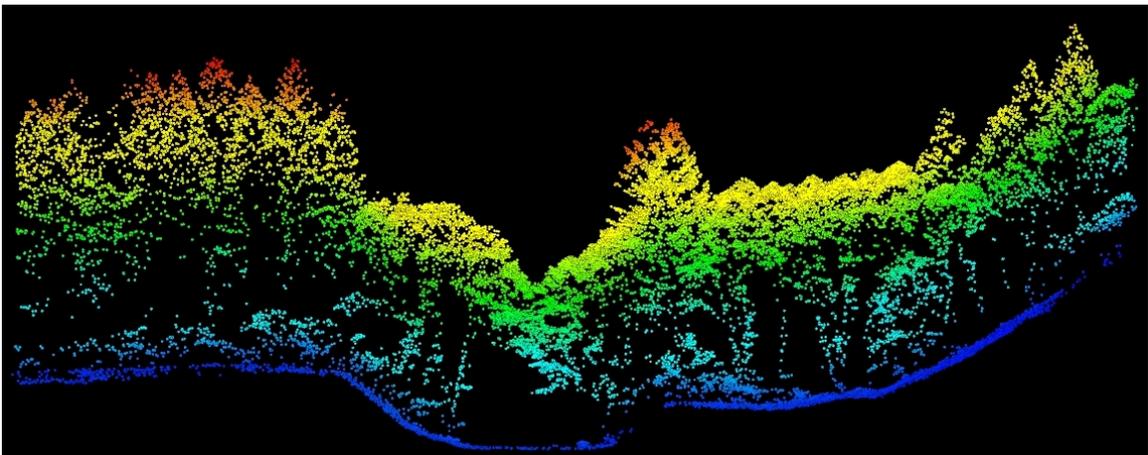
Mapping current conditions and
Modeling the dynamic responses of
riparian vegetation and salmon habitat in Oregon

2009 Annual Project Report

Mapping Component: OWEB # 208-8007-6459

10 December 2009

Warren B. Cohen, PI for Mapping Component
Dirk Pflugmacher, Ph.D. student
Janet Ohmann, Co-PI for Mapping
Robert Kennedy, Research Ecologist



Comparison of actual accomplishments to the tasks and timeline established in the Statement of Work:

The start of the project was delayed to early 2008 because of time required to get funding in place. Following is a status report for budgeted tasks between October 2008 and October 2009.

Fly lidar over MFJD River (1st Quarter 2008) – Completed 3rd Quarter 2008 – Received Data 1st Quarter 2009

Lidar data acquisition was completed on 8/28/2008. The Oregon Lidar Consortium received the data on 12/1/2008 and started quality control analysis. Quality control was finished in February 2009, and the project received the lidar data along with the quality assessment at the end of February 2009.

Identify additional field sampling needs (1st Quarter 2008) – Completed 3rd Quarter 2009

Screening of existing data sources and field trips in the spring of 2009 revealed the need to collect field data in the riparian zones and uplands to validate and parameterize models for stream layer generation and vegetation mapping. Watershed-level vegetation data for riparian zones was either not existent (MFJDR) or too coarse (Wilson) for lidar-based vegetation mapping. Thus, field data was collected in the riparian zones during the summer 2009 (see Modeling report). Also, inventory data in the uplands was too sparse or outdated. Thus, we collected additional field data in the uplands to derive layers of vegetation structure using lidar data.

Upland field data was collected on circular, 15-m radius plots. Field plots were selected by stratified random sampling from a combination of lidar canopy height and Landsat's Normalized Burn Ratio index (NBR) strata, and by including disturbance layers and potential relative radiation layers in the selection process. At the end of the summer we collected ~40 plots each at the Wilson and MFJDR study sites. Measurements included tree characteristics (e.g. species, height, diameter, live crown), cover and height of herbaceous and shrub vegetation, and standing and down-woody debris. Plot locations were measured with a Trimble GeoXM GPS.

Develop DEM, stream, and vegetation layers from lidar data (3rd Quarter 2008) – In progress

- We have the DEM for the Wilson area and received the DEM for the MFJDR area in the 1st Quarter of 2009.
- We have derived preliminary stream data layers for the Wilson and MFJDR area. We are in the process of refining these layers with the field data collected this summer (see Modeling report).
- Development of vegetation layers is in progress (see next section).

Integrate spatial and plot data to generate rasters of vegetation attributes and classified riparian network (4th Quarter 2008) – In progress

Integration of spatial data with the plot data that was collected over the summer is in progress. By the end of the 3rd Quarter of 2009 most of the field data was entered into a database. We started then analyzing the data for the MFJDR area. We have finished the exploratory data analysis of the riparian field data and the lidar data to assess data integrity and to identify suitable response and predictor variables (e.g. from the lidar intensity and height distribution) to build statistical models. We are currently in the process of identifying lidar variables that could improve estimation of sub-canopy structure (e.g. multi-layer forests, shrub undergrowth). We will then apply and test statistical models (e.g. random forest, multiple regression) to derive vegetation type and structure classifications. Analysis of the Wilson area will begin after mapping of the MFJDR area is completed.

Examine history of disturbance and succession (Landsat) (1st Quarter 2009) – In progress

To describe the history of disturbance and succession during the last two decades we use annual Landsat data and a curve-fitting algorithm (LandTrendr) developed in our lab (Kennedy et al. 2007). The advantage of LandTrendr over traditional change detection methods is that it takes advantage of the full temporal trajectory to capture both the time of an event and its magnitude (Figure 1). In addition, by increasing the (temporal) sampling density, this approach is more robust for separating change from no-change. The application of the LandTrendr algorithm requires the following pre-processing and analysis steps:

- Identify and acquire stack of Landsat imagery (3rd Quarter, 2008)
- Atmospheric correction of a reference Landsat Scene (1st Quarter, 2009)
- Radiometric normalization across the time-series to the atmospherically corrected image (1st Quarter, 2009)
- Mask clouds and cloud shadows (2nd Quarter, 2009)
- Extract spectral trajectories and fit segments (in progress)
- Extract summary information from segments (start and end year, duration and magnitude of disturbance (in progress))

We have built preliminary maps of disturbance and recovery trends in the 2nd Quarter of 2009 for the Wilson and MFJDR study area (Figure 2). We expect the final maps, which will incorporate recent refinements to the LandTrendr algorithm, to be finished by the 1st Quarter 2010.

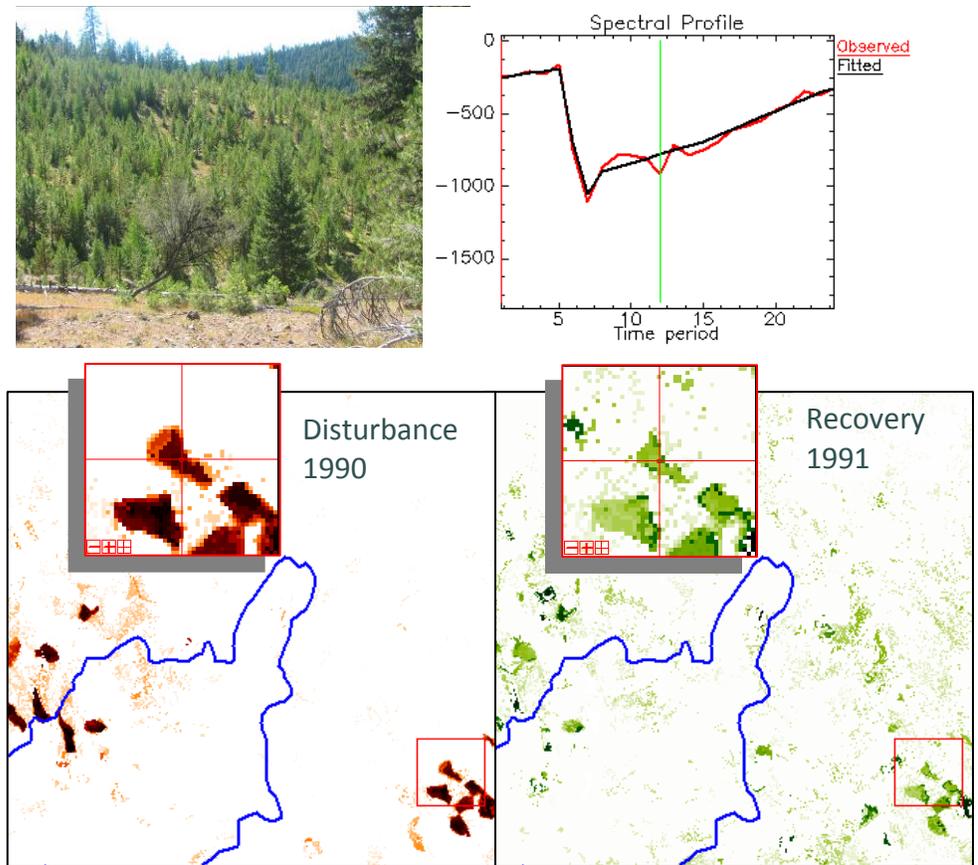


Figure 1. Example of a forest clear-cut (upper left) showing a clear disturbance and recovery trajectory in the Landsat time-series (upper right). Based on these trajectories, time and magnitude of disturbance and recovery are being mapped for the entire study region (lower left and right).

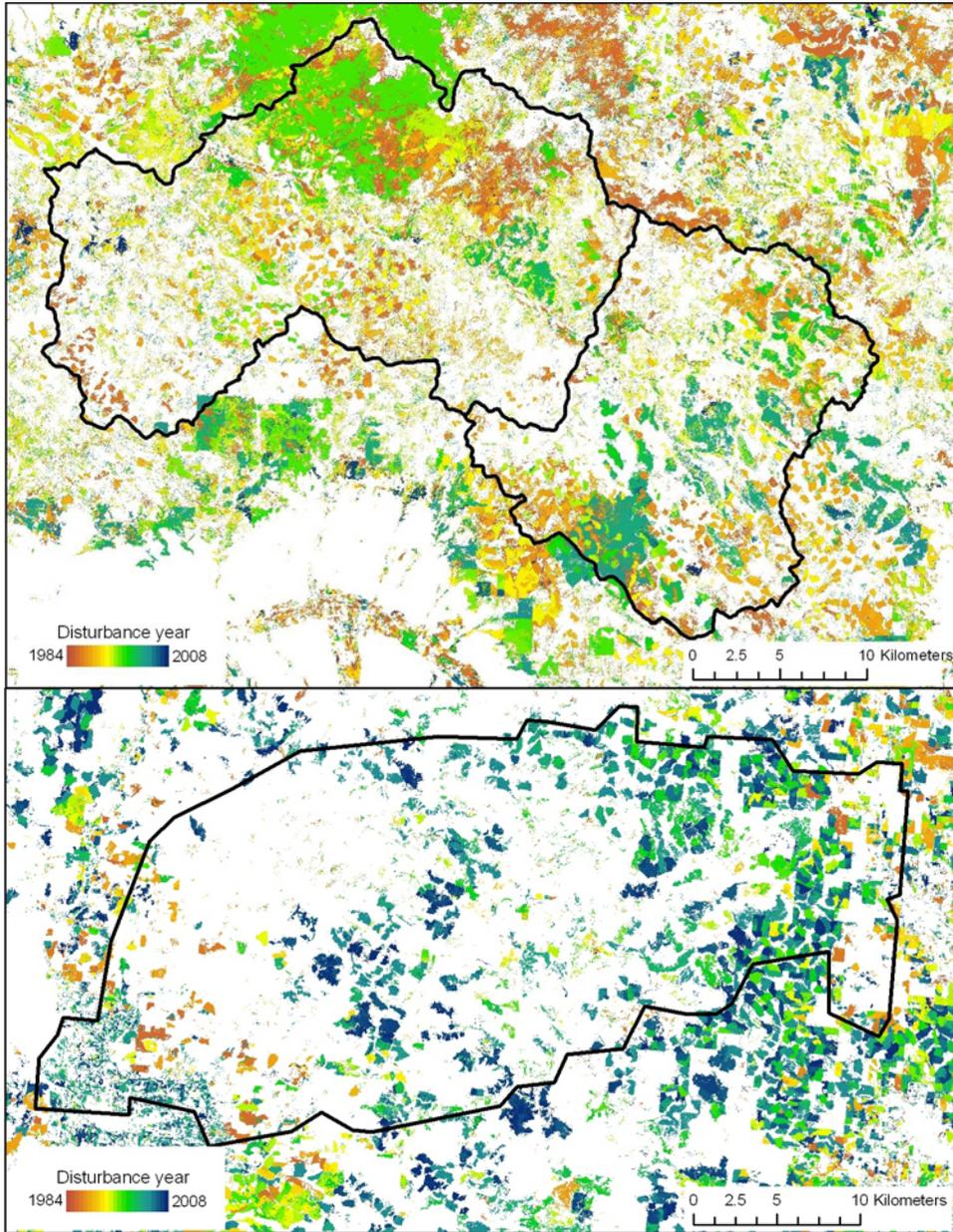


Figure 2. Preliminary results showing year of first disturbance of vegetation cover for the MFJDR (top) and Wilson (bottom) study area

All other tasks are scheduled for completion after the 3rd Quarter 2009.

Progress toward meeting matching funds requirements:

Matching funds are in kind support for Cohen's salary. This has been met for the FY09 contribution.

Expenditure reports documenting use of project funds:

Please refer to pages 7-18.

References:

Kennedy, R.E., Cohen, W.B., & Schroeder, T.A. (2007). Trajectory-based change detection for automated characterization of forest disturbance dynamics. *Remote Sensing of Environment*, 110, 370-386



OREGON WATERSHED ENHANCEMENT BOARD
REQUEST FOR RELEASE OF FUNDS

Grantee Name: U.S. Forest Service - Warren Cohen

Grantee's Fiscal Agent: U.S. Forest Service, Albuquerque Service Center, 101B Sun Ave NE - RACA, Albuquerque, NM

Project Number: 208-8007-5781 Project Name: Mapping Current Conditions & Modeling the Dynamic Responses of Riparian Vegetation & Salmon Habitat in Oregon

In accordance with the terms of the Grant Agreement, I request funds as follows:

Payment Request Number 7 OR Final Request

I understand that I will need to send receipts/invoices and an expense tracking spreadsheet to document all funds previously received from OWEB for this project within 120 days of the date of the check. Failure to comply may delay new grants from being issued and may delay other grant payment requests.

Note: All checks will be made payable to Grantee's Fiscal Agent. Grantee and Fiscal Agent are responsible for paying vendors directly with funds received for this project.

Table with 3 columns: Budget Category per Grant Agreement, TOTAL of All Amounts Previously Paid, Current Request Amount. Rows include Capital Funds - Contract Services, Fiscal Admin, In-house Personnel, and a Totals row.

I declare that this statement is, to the best of my knowledge, true, correct and complete.

Grantee's Authorized Signature: [Signature] Date: 13 Jan 09

Grantee Contact Phone Number for Billing Questions: (877) 372-7248 Fax: (505) 563-7995

Grantee Contact E-mail Address: wcohen@fs.fed.us, 541-750-7322

Forward This Request to OWEB's Regional Program Representative (RPR) for Signature Below

I find this request to be consistent with the Grant Agreement and all funding conditions have been met. OWEB RPR: Date:



**United States Department of Agriculture
Forest Service
Transaction Register, Obligations**

Page 1 of 1
01/08/09 10:51 AM
TROB
BP P0836600966 TRO

Period Ending: 03 2009 (12/31/2008) -- DECEMBER (CLOSED)

Fiscal Year: 2009

Division / Division Name: 1126 / PACIFIC NW RESEARCH STATION

Allot Org / Allot Org Name: 2619 / PNW EXP STATION

Org:

Job Code	FM	TC	Document Number	Line#	TT	Document Date	Vendor Name	Ref Info	Boc	Commitments	Obligations	Unpaid Expenditure	Paid Expenditure	Pay Hours
FRXN7908	03	IV	P0836600280	001	IT	01/02/09	OWEB		0210	0.00	0.00	0.00	2,570.40	0.00
FRXN7908	03	PV	G06889208511	007	01	01/02/09	OR DEPT OF GEO & MIN	08CS11062761024*188147560	2550	0.00	-35,700.00	35,700.00	0.00	0.00
Total for Job Code: FRXN7908										0.00	-35,700.00	35,700.00	2,570.40	0.00

Query Limits: Fiscal Year = 2008, 2009
Fiscal Month = 01, 02, 03, 04, 05, 06, 07
Organization Begins With 2619
Job Code Begins With FRXN7908



OREGON WATERSHED ENHANCEMENT BOARD REQUEST FOR RELEASE OF FUNDS

Grantee Name: U.S. Forest Service – Warren Cohen

Grantee’s Fiscal Agent: U.S. Forest Service, Albuquerque Service Center, 101B Sun Ave NE – RACA, Albuquerque, NM

Project Number: 208-8007-5781 Project Name: Mapping Current Conditions & Modeling the Dynamic Responses of Riparian Vegetation & Salmon Habitat in Oregon

In accordance with the terms of the Grant Agreement, I request funds as follows:

Payment Request Number 8 OR Final Request _____

I understand that I will need to send **receipts/invoices** and an **expense tracking spreadsheet** to document all funds previously received from OWEB for this project within 120 days of the date of the check.
Failure to comply may delay new grants from being issued and may delay other grant payment requests.

Note: All checks will be made payable to Grantee’s Fiscal Agent. Grantee and Fiscal Agent are responsible for paying vendors directly with funds received for this project.

<u>Budget Category per Grant Agreement</u>	<u>TOTAL of All Amounts Previously Paid</u>	<u>Current Request Amount</u>
1. <u>Capital Funds – Contract Services</u>	\$ <u>95,200.00</u>	\$ <u>23,800.00</u>
2. <u>Capital Funds – Fiscal Admin</u>	\$ <u>8,335.25</u>	\$ <u>1,713.60</u>
3. <u>Capital Funds – In-house Personnel</u>	\$ <u>20,567.38</u>	\$ <u>0.00</u>
4. _____	\$ _____	\$ _____
5. _____	\$ _____	\$ _____
6. _____	\$ _____	\$ _____
7. _____	\$ _____	\$ _____
8. _____	\$ _____	\$ _____
9. _____	\$ _____	\$ _____
10. _____	\$ _____	\$ _____
Totals	\$ <u>124,102.63</u>	\$ <u>25,513.60</u>

I declare that this statement is, to the best of my knowledge, true, correct and complete.

Grantee’s Authorized Signature:  Date: April 8, 2009

Grantee Contact Phone Number for Billing Questions: (877) 372-7248 Fax: (505) 563-7995

Grantee Contact E-mail Address: wcohen@fs.fed.us, 541-750-7322

Forward This Request to OWEB’s Regional Program Representative (RPR) for Signature Below

I find this request to be consistent with the Grant Agreement and all funding conditions have been met.

OWEB RPR: _____ Date: _____



**USDA FOREST SERVICE
BILL FOR COLLECTION**



BILL DATE: 04/01/09		PAGE: 01									
ENCLOSE A COPY OF THIS BILL WITH YOUR CHECK OR MONEY ORDER. DO NOT SEND CASH. PLEASE INCLUDE BILL NO. AND PAYER CODE ON YOUR CHECK. MAKE CHECK PAYABLE TO: USDA FOREST SERVICE		MAIL PAYMENT TO: USDA FOREST SERVICE C/O CITIBANK P.O. BOX 894183 LOS ANGELES, CA 90189-4183									
TO: OWEB OR WATERSHED ENHANCEMENT BOARD 775 SUMMER ST NE SUITE 360 SALEM OR 97301		PAYER INDICATE AMOUNT ENCLOSED: NET AMOUNT DUE: \$ 25,513.60 DUE DATE: 05/01/09 BILL NUMBER: BP P0909000983 PAYER CODE: 931275767 C									
AGREEMENT NO: 2619-08-CO-479 CONTRACT NO:		DESCRIPTION: OWEB #208-8007-5781									
REMARKS: RE: PAYER CODE: 931275767 C BILL NO: BP P0909000983 NOTE: PLEASE SEND ALL CORRESPONDENCE, INQUIRIES, AND CHANGE OF ADDRESS TO: US FOREST SERVICE, ABQ SRV CTR 101B SUN AVE NE - RACA ALBUQUERQUE, NM 87109 877-372-7248 BUDGET & FINANCE		PRINCIPAL: \$ 25,513.60 INTEREST: ADMINISTRATIVE COSTS: PENALTY: AMOUNT DUE: \$ 25,513.60 AMOUNT CREDITED: NET AMOUNT DUE: \$ 25,513.60									
FAILURE TO MAKE PAYMENT BY THE DUE DATE WILL RESULT IN THE ASSESSMENT OF LATE PAYMENT CHARGES (INTEREST, ADMINISTRATIVE COST, AND/OR PENALTY CHARGES) IN ACCORDANCE WITH YOUR CONTRACT, PERMIT, OR THE DEBT COLLECTION ACT OF 1982, AS AMENDED. POSTMARKS ARE NOT HONORED. LATE FEES DO NOT APPLY FOR BILLINGS IN ADVANCE OF RECEIPT OF GOODS OR SERVICES											
LINE: 001 ORG: 2619 JOB:		OWEB AGREEMENT #208-8007-5781; FS AGREEMENT #08-CO-11261952-479; PROJECT: MAPPING/MODELING DYNAMIC RESPONSES OF RIPARIAN VEGETATION AND SALMON HABITAT IN OREGON; FS POC: WARREN COHEN 541-750-7322; OWEB POC: CINDY SILBERNAGEL 503-986-0188; FS BILLING: 877-372-7248 OPT 1									
SPECIAL BILLING REQUIREMENTS: B1- B4:C2:F											
LINE	ORG	JOB	AMOUNT	LINE	ORG	JOB	AMOUNT	LINE	ORG	JOB	AMOUNT
001	2619		\$ 25,513.60								

**United States Department of Agriculture
Forest Service
Transaction Register, Obligations**
Period Ending: 06 2009 (03/31/2009) - MARCH (CLOSED)

Page 1 of 1
04/06/09 07:37 AM
TROB
PCAS TROB for M cyc

Fiscal Year: 2009
Division / Division Name: 1126 / PACIFIC NW RESEARCH STATION
Allot Org / Allot Org Name: 2619 / PNW EXP STATION
Billing Document: BP P0909000983 Agreement Number: 2619-08-CO-479
Job Code: FRXN7908 RIPARIAN VEGETATION/SALMON HAB

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06	IV	P0909000183	001	IT	04/01/09	OWEB		0210	0.00	0.00	0.00	1,713.60	0	
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06	PY					WEBB LOWRY, TAMI L	8XX2619 FRXN79 05	1101	0.00	0.00	0.00	0.00	0	
06	PY					WEBB LOWRY, TAMI L	8XX2619 FRXN79 05	1202	0.00	0.00	0.00	0.00	0	
06	PY					WEBB LOWRY, TAMI L	8XX2619 FRXN79 05	1204	0.00	0.00	0.00	0.00	0	
06	PY					WEBB LOWRY, TAMI L	8XX2619 FRXN79 05	1213	0.00	0.00	0.00	0.00	0	
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Total for BP P0909000983										Total Expenditures:		25,513.6	25,513.6	

Query Limits: Fiscal Year = 2009
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Transaction Code = BP
Document Number Begins With P09090
Bill Cycle = M
Script(x):uncaught exception: Internal Error



OREGON WATERSHED ENHANCEMENT BOARD REQUEST FOR RELEASE OF FUNDS

Grantee Name: U.S. Forest Service – Warren Cohen

Grantee’s Fiscal Agent: U.S. Forest Service, Albuquerque Service Center, 101B Sun Ave NE – RACA, Albuquerque, NM

Project Number: 208-8007-5781 Project Name: Mapping Current Conditions & Modeling the Dynamic Responses of Riparian Vegetation & Salmon Habitat in Oregon

In accordance with the terms of the Grant Agreement, I request funds as follows:

Payment Request Number 9 OR Final Request _____

I understand that I will need to send receipts/invoices and an expense tracking spreadsheet to document all funds previously received from OWEB for this project within 120 days of the date of the check.

Failure to comply may delay new grants from being issued and may delay other grant payment requests.

Note: All checks will be made payable to Grantee’s Fiscal Agent. Grantee and Fiscal Agent are responsible for paying vendors directly with funds received for this project.

<u>Budget Category per Grant Agreement</u>	<u>TOTAL of All Amounts Previously Paid</u>	<u>Current Request Amount</u>
1. <u>Capital Funds – Contract Services</u>	\$ <u>119,000.00</u>	\$ <u>76,000</u>
2. <u>Capital Funds – Fiscal Admin</u>	\$ <u>10,048.85</u>	\$ <u>5472.00</u>
3. <u>Capital Funds – In-house Personnel</u>	\$ <u>20,567.38</u>	\$ <u>0.00</u>
4. _____	\$ _____	\$ _____
5. _____	\$ _____	\$ _____
6. _____	\$ _____	\$ _____
7. _____	\$ _____	\$ _____
8. _____	\$ _____	\$ _____
9. _____	\$ _____	\$ _____
10. _____	\$ _____	\$ _____
Totals	\$ <u>149,616.23</u>	\$ <u>81,472.00</u>

I declare that this statement is, to the best of my knowledge, true, correct and complete.

Grantee’s Authorized Signature: Date: September 17, 2009

Grantee Contact Phone Number for Billing Questions: (877) 372-7248 Fax: (505) 563-7995

Grantee Contact E-mail Address: wcohen@fs.fed.us, 541-750-7322

Forward This Request to OWEB’s Regional Program Representative (RPR) for Signature Below

I find this request to be consistent with the Grant Agreement and all funding conditions have been met.

OWEB RPR: _____ Date: _____

**United States Department of Agriculture
Forest Service
Transaction Register, Obligations**
Period Ending: 11 2009 (08/31/2009) -- AUGUST (CLOSED)

Fiscal Year: 2009

Division / Division Name: 1126 / PACIFIC NW RESEARCH STATION

Allot Org / Allot Org Name: 2619 / PNW EXP STATION

Billing Document: BP P0924300471 Agreement Number: 2619-08-CO-479

Job Code: FRXN7908 RIPARIAN VEGETATION/SALMON HAB

FM	TC	Document Number	Line#	TT	Document Date	Vendor Name.	Ref Info	Boc	Commitments	Obligations	Unpaid Expenditure	Paid Expenditure	Pay Hours
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11	IV	P0924300109	001	IT	09/01/09	OWEB		0210	0.00	0.00	0.00	5,472.00	0
11	PV	G2689101514	004	01	08/10/09	OUS OREGON STATE	05JV11261952370*19097750010602	2554	0.00	-76,000.00	76,000.00	0.00	0

Total for Job Code: FRXN7908

0 -76,000 0 81,472 0

----- Total Expenditures: -----

81,472

Total for BP P0924300471

81,472

Query Limits: Fiscal Year = 2009

Fiscal Month = 11

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Document Number Begins With P09243

Bill Cycle = M

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