1. Project Title

Rush Creek Instream Pilot Project Habitat Restoration

2. Project Manager

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3. Identification of problem or opportunity to be addressed

Bull trout numbers have been declining in the Upper Lewis River Basin as documented by PacifiCorps and the Washington Department of Fish and Wildlife. Personnel conducting spawning surveys each summer have observed minimal areas with suitable spawning gravel in the mainstem. Observers have noticed a significant decline in suitable spawning gravel available to bull trout over the last six years, and fewer areas for spawning now exist than before. Bull trout are currently limited to a few streams in the Upper Lewis River basin and the population is critically depressed. In order to address declining bull trout populations in the Upper Lewis River a pilot instream habitat enhancement project is being proposed in Rush Creek (HUC 170800020109) that will add spawning gravel and Large Woody Material (LWM) to a stable side channel. This pilot project will be intensely and cooperatively monitored to determine if spawning gravel can be retained by log structures in Rush Creek, how bull trout spawning use of enhanced areas is improved, and investigate juvenile use in the side channel. This pilot project will help determine the role of LWM projects in Rush Creek bull trout recovery activities, if these types of projects are successful in a stream of this nature, and if additional LWM projects are warranted in Rush Creek. This project also is intended to serve as a unique opportunity to help align multiple agency implementation strategies to take best action towards meeting Lewis River Basin bull trout recovery needs.

The Rush Creek Side Channel Restoration Pilot Project will be implemented and monitored in collaboration with the United States Fish and Wildlife Service (USFWS), United States Forest Service (USFS), Washington Department of Fish and Wildlife (WDFW) and the Gifford Pinchot Task Force (GPTF). The goal of the Project is to increase bull trout spawning and juvenile rearing opportunities and success in this high gradient, high velocity stream. Together we have identified this as a Pilot Project to determine the success of installing log structures to capture more gravel in a side channel of Rush Creek and how it can further lead towards meeting identified bull trout recovery goals. Approximately 750 feet of side channel habitat in Rush Creek would have four log weirs with spawning gravel placed in strategic locations using a small helicopter to restore bull trout spawning opportunities. Onsite boulders will be manipulated by hand using pry bars and winches to stabilize gravel additions. Small diameter logs will be flown in by helicopter and anchored to boulders to add stability to some of the sites. Gravel will be added to the stream upstream of the log weirs with a helicopter.

4. Background

On September 2011 representatives of USFS, WDFW and USFWS personnel performed a field reconnaissance in Rush Creek to determine potential habitat limitations for bull trout. It was noted that few spawning opportunities for bull trout currently exist because of high water velocity and minimal deposits of useable spawning gravel. It was observed that bull trout spawn primarily on stream margins and occasionally in side channels. Side channels in Rush Creek are more stable with lower velocities than the Rush Creek. It was also noted that gravel recruitment into these side channels is limited and that it appears substrate is exposed through down cutting rather than recruitment.

Jim Byrne from WDFW also noted that in the past bull trout were observed in the side channel and some limited evidence of spawning was also observed. During a 2010 genetic sampling a majority of juvenile bull trout were captured from this side channel. Few juveniles in the mainstem were observed or captured. He also noted that when the smolt trap was run in 2005 and 2006 many of the bull trout captured were leaving the system as button up fry (and many were not fully buttoned up) implying limited high flow refugia. However, the probability of juvenile bull trout exiting in the system was not correlated with high water events.

This side channel currently provides suitable bull trout rearing habitat, spawning adults have been observed here, and juveniles found in the side channel probably were their progeny. This project will increase both spawning and rearing habitat for bull trout. The mainstem Rush Creek appears deficient of suitable size spawning gravel due to the inherent high velocities and steep gradients. Observations from the collaborative September 2011 field trip concluded that there probably was less gravel in Rush Creek than several years ago, and that gravel being held by the log jam creating the side channels had decreased substantially. Even the one "prime" spawning spot downstream of the log jam where bull trout had been observed spawning in the past had greatly reduced gravel. This spawning site typically has room for one to two pairs of bull trout to spawn and is only a narrow strip adjacent to stream margins about 6 feet wide and 10 feet long.

The idea of a Pilot Project developed to determine if adding logs and gravel to the side channel would increase bull trout spawning and juvenile rearing opportunities and success. Bull trout are the target species for this project.

Approximately 750 feet of side channel habitat in Rush Creek would be enhanced to restore bull trout spawning opportunities by: 1) creation of four log weir structures; 2) placement of spawning gravel placed in strategic upstream locations using a small helicopter; 3) boulders will be manipulated onsite by hand using pry bars and winches to stabilize gravel additions; 4) small diameter logs will be flown in by helicopter and anchored to boulders to add stability to some sites.

Bull trout are the targeted species for benefits from this project. It is possible that once reintroduction of steelhead occurs, this project may be used by them as well.

The Lower Columbia Salmon Recovery Plan 2009 Six Year Habitat Work Schedule identifies this as a Tier 4 reach for anadromous fish recovery. The ACC Synthesis Matrix rated Rush Creek as having Low restoration potential, but also identified several reach specific concerns that include: moderate need for channel stability and habitat diversity; some of best bull trout habitat in basin; needs additional gravels; log jams may act as migration hindrance; and serve as off-channel habitat. The Rush Creek cold thermal regime offers some of the best bull trout habitat in the basin.

Gifford Pinchot Task Force: The GPTF will serve as project manager. The GPTF supports the biological diversity and communities of the Northwest through conservation and restoration of forests, rivers, fish, and wildlife. We are local non-profit organization that has been working in southwest Washington for 26 years and has over 6,000 members.

We intend to use our dedicated volunteer workforce to perform some of the handwork associated with this project such as, anchoring logs to boulders, moving boulders by hand, spreading gravel deposited by the helicopter. We also intend to work closely with the US Forest Service, WDFW, and US Fish and Wildlife Service to perform the numerous monitoring tasks.

US Forest Service: USFS' role will be to provide project design, write and administer the helicopter and logging contracts, and provide monitoring support and logistics as needed.

Washington Dept of Fish and Wildlife: WDFW's role is to provide monitoring support, monitoring personnel and development of a monitoring report

US Fish and Wildlife Service: USFWS' role is to provide technical support and training for monitoring activities.

5. Project Objective(s)

GOAL:

1) *Enhance the quality of fish habitat in the Lewis River by:*
   - Improving habitat complexity and diversity in the side channel using LWM
   - Providing refugia during winter flows for juvenile bull trout
   - Providing increased spawning opportunities for adult bull trout
2) Collect and evaluate information on bull trout use and response to LWD augmentation in Rush Creek
3) Align multi-agency strategies and identify future actions that can lead towards bull trout recovery

This project addresses the following Aquatic Fund priorities.

Priority 1: *Benefit fish recovery throughout the North Fork Lewis River, with priority to federal ESA-listed species.*
Columbia River Bull Trout are listed as a threatened species under the ESA. Lewis River bull trout are a priority focal species for the GPNF.

Priority 2: *Support the reintroduction of anadromous fish throughout the basin.*
This project is targeted to benefit bull trout. It is possible that steelhead trout may use these structures, however that is not the primary purpose of this project.

Priority 3*: Enhance fish habitat in the Lewis River Basin-, with priority given to the North Fork Lewis River.*
This project is located in the North Fork Lewis River basin. The USFS has identified the North Fork Lewis River as priority basin for habitat restoration. This project consists of large woody material and spawning gravel placed instream in side channels, designed specifically to enhance and restore fish habitat. This project will increase instream habitat diversity, and in turn it is expected that this project will contribute to increasing bull trout production in this area.

6. Tasks:

Task 1: NEPA and required permits

1) The USFS will complete all phases of NEPA documentation. Field work for this NEPA document would be completed during the summer and fall of 2012. The final document should be crafted and signed by March 2013, and the project would be implemented July 2013.

2) Instream restoration activities are covered within the WDFW-MOU, and the Regional Permit with the Army Corps of Engineers.

Task 2: Project Design-USFS

1) Finalize project design and project preparation details: Preliminary designs have been planned during reconnaissance visits in 2011. We will use a laser level to run a longitudinal profile and collect cross-sectional information as we finalize designs.

2) Secure materials: A 35 acre Peppercat timber sale unit has been set aside to use for fish habitat restoration activities over the next ten years. We will layout an area within this stand to thin and prepare for harvest operations. Additional material may be acquired from PacifiCorp Swift Reservoir Cleaning operations.

Task 3: Project Implementation-USFS

1) Develop contract: A standard RFQ contract will be developed specifying the scope of the project and project requirements. We will use an equipment rental contract to perform the actual work, which will allows us the flexibility to make changes to the project as implementation is occurring.

2) Administer contract: A Fish Biologist or Fisheries Technician will administer the contract to ensure contract compliance and project specifications are met.

Task 4: Monitoring

1) Perform baseline monitoring: This monitoring will occur prior to project implementation and include a longitudinal profile, cross-sections, pebble counts, photo-documentation and snorkel surveys. A thorough monitoring plan was developed by the USFWS, WDFW and the USFS to determine success of this project (see attached monitoring plan). The GP Task Force will be performing monitoring tasks in conjunction with USFWS, USFS, WDFW and PacifiCorp. The GP Task Force will perform most aspects of the monitoring with supervision and training from the Forest Service.

2) Perform after project monitoring: This monitoring will occur following project implementation and will continue on an annual basis for several years following project completion. The GP Task Force will perform most aspects of the monitoring with supervision and training from the Forest Service.

3) Monitoring Report: A monitoring report will be written each year following project implementation. The GP Task Force will compile raw data and turn this information over to the USFWS, WDFW, and USFS for analysis. The final report will be written by WDFW and included in the annual bull trout report for the Upper Lewis River Basin.

7. Methods:

The USFS Mount St. Helens Fisheries Program will oversee the project design, implementation and monitoring phases.

Approximately 24 pieces of LWM would be made available for this project and harvested during thinning operations from a nearby timber sale. Woody material will be trucked to a staging area located at House Rock Gravel Pit. Ten cubic yards of suitable sized spawning gravel will also be trucked to this site. The wood and gravel would then be flown by a Bell Jet Ranger helicopter to four specific sites located in the side channel. This type of helicopter is ideal for smaller projects and was used successfully by USFS in a previous ACC project to remove remnants of Sheep Bridge. Approximate load capacity for this helicopter is 750 lbs with a cost of $1,200/hour.

Approximately six pieces of LWM will be used to create each structure location to retain spawning gravel and form complex habitat. LWM will be anchored to boulders and interwoven with existing riparian vegetation to provide stability. Structures will span the entire side channel, but sections will be low enough to provide passage of juvenile fish. Several pieces of wood will be placed to provide hiding cover at each structure. Between 1.5 and 2 cubic yards of spawning gravel will be flown above each structure and deposited in a pile. This will be spread by hand to insure even distribution of gravel.

8. Specific Work Products

Deliverable 1: Completed project. Four LWM structures with 1.5-2 cubic yards of gravel injected, etc

Deliverable 2: A report describing the project. Report to include project narrative, financial information, and photographs of completed projects.

Deliverable 3: Monitoring Report. That evaluates the success of the project, bull trout use and response to structures, and recommended next steps.

9. Project Duration

Monitoring for this project would begin during the summer of 2012. Project implementation would occur July 15, 2013 and is expected to take two weeks to complete. As built documents will be completed by December 31, 2013. An initial report documenting fish response to the structures will be completed by December 31, 2014. The first monitoring report with pre and post project data will be available December 31, 2014. If funding or LWM supply becomes an issue, project dates would be delayed by one year from above.

A project closeout meeting would occur at an ACC meeting following project completion.

10. Permits

NEPA**:** Field work will be completed during the summer of 2012, NEPA document will be completed Spring 2013.

CLEAN WATER ACT: The Gifford Pinchot National Forest has a Memorandum of Agreement with the Washington State Department of Ecology (DOE). The agreement recognizes the Forest Service will ensure that 1) all waters on National Forest lands meet or exceed water quality laws and regulations (Sections 301, 302,

303, 306 and 307) of the Clean Water Act and 2) activities on those lands are consistent with the level of protection of the Washington Administrative Code relevant to state and federal water quality requirements. This agreement is neither a fiscal nor a funds obligation document.

The Gifford Pinchot National Forest has a Memorandum of Understanding (MOU) with the Washington State Department of Fish and Wildlife Regarding Hydraulic Projects conducted by USDA Forest Service Northwest Region (2005). Compliance with the instream restoration provisions within this MOU replaces the need for an individual hydraulic project approval (HPA). This fish habitat enhancement project will be conducted within the provisions set forth in this MOU.

The Clean Water Act (as amended by the Water Quality Act of 1987, Public Law 100-4) authorizes the states to regulate the "fill and removal" activities of Federal agencies. In Washington, the Forest Service has authorization for its fill and removal projects through the MOU with WDFW when the projects comply with the provisions of the MOU.

The US Forest Service has a state wide Regional General Permit (RGP) with the Army Corps of Engineers to perform aquatic restoration activities in waterways. Permit CENWS-OD-RG-RGP-8 authorizes the USFS to perform 13 restoration activities including Large Wood, Boulder and Gravel Placement on National Forest Lands.

Land ownership in this section of the Lewis River is comprised of public lands. The project is wholly on public lands, however the access route is through both Forest and private lands. We have received permission from the landowners to use the private spur road to access this project area.

11. Matching Funds and In-kind Contributions

Partner	**Contribution**	**Funds**
Forest Service	Project development, Contracting, Permitting, Monitoring	$19,000 In-kind
Materials from USFS	Trees with rootwads	$1,200,000 In-kind
WDFW In kind	Monitoring	$2,000
USFWS In Kind	Monitoring Plan	$3,000

12. Professional Review of Proposed Project

This project proposal was reviewed by Gifford Pinchot National Forest (GPNF) Hydrology program manager, Ruth Tracy, GPNF Fisheries program manager Dave Hu, District Fish Biologist Adam Haspiel, WDFW Fish Biologist Jim Bryne, and USFWS Geomorphologist Paul Bakke.

13. Budget

	NEPA	Final designs	Project Mgmt	Construction	Monitoring/Labor /Reporting/Coord.
Personnel Costs					
FS - Zone Team or Contract	$3,000 (ACC)				
FS –Fish Bio and Hydrologist		$2,000 (IK) $1,000 (ACC)			
FS - Fish Bio and Hydrologist			$3,000 (IK)		$2,000 (IK) $1,000 (ACC)
FS - Contract administrator -				$3,000 (IK) $3,000 (ACC)	
FS - Contract Specialist				$2,000 (IK)	
GP Task Force			$3,000 (IK) $3,000 (ACC)	$6,000(IK)	$10,000 (IK) $1,000 (ACC)
USFWS (monitoring Plan)					$3,000 (IK)
WDFW					$2,000 (IK) $2,000 (ACC) $2,000 (ACC)*
Forest Service 12 trees (24 pieces of LWM)				$1,200 (IK)	
Contract Payables					
Helicopter Contract				$12,720 (ACC)	
Logging and hauling of trees				$2,000 (ACC) $2,000 (IK)	
Materials and Supplies (Gravel and bags)			$ 1,000(ACC)		
Total ACC Funds **$31,720**	**$3,000**	**$1,000**	**$4,000**	**$17,720**	**$6,000**
Total GPTF Funds *$19,000*			*$3,000*	*$6,000*	*$10,000*
Total Partner Funds *$20,200*		*$2,000*	*$3,000*	*$8,200*	*$7,000*
Project Total ***$70,920***					

Personnel estimated as $300/day.

*This 2,000 is for spawning surveys, this can be eliminated if the Bull trout AOP agrees to do this.

Rush Creek Instream Pilot Project expanded budget 2012

Item	**Personnel**	**Estimated Days/units***	**Cost Per Unit**	**Total***
NEPA Environmental Assessment required by Federal Law	Fish Biologist Wildlife Biologist Hydrologist Botanist Archeologist Soil Scientist Recreation Forester NEPA Coordinator	2.5 1 1 1 0.5 0.5 0.5 0.5 1	$350 per day per person	$3,000 (ACC)
Final Designs	Fish Biologist Hydrologist Fish Technician	5 2 3	$300 per day per person	$2,000 (IK) $1,000 (ACC)
Project Management	Fish Biologist Fish Technician Program Mgr.	5 5 20	$300 per day per person	$6,000 (IK) $3,000 (ACC)
Construction	Contract Administration/Prep Logging Helicopter	43	$300 per day per person	$11,000 (IK) $3,000 (ACC) $2,000 (IK) $2,000 (ACC) $12,720 (ACC)
Materials & Supplies	Gravel and bags			$1,000 (ACC)
Trees with rootwads		12 (24 pieces)	$1,200	$1,200 (IK)
Monitoring *GPTF* *USFS* *WDFW* *USFWS*	 Supervisor (& Volunteers) Assistant Fish Biologist Fish Biologist Geomorphologist	 10 3 13 10	 $300 per day per person	 $17,000(IK) $6,000 (ACC)
Total				**$70,920**

*Values are rounded up or down as need to display whole number and days

Rush Creek Instream Pilot Project Equipment Budget 2012

Item	Cost per unit	Number of units	ACC cost	Total Cost
Helicopter	$1,200/hour	8.6	$10,320	$10,320
Helicopter move in/out	$2,400	1	$2,400	$2,400
Logging and Hauling cost: Based on Previous Contract	$4,000	1	$2,000 ($2,000 FS in kind))	$4,000
Total			**$14,720**	**$16,720**

Appendix Items

Adaptive Management Monitoring of Rush Creek Pilot Project

Developed with Paul Bakke and Jeff Chan USFWS, Jim Byrne WDFW, and Adam Haspiel USFS

Juvenile bull trout surveys: These would consist of day and night snorkeling to determine pre- and post-treatment use of augmentation sites, as well as detect changes in habitat use downstream of augmentation sites. Juvenile surveys in Rush Creek will include an area upstream of the treatment sites, through and adjacent to the treatment sites, and downstream of the treatment sites as far as to the confluence with the Lewis River. Surveys would focus on determining abundance and distribution of various juvenile life stages in representative habitats using typical size range categories. Surveys would be conducted during summer months. Depending on weather and snow conditions surveys will be conducted during the winter as well to determine any seasonal differences in habitat use affected by the proposed treatment. A nighttime snorkel in early December will determine if any further winter snorkels will be necessary because data from WDFW collected during smolt trap operations concluded mostly young of the year fry are present in Rush Creek. Young of the year fry will not emerge from gravels until late March or early April.

Adult bull trout surveys: These would consist of the traditional bull trout spawner surveys that have been conducted in Rush Creek in the past. These would focus on adult and redd counts. For the purposes of this effort, the distribution of surveys could be similar to the juvenile survey effort. Data could be borrowed from any larger escapement survey effort planned for Rush Creek, as long as the areas within the treatment reach are included in that survey (i.e., side channels and downstream reaches to the confluence with the Lewis River). Ideally, at least one pre-treatment spawner survey would be conducted prior to the augmentation effort.

Physical process monitoring: At each proposed structure location site, a vertical elevation benchmark will be established a cross-section of the side channel will be conducted. The pre structure cross-section with be

marked with temporary endpoint markers, since it is not likely to be the permanent cross-section used for post-construction monitoring. A pebble count to characterize the average site streambed surface particle size distribution will be conducted. Photographs of the cross-section from each side, and from mid-channel looking upstream, and then downstream will be taken. A longitudinal profile, covering the entire reach will be taken pre and post structure establishment
The following reference sites will be established:

1. Two pools in the side channel within influence of the treatment reach, that are not treatment sites. These will be located downstream from all of the treatment sites. These will be used to judge the impact of imported gravel on pool habitat downstream from the project.
2. Two pool transects in the side channel upstream from the treatment sites. These will be used as controls, to detect changes to pool depth due to natural sediment movement, if any.
3. Two alluvial deposit reference transects (alluvial bars, pool tail out zones, etc.) in the side channel upstream from the treatment sites. These will be used as controls, to detect trends in streambed alluvial features in the absence of gravel augmentation.

All six of these reference sites will be marked with permanent end points, located on the longitudinal profile, and surveyed for cross-section profile. Perform streambed photography along each transect, as described below.

Physical process, post-construction monitoring, to be done after construction but before the first winter season: At each structure location site, At least one permanent transect which crosses the bulk of the imported gravel will be established. We will perform cross section survey on the transect, and do a pebble count. Cross-sections will be photographed from each side, and from mid-channel looking upstream, and then downstream. The structure will be photographed as well. We will perform streambed photography along each transect, using a submersible photo stand designed for this purpose. Photos will be back-to-back or overlapping, and if possible, will span the active channel (unvegetated portion of the cross-section) and will include in the photo a reference rule or card clearly marked in one centimeter segments for scale. The exact location along the transect of each photo will be recorded.

Physical process adaptive management monitoring: Re survey the cross sections and re-do the streambed photos after one year, two years, and (at least) five years or after any hydrological or sedimentation event that could likely affect the streambed, such as a large peak flow, mass wasting event, culvert or road fill failure upstream, breakup of the major logjam upstream, etc.

Attachment 2

ACC Comments and Questions on Pre-Proposals:
Rush Creek Side Channel Restoration Pilot Project

Note: Comments and questions that follow are directly from emails and/or discussions by the ACC.

Proposal should demonstrate that the project is scientifically supported, has a clear nexus to the Lewis River hydroelectric projects, and clearly supports the Aquatic Fund objectives. Please prepare the document with the assumption that the reader is not familiar with the Lewis River basin, its issues, or its resources.

While WDFW would be open to receiving a full proposal for this project, we do have some significant concerns regarding this project. The full proposal would need to show other situations where gravel augmentation was used above dams to improve habitat. WDFW is not sure that Rush Creek is a gravel starved system and that gravel augmentation is really addressing a key limiting factor. Final proposal should consider only doing the portion of the project that includes placing LWD and logs in manner that captures gravel and not include gravel augmentation. WDFW is very concerned about the cost estimate of $24,000 because we believe the costs in the final proposal will rise significantly from what is presented in the pre-proposal. WDFW does agree that there is limited juvenile rearing habitat in Rush Creek and this needs to be improved. The final proposal needs to clearly show how this project is going benefit juvenile rearing habitat for WDFW to be supportive of funding this project.

The LCFRB supports the GPTF's effort to secure habitat restoration funding from the Aquatic Fund, and encourages the Task Force to work with PacifiCorp and the ACC on future project proposals. Overall, however, this proposal lacks clarity of purpose, and would need substantial revision and additional information to be favorably considered for funding. The project is identified as a pilot, but it fails to adequately identify the problem it would address or the hypothesis it is attempting to test. The project objective appears to focus on the creation of a habitat type rather than restoring natural processes that create and sustain habitat.

According to the pre-proposal information supplied, the side channel currently provides bull trout rearing habitat for Rush Creek, but is not a primary spawning area. If the side channel is currently functional as rearing habitat, and spawning habitat is limited in mainstem Rush Creek, attempting to create unsustainable spawning habitat in the side channel seems ill-advised. A project proposal that attempts to restore natural processes (e.g., sediment transport and wood recruitment) would be more likely to be successful than temporary spawning habitat creation.

The sponsor should provide additional current and proposed habitat information, photos of the site(s), and rationale for the habitat-creation approach over process-based actions. This includes an evaluation of why gravel recruitment to the side channel is currently poor, a justification for the spawning pad approach, and an explanation of how this new habitat would be maintained over time. The full proposal should also include an explanation of how the project would be implemented without detrimental effects on currently functional rearing habitat.

Question proposing a project that will obliterate the only habitat where juvenile bull trout have been found and replacing it with spawning habitat. We do not like to see that this project may also create suitable steelhead spawning habitat.

Answers to questions are found throughout the document, but below is additional information related to the questions presented above.

Additional information related to above questions:

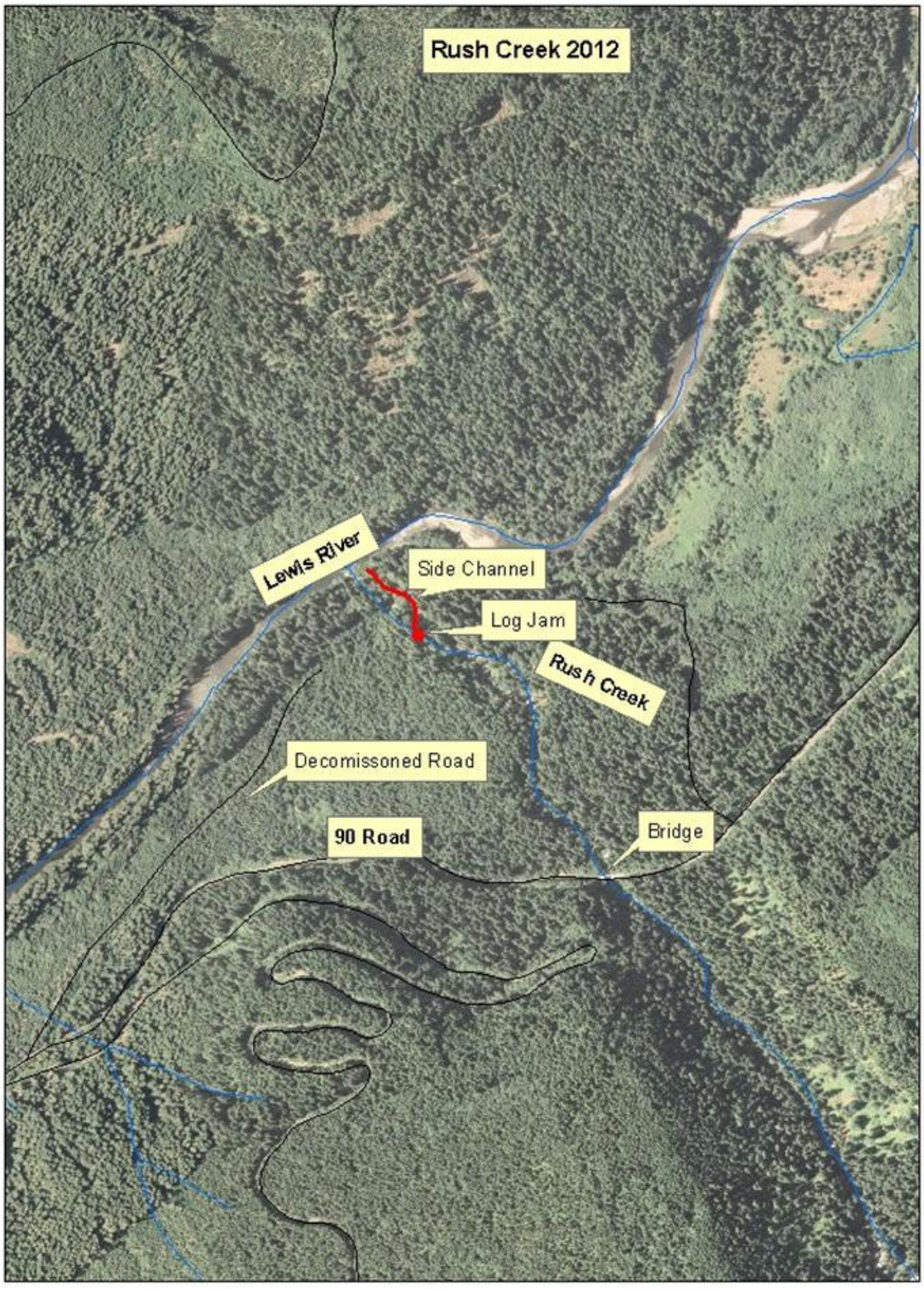
Gravel Augmentation Above Dams: Most projects and studies involving gravel augmentation occur downstream of dams because dams trap gravels and sediments leaving downstream stream reaches gravel deficient. The side channels in Rush Creek are upstream of any man made dams however they are created because of the logjam in Rush Creek which acts as a dam, trapping sediment and disrupting natural distribution downstream. J.R.Gerke found that spawner density was twice as high in Perkins Creek Washington after gravel augmentation occurred when compared to unimproved areas, and fry output from the stream increased. (Gerke 1974). USFWS Geomorphologist Paul Bakke determined that this side channel was lacking gravel recruitment, and that substrate cobbles that were present evolved as the stream down cut through the side channel.

This side channel currently provides bull trout rearing habitat, but spawning adults have been observed here, and juveniles found in the side channel probably were their progeny. This project will increase both spawning and rearing habitat for bull trout. The mainstem Rush Creek appears deficient of suitable size spawning gravel due to high velocities and steep gradients. Observations from the collaborative September 2011 field trip concluded that there probably was less gravel in Rush Creek than several years ago, and that gravel being held by the log jam creating the side channels had decreased substantially. Even the one "prime" spawning spot downstream of the log jam where bull trout had been observed spawning in the past had greatly reduced gravel. This spawning site typically has room for one to two pairs of bull trout to spawn and is only a narrow strip adjacent to stream margins about 6 feet wide and 10 feet long.

Photo1. Picture of side channel being proposed for habitat improvement

Photo 2. Picture of side channel being proposed for habitat improvement

Photo 3. Picture of side channel being proposed for habitat improvement


Rush Creek 2012
Lewis River
Side Channel
Log Jam
Rush Creek
Decomissoned Road
90 Road
Bridge
0
375
750
1,500
2,250
3,000
Feet
N
W
E
S

Rush Creek
Stream Survey, 2004
Skamania County, Washington

Level II, Version 2.4
Pacific Northwest Region, Region 6

Prepared For:
Gifford Pinchot National Forest
10600 NE 51st Circle
Vancouver, WA 98682

Prepared By:
R. Terry Lawson
Fisheries Technician
October 10, 2005

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TABLES

APPENDICES

OVERVIEW

Rush Creek Stream Survey Report, 2004
Mt. St. Helens Ranger District
Gifford Pinchot National Forest

Survey Methods

Survey Type: Pacific Northwest Region, Region 6 Stream Inventory, Version 2.4, Level II

Dates Surveyed: August 4 – 12, 2004

Surveyors: Observer: B. Michaelis **Recorder:** T.Lawson

Reaches and Lengths (miles): R1 2.3, R2 2.4

Stream Location:

USGS Quad Map: Burnt Peak, BUPK, Lone Butte, LOBU

Mouth Location[1]: Latitude: 46° 04' 28.37" N Longitude: 121° 56' 11.91" W

Survey End: Latitude: 46° 02' 22.56" N Longitude: 121° 52' 25.05" W

Headwater Location: Latitude: 46° 01'05.60" N Longitude: 121° 46' 04.71" W

Watershed Information:

Watershed: Lewis River

Tributary to: Lewis River

NFS Watershed Code: 17, 08, 00, 02, 01,11

Approximate Drainage Area: 26.37 sq. miles

Stream Order at Mouth: 4

Stream Class: II

Stream Discharge / Date: N/A

Distance Surveyed: 4.7 miles

Fish Species Observed: *Oncorhynchus clarki* (Cutthroat trout)
Salvelinus confluentus (Bull Trout)

[1] A Garmin model GPS72 was used to record latitude/longitude coordinates for the mouth and end of survey. There is an error of +/- of 58 feet at the mouth and an error of +/- of 35 feet for the end of the survey. A lat/long tool was used in GIS for the lat/long for the headwater location.

EXECUTIVE SUMMARY

Rush Creek, a tributary to Lewis River, is located in the Gifford Pinchot National Forest, Mount St. Helens National Volcanic Monument, Washington State. The stream is a large fourth-order tributary to Lewis River and the survey started on August 4, 2005 at river mile (RM) 0.0. Rush Creek was surveyed from the confluence with Lewis River up stream 4.7 measured miles to the Meadow Creek confluence, using Region 6 Level II Stream Inventory Methodology. The most striking observation about Rush Creek is the high volume of water over large boulder, bedrock substrate on steep gradient.

- **Rush Creek** is a 4th order stream that drains approximately 26.4 square miles (16876 acres). Due to safety reasons a discharge was not taken, the surveyors were unable to stand in the stream. However, data from three gaging stations will be used in the analysis. Rush Creek starts out in the Indian Heaven Wilderness at 4961 mean sea level (msl) and is feed by Placid Lake, Chenamus Lake, Junction Lake, and Lemei Lake. Meadow Creek, a major tributary contributes more than 50 percent flow to Rush Creek (USGS, 2005). At the confluence with the Lewis River, 1154 msl, Rush Creek has dropped over 3800 feet in elevation over a stream length of 10.8 miles (ave. 7% gradient). The Rosgen stream type for most of the surveyed section is B1 / B2.

- **Fish Populations** observed in Rush Creek included bull trout (*Salvelinus confluentus*) and Cutthroat trout (*Oncorhynchus clarkii*). Mountain Whitefish (*Prosopium williamsoni*), eastern brook trout (*S. fontinalis*), and unknown sculpin (*Cottus SP*.) were seen in the 1994 stream survey. Telemetry work in 1994 was found that approximately 75 percent of the spawning bull trout in the Lewis River population above Swift Reservoir spawn in Rush Creek (USFS, 1994).

- **Wood tallies** are below the recommended count of 80 pieces per mile. Both reaches have half of what is expected for a west-side stream. However, the potential for recruitment is good as the riparian vegetation is mature timber for the surveyed Reaches.

- **Pool Habitat** for the surveyed section is good for the type of stream that it is. The pools average 65 feet length and have a mean depth of 5.5 feet. In the lower section of reach 1 (below FR 90 crossing), large woody material (LWM) is associated with the pools. Above the road crossing the pool formation is boulder, bedrock. The stream is characterized as plunge pool, riffle system.

- **Bank Stability**, (amount of erosion above bankful), measured in every unit, was excellent throughout the survey. Only 682 feet (2.7 percent) of the total distant measured show signs of bank erosion. Likely reasons for this are; good ground cover by brush and trees, and the large amount of bedrock and boulders that make-up the banks.

- **Channel stability** evaluated using the Pfanfuch channel stability rating system resulted in a stability rating of 50 placing both reaches in the "Good" range. The rating system ranges from 0 to over 115, the lower the number the better the rating and measures elements in the upper and lower banks and channel bottom.

BASIN DESCRIPTION

WATERSHED AND FLOW REGIME

General Characteristics

***Location*:** Rush Creek, a tributary to the Lewis River, is located in the Gifford Pinchot National Forest, Mt. St. Helens National Volcanic Monument. Rush Creek was surveyed August 4 - 12, 2004 (SOs 1-54) using protocols established in the Region 6 Stream Inventory Methodology. The start of the survey was located at the mouth of Rush Creek at the Lewis River confluence, located at Latitude 46° 04' 28.37" N, Longitude 121° 56' 11.91" W. The survey ended at approximate RM 4.7 (SO 54) at the Meadow Creek confluence. A total of 4.4 mapped miles and 4.7 measured miles were surveyed. The most notable feature of Rush Creek was the high volume of flow, bedrock pool formations, and the water fall at RM 2.9 (SO 21). A vicinity map showing the location of Rush Creek is provided in Appendix A.

***Stream Order*:** Rush Creek is a 4th order stream throughout the length surveyed.

***Flow*:** Discharge was not measured. The decision was based on safety of the surveyors. However, USGS maintained a gaging station above the fall at Latitude N46° 03' 12", Longitude W121° 54'40" (RM 2.08, SO 28) for 22 years (USGS, 2005). The daily mean values for August 4 is 147 cubic feet per second (cfs). Along with the above gaging station the USGS also maintained gaging stations on the Meadow Creek at Latitude 46° 02' 50", Longitude 121° 51' 20". This site is near Lone Butte meadow on Meadow Creek and there are only a couple of small tributaries entering Meadow Creek below the gaging station. Data from this station indicates that Meadows Creek supplies over 90 percent of the flow during the dry months of August and September. Data from the three gaging stations (Rush Creek above the fall, Rush Creek above Meadow Creek and Meadow Creek below Lone Butte) is contained in Appendix E.

***Elevation and Gradient*:** The elevation of Rush Creek at the start point was determined to be approximately 1154 feet, and the elevation at the end point, at RM 4.7 (SO 54) was determined to be 2922 feet. Thus, the average gradient of the surveyed portion of Rush Creek is approximately 7.1 percent. However, it should be noted that it is not very accurate to determine the gradient of a channel using a 1:24,000 scale USGS topographic map as described in the Region 6 Stream Inventory Methodology.

***Sinuosity*:** Values from a digitized map were used to calculate an average sinuosity of 1.1 for the surveyed portion of Rush Creek.

Reach Summaries

Table 1 lists the major channel characteristics observed in the Rush Creek Stream Survey.

Table 1: ***Major Channel Characteristics of Rush Creek***, Gifford Pinchot National Forest, Washington.

ATTRIBUTE	REACH 1	REACH 2
Channel Characteristics		
Stream order	4	4
Habitat units (SOs)	1-28	29-54
River miles (mapped)	2.1	2.3
Length (miles measured in field)	2.3	2.4
Valley width (feet)	50	60
Rosgen channel Type	A1	B1
Bankfull width:depth ratio	N/A[2]	N/A[2]
Mean gradient (percent)	10.09	4.53
Mean D_{50} (in mm, with range)	N/A	N/A
Mean D_{84} (in mm, with range)	N/A	N/A
Pfankuch stability rating	50 (Good)	50 (Good)
Bank Stability (percent)	95.8	98.7
Aquatic Habitat		
Mean riffle width (feet)	37.5	46.0
Percent riffle (area)	97	95
Percent pool (area)	3	5
Pool:riffle ratio (area)	0.03	0.05
Pools/mile	2.6	3.3
Large (>3 ft. deep) pools/mile	2.6	3.3
Mean residual depth of pools (feet)	4.1	3.6
LWM (medium + large pieces)/mile	37.54	36.32
Total debris (LWM + small pieces)/mile	62.71	87.09
Percent fines (<6mm) in riffles	N/A	N/A
Max 7 day average (F^o)	N/A	N/A
Riparian Vegetation		
Inner riparian zone		
Dominant seral stage	Mature	Mature
Dominant overstory species	Western Hemlock	Western Hemlock
Dominant understory species	Douglas Fir	Douglas Fir
Outer riparian zone		
Dominant seral stage	Mature	Mature
Dominant overstory species	Western Hemlock	Western Hemlock
Dominant understory species	Western Hemlock	Western Hemlock
Fish and Barriers		
Fish species observed[3]	ONCL, SACO	ONCL, SACO
Natural migration barriers (#)	3	0
Culvert migration barriers (#)	0	0

Note: See Tables 2 – 6 for more specific information.

[2]Data was not collected, safety concerns.
[3] Species codes: cutthroat trout (ONCL) and bull trout (SACO)

Reach 1

Useful Reach Information:
This is the third stream survey the first was done in September of 1989 and the second in August 1994. This survey divided the first reach into two, with a reach break at FR 90 bridge crossing. The raw data and copy of the stream survey report can be seen at Mount St. Helens National Volcanic Monument office in Amboy, Washington.

Location: Reach 1 of the Rush Creek stream survey started at the Lewis River confluence, at Latitude 46^{o} 04' 28.37" N, Longitude 121^{o} 56' 11.91" W, extended 2.0 measured miles to Latitude 46^{o} 03' 12" N, Longitude 121^{o} 54' 40" W[4], and included 28 habitat units (SOs 1 – 28). The survey of Reach 1 started on August 4, 2004.

Stream Order: 4rd order.

Frequency of Measured Units: Rush Creek presented a problem, due to the high flow volume, narrow channel, steep gradient, and bedrock substrate it was impossible to cross the creek. All length and width measurements were taken with a Laser Technology, Inc. Impulse 200 laser ranging instrument. Every habitat unit length and width was measured. Water depths were measured where possible; in most cases the pool depths exceeded four foot depths and were estimated. No bankful measurements were taken nor were pebble counts preformed for safety reasons.

Access: Forest road (FR) 90 crosses Rush Creek approximately a quarter mile up stream from the confluence of Lewis River and Rush Creek. A trail and old spur road off of FR 90 will lead to the confluence. There is a primitive trail that goes up the left hand side of the creek (standing on the bridge looking up stream,). The trail is approximately 1.75 miles in length and stops short of the falls.

Reach 1
Overall Reach 1 of Rush Creek is characterized as Rosgen Type A1. However, the first quarter mile of stream is a B3. The bedrock starts at FR 90 crossing and is the dominate feature to the end of the reach. Rush Creek is a high gradient stream that is dominated by bedrock substrate and deep pocket pools. The valley is very narrow restricting the channel width and forcing average waters depths to exceed 3 feet.

Reach 1 was characterized as predominantly a Rosgen Type A1 channel in a narrow valley. The maximum riffle depth averaged 4.3 feet with an average riffle depth of 2.5 feet. The average wetted riffle width is 37.6 feet. Two side channels with a combined length of 230 feet were observed in the reach. The substrate consisted primarily of bedrock and boulders. Banks were fairly stable, with 96 % showing no signs of erosion. The overstory and the understory were dominated by conifers (Douglas fir and western hemlock) in the outer zones and inner zone. There is evidence of timber management in the drainage, however, the leave blocks seem to be of adequate size. Large woody material, of all three size classes, was present throughout the reach. The average water temperature, taken with a hand held thermometer was 8^{o} C.

[4] GPS coordinates are from GIS mapping. Unable to obtain GPS coordinated in the field.

Reach 2

Useful Reach Information:
The reach break between Reaches 1 and 2 is located by a tributary entering from the right bank. Also at this location the U.S. Geological Service (USGS) managed a gaging station. The station was in operation from November 1929 to January 1974. Data from this is can be obtain from the USGS web page, station number is 14215000 and copy of the data is in Appendix E.

Location: Reach 2 of the Rush Creek stream survey started at RM 2.25 (SO 29), at Latitude 46^{o} 03' 12"N, Longitude 121^{o} 54' 40" W, and extended up stream to RM 4.7 (SO 54), Latitude 46^{o} 02'22.56" N, Longitude 121^{o} 52' 25.05" W[5], and included 25 habitat units (SOs 29 – 54). The survey of Reach 2 started on August 10, 2004.

Stream Order: 4th order.

Frequency of Measured Units: Rush Creek presented a problem, due to the high flow volume, narrow channel, steep gradient, and bedrock substrate it was impossible to cross the creek. All length and width measurements were taken with a Laser Technology, Inc. Impulse 200 laser ranging instrument. Every habitat unit length and width was measured. Water depths were measured where possible; in most cased the pool depths exceeded four foot depths and were estimated. No bankful measurements were taken nor were pebble counts preformed for safety reasons.

Access: Use FR 3211 and 3211722 to access the start of the reach and FR 30 accesses the upper end.

Reach 2
Reach 2 is a Rosgen B1 channel type. Characterized by steep channel gradient, moderate width:depth ratio and low sinuosity. Reach 2 starts above the last falls (SO 29) and is were USGS had a gaging station for 45 years. Part of the structure is still there. The gradient flattens a little from the average 10 percent in Reach 1 to an average of a little over 4 percent. The maximum riffle depth averaged 3.9 feet with an average riffle depth of 1.9 feet. The average wetted riffle width is 46 feet. Two side channels with a combined length of 263 feet were observed in the reach. The substrate consisted primarily of bedrock and boulders. Banks were fairly stable, with 98.6 % showing no signs of erosion. The overstory and the understory were dominated by conifers (Douglas fir and western hemlock) in the outer zones and inner zone. There is evidence of timber management in the drainage, however, the leave blocks seem to be of adequate size. Large woody material, of all three size classes, was present throughout the reach. The average water temperature, taken with a hand held thermometer was 8^{o} C.

Tributaries

Reach 1: The USGS 7.5 minute topography map (Appendix A) for the drainage shows a number of tributaries entering on either side of Rush Creek. However, none of the streams met

[5] GPS coordinates are from GIS mapping. Unable to obtain GPS coordinated in the field.

protocols as listed in the Stream Inventories Handbook, version 2.4. The map shows all the tributaries entering on the right bank (looking down stream). These streams are coming off of Crazy Hills on the north side (right bank) of Rush Creek. During the survey time none of these tributaries offer habitat for the resident fish population. The survey ended at Meadow Creek a tributary that is contributing over 50 percent of the Rush Creek flow. This tributary enters Rush Creek on an eight percent grade, water temperature at 11:45 AM in the morning was 6^{o} C (hand held thermometer).

Photo 1: Meadow Creek, tributary to Rush Creek, Gifford Pinchot National Forest, Washington, end of survey.

FAUNAL COMMUNITY

Fish Community

Fish Presence: Radio telemetry work has been done (1994) found that approximately 75 percent of the spawning adults in the Lewis River population above Swift Reservoir spawn in Rush Creek (USFS, 1994). The US Forest Service and the Washington Department of Fish and wildlife have been conducting snorkeling surveys and have maintained a screw-trap in Rush Creek, an effort to monitor the bull trout population. Daytime snorkel surveys were conducted to ascertain the presence or absence of fish species above the falls, surveys were conducted in SO's 28 and 39 (RM 2.08 and RM 3.2). Only cutthroat trout were seen in Reach 2.

Barriers to Fish Passage: All three falls are barriers to fish. The first is at SO #18 (RM 1.78) and it is a 27 foot fall. The next fall is at SO 21(RM 1.8) and is estimated to be 100 foot high. The last fall is a 20 foot fall at SO 23 (RM 1.83). The pool count does not indicate quality pool habitat, however, the high gradient cascades have deep pocket pools that in some other systems would probably have been counted as pools.

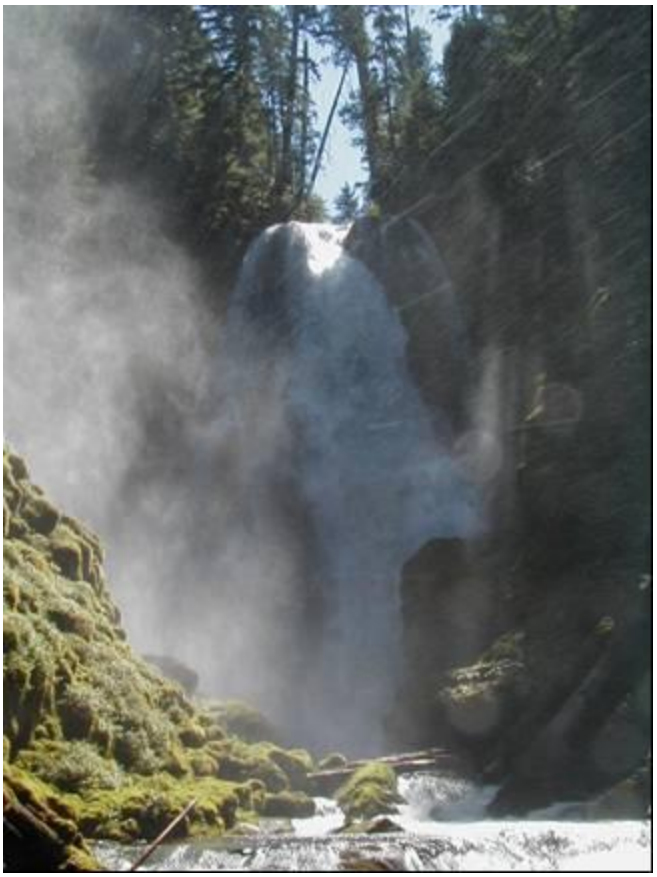

Photo 2: SO #23 (RM 1.8), highest fall on Rush Creek, Gifford Pinchot National Forest, Washington. Estimated height is approximately 100 feet. This is the middle of three falls.

Other Fauna

Amphibians: None were seen.

Birds: Limited bird sighting were made during the Rush Creek survey. Surveyors observed a few American Dippers (*Cinclus mexicanus*) throughout the survey. It should be noted that this list is by no means exhaustive. Other birds were seen or heard but could not be identified .

Mammals: Other than an occasional deer track no mammals were seen. One would expect because of the general isolation that more mammals and birds would have been seen.

IN-CHANNEL HABITAT

Temperature

Temperatures were recorded in degrees Celsius at the beginning of the work day, at noon, and at the end of the day using a hand held thermometer. The temperature was 8 to 9^{o} C in Reach 1 and 6 to 8 in Reach 2. The maximum temperature recorded was 9^{o} C in Reach 1 and 8^{o} in Reach 2. Temperature for a tributary entering on the right bank at SO 45, F25 was measured with a hand held thermometer and was 6^{o} C.

Large Woody Material (LWM)

Woody Debris: Definitions of woody debris size categories can be found below in Table 2. Existing number of woody debris in the small, medium and large size categories are located in Table 3.

Table 2: ***Definitions of wood size classes west of the High Cascades.***

Size	Diameter	Length
Small	> 12 inches at 25 feet from large end	>25 feet or 2X the bankfull width
Medium	> 24 inches at 50 feet from large end	>50 feet or 2X the bankfull width
Large	> 36 inches at 25 feet from large end	>50 feet or 2X the bankfull width

Woody Debris Density: Woody debris densities are low for a west side stream. A region 6 stream survey protocol requires 80 pieces per mile of large class wood. Rush Creek only has 12 pieces per mile. There has been timber harvesting in the watershed but a buffer meeting the Aquatic Conservation Strategy (ACS) is in place along most of the stream up to Meadow Creek. A few possible reasons why the wood count is low are; 1) stream gradient is high and stream flow is high both of these elements will move the wood getting to the stream out of the system faster, 2) the valley is narrow and a number of logs are suspended overhead, hung up on the bedrock, 3) the growing site is poor due to the rocky soils, reducing the size potential of the trees. The GIS vegetation cover for the Gifford Pinchot National Forest indicates that the average diameter for the timber stand bordering Rush Creek is 19 inches at breast height and the stand is over 200 years. Well below the large wood protocol.

Existing density of woody debris in the small, medium and large size categories are located in Table 3.

Table 3: ***Existing number of in-channel woody debris per reach and woody debris density***, Rush Creek, Gifford Pinchot National Forest, Washington.

Reach Number	Corrected Length In Miles	Number of Pieces In-Channel				Density per Mile			
		Small	Medium	Large	Total	Small	Medium	Large	Total
1	2.3	76	57	28	161	33	25	12	70
2	2.4	123	57	31	179	51	24	13	88

Woody debris: A log jam (or debris jam) is defined as a complex of wood with 3 or more pieces. The wood does not need to be in a countable category. Log jams were observed during the Rush Creek stream survey but most of the wood count came from single logs. Reach 1 has a good accumulation of woody material below the bridge. This jam (the only one in Reach 1) has caused the stream to braid and there are a couple of small falls associated with the jam. The jam looks fresh and may not have been in place for very long. The 1994 stream survey does not list it. There are two logjams in Reach 2. Both of the jams are associated with a lessening in gradient and a widening of the steam channel. All of the other logs counted were in one or two's and resting on the channel banks or suspended across the channel.

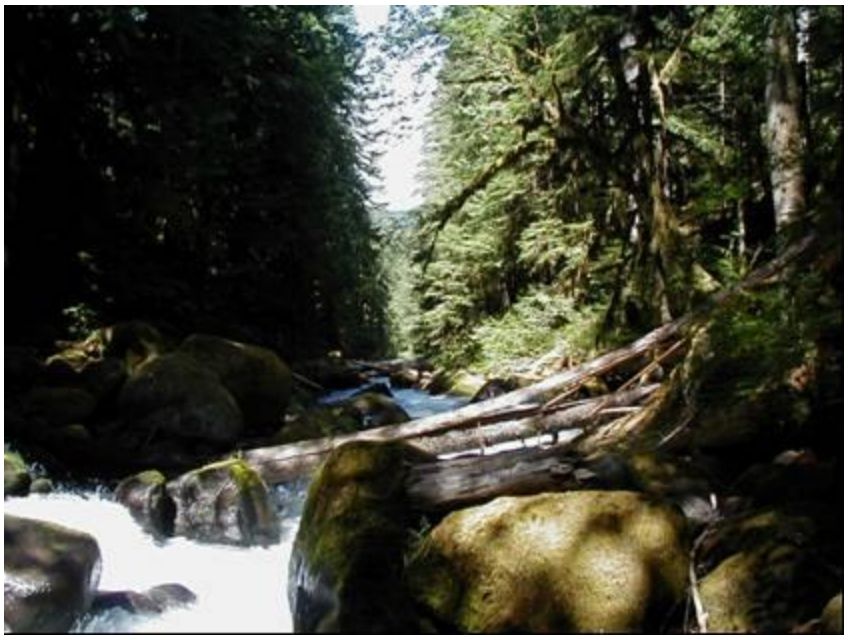

Photo 3: At SO #11 (RM0.9), looking up stream at wood that has fallen into Rush Creek, Gifford Pinchot National Forest, Washington. It is a little hard to see but in the back ground there is more wood across the channel.

Pools

Note: Under current surveying procedures, a pool (or slow water unit) is defined as any habitat unit possessing pronounced scour, a hydraulic control at the tail crest, greater depth and lower average velocities than surrounding non-pool units. The overall availability of pool habitat to fish and the average dimensions of existing pools are also taken into account when identifying habitat units. Primary pools are those having greater than 3 ft. depth.

Pool Frequency, Quality and Quantity: The number of pools per reach, pool frequency and pool / riffle ratio appears below in Table 4.

Table 4: ***Pool dimensions and abundance per reach***, Rush Creek, Gifford Pinchot National Forest, Washington.

Reach Number	Corrected Reach Length (Miles)	Pool Area (%)	Pool Area to Riffle Area Ratio	Total Pool Number		Pools w/ >3 ft. Depth per Mile	Pools, all Depths Per Mile
				>3 ft. Depth	All Depths		
1	2.3	3.0	0.03	6	6	2.6	2.6
2	2.4	5.0	0.05	8	8	3.3	3.3

The survey does not indicate a high numbers of pools in Rush Creek. However, the pools that were measured are of high quality. All pools were estimated with depths of greater than 5 feet and in Reach 1, 6 out of the 8 pools where estimate to be deeper than 5 feet. The riffles in Reach 1 contain pocket pools with estimated depths of between 3 and 5 feet with average estimated depths of 2.5 feet. The maximum water depths of the riffles in Reach 2 range from 3 to 5 feet with the average depth of 1.9 feet.

Substrate

Wolman pebble counts were not done in Rush Creek. The substrate below the FR 90 bridge in Reach 1 was pre-dominantly cobble / gravel and the rest of the stream has a substrate of bedrock / boulders with gravel and sand.

Photo 4: Examples of substrate sizes in Rush Creek, Gifford Pinchot National Forest, Washington. Picture on left is SO 1 (RM 0.0) below FR 90 Bridge, picture on right is SO 48 (RM 3.7).

Channel Stability and Bank Stability

Channel stability was measured for each reach using the Pfankuch channel stability evaluation, which applies matrices to various categories of the upper banks, lower banks and the channel bottom to develop an overall rating for the reach being surveyed. The Pfankuch Rating for the reach is then converted to a Reach Condition (good, fair or poor) by stream type based on relationships developed by Rosgen. The Pfankuch Ratings and Reach Conditions for the reach is presented in Table 5. It should be noted that Pfankuch evaluations are only useful when applied to short reaches of consistent morphology, i.e. the same Rosgen stream type. Therefore, its applicability to long reaches is somewhat questionable. The Pfankuch Channel Stability Evaluation and Stream Classification Summary Forms are provided in Appendix E.

Table 5: ***Pfankuch Ratings and Reach Conditions of Rush Creek***, Gifford Pinchot National Forest, Washington.

Reach Number	Stream Type	Pfankuch Rating	Reach Condition
1	A1	50	Good
2	B2	50	Good

Bank stability is a measure of actively eroding banks at an elevation above the bankful stream margin and was measured in every unit. Bank stability rating is good for both reaches with Reach 1 having 95 percent and Reach 2 98.6 percent stable banks. The amount of bedrock and boulder covering the banks helps to reduce the amount of unstable banks.

Special Habitats

Side Channels: Reach1 had two side channels, totaling a distance of 230 feet, 1.8 percent of the total distance surveyed. Both side channels were located below the FR 90 crossing. The side

channels are at SO5 (RM 0.4) and SO 7 (RM 0.6). The average maximum depth was 2.7 feet with an average estimated wetted width of 3 feet. Reach 2 had two side channels, totaling a distance of 263, 2.0 percent of the total distance surveyed. The side channels are at SO 43 (RM 3.4) and SO 49 (RM 3.7). The average maximum depth was 3.4 feet with an average estimated wetted width of 8 feet. Habitat conditions were fair in all of the side channels.

Falls and Chutes: Reach 1had only two chutes at SO 9 (RM 1.62) and SO 26 (RM 1.93). The first chute is 183 feet in length with a wetted width of 54 feet and an estimated elevation difference of 18 feet. The second chute is 123 feet in length with a wetted width of 23 feet and an estimated elevation difference of 28 feet. The substrate for both chutes was bedrock and they are not barriers to fish. There are no chutes in Reach 2. There are 3 falls in Reach 1, SO 18 (RM 1.78), SO 21, (RM 1.81) and SO 23 (RM 1.83). All three are of sufficient height to be barriers to fish. Table 6 contains the data for the three falls. There are not any falls in Reach 2.

Table 6: ***Falls data for Reach 1, Rush Creek***, Gifford Pinchot National Forest, Washington.

Sequence Order	Height (ft.)	Width (ft.)	Spill Pool Depth (ft.)
SO 18	27	20	6+
SO 21	110	50	6+
SO 23	20	18	6+

Braids: The section below FR 90 bridge is the only area that contained braids. The braids are caused in part by the log jam below the bridge.

RIPARIAN HABITATS

Description of Riparian Vegetation

Riparian vegetation was recorded only in measured units. For this survey, it was separated into an inner zone of 50 feet and an outer zone of 50 feet. In Reach 1and 2 the dominate overstory and understory, in both zones, was mature western hemlock *(Tsuga heterophylla)* and Douglas fir *(Pseudotsuga menziesii)* with some western red cedar *(Thuja plicata)* intermixed. Heavy timber harvesting is evident in the aerial photos of the stream course. Due to the geomorphology of the valley only one of the timber units was visible from the stream.

MANAGEMENT ACTIVITIES / IMPACTS

In-channel Alterations

There is no evidence of apparent human made in-channel alterations observed in Rush Creek.

Recreation

Trails: No major recreational hiking trails are in the vicinity of Rush Creek. A minor trail that follows the left bank (looking upstream from FR 90 bridge). The primary purpose of this trail is for access to Rush Creek for bull trout monitoring. The trail is primitive in nature and stops approximately a quarter mile from the first fall SO18 (RM 1.78).

Campgrounds: No campgrounds are located in the Rush Creek watershed. No dispersed camp sites were seen in the survey area.

Roads: An old spur road that comes off of the north side of FR 90 accesses the confluence area of Lewis River and Rush Creek. This road is closed at the junction and is used as the access route to a Washington Department Fish and Wildlife screw trap location in Rush Creek. Forest road 3211, north of Rush Creek, and FR 30 were used to access Rush Creek for the survey.

Timber Harvests

Timber harvesting had taken place in the watershed. Aerial photos of the drainage give a clear picture of the amount of timber harvesting activity (Appendix D). Most of the leave blocks of timber between the stream and harvest units are of adequate widths. Only one of the plantations was visible from the stream.

RECOMMENDATIONS

The two reaches surveyed for this survey appear free from most of the natural and human type of activity associated with other areas. The stream shows little (if any) indication of high water damage. In fact, based on visible indicators there is very little fluctuation in the water level. Past timber harvesting in the drainage has not produced the same results as elsewhere (road failures, slides, or scour out creek channels). All of the plantations are doing well and the leave blocks are supplying Rush Creek with woody material.

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U.S. Department of the Interior, U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, ND 58401 USA, http://frogweb.nbii.gov

Appendix A

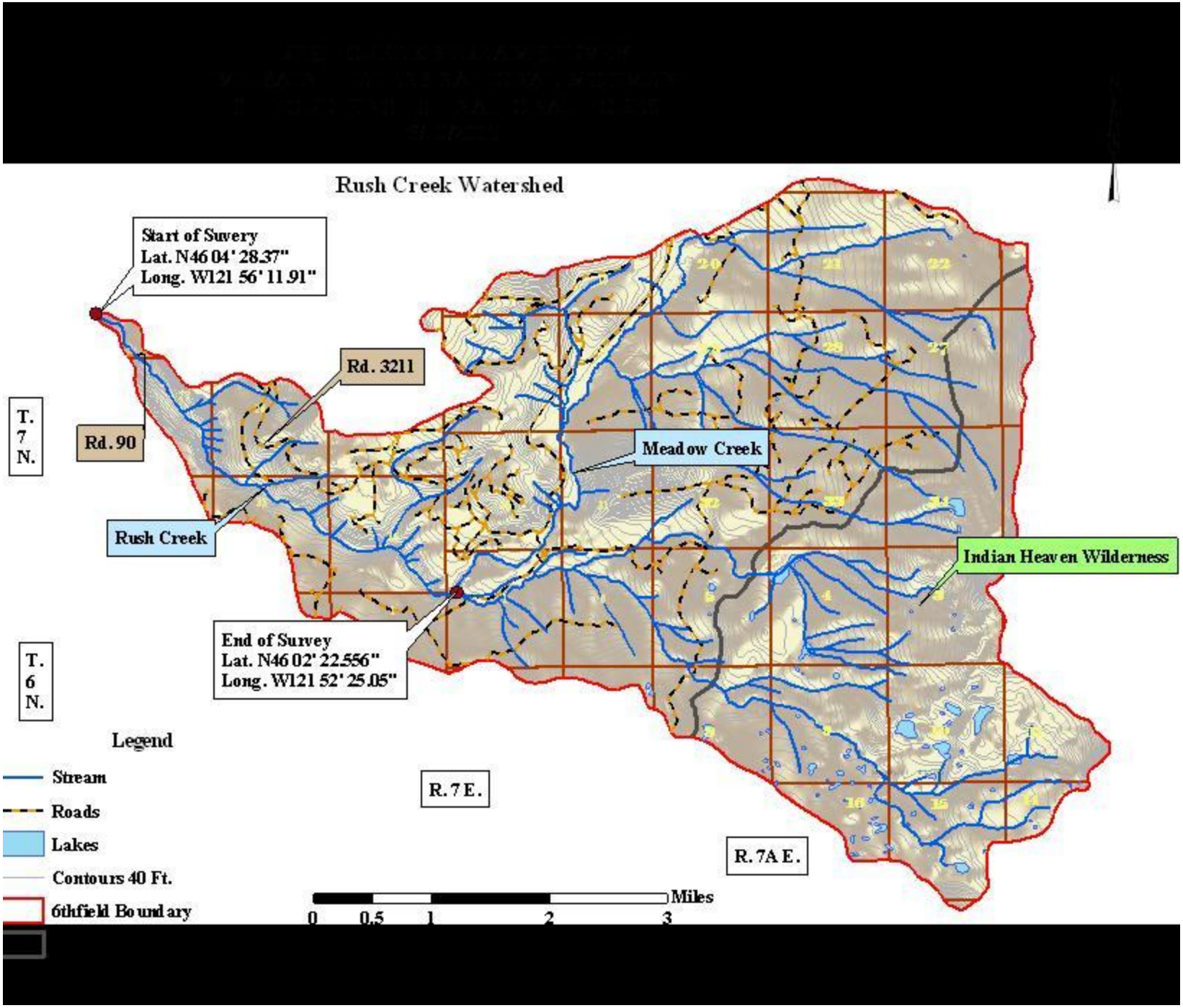
Maps

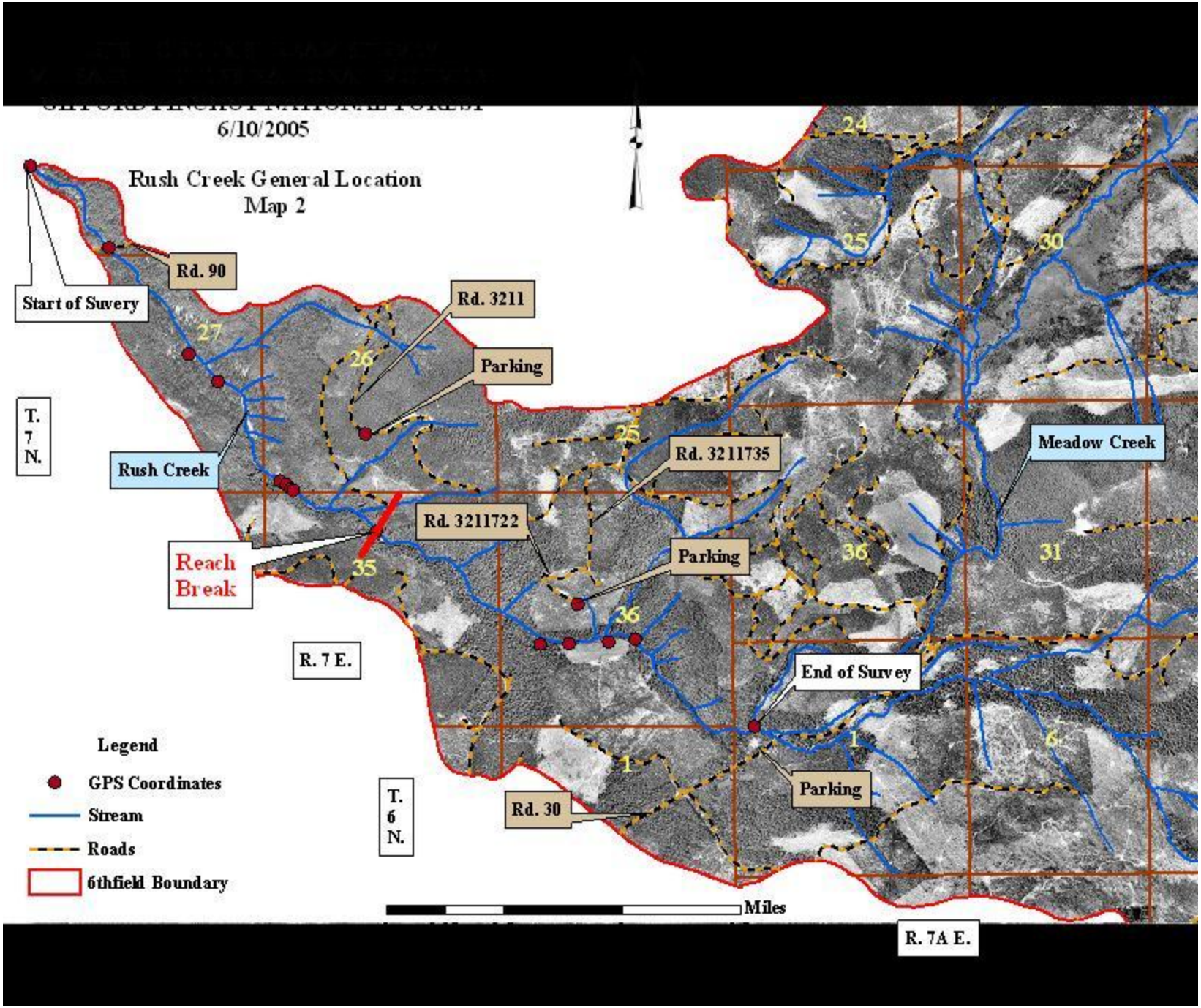
Watershed

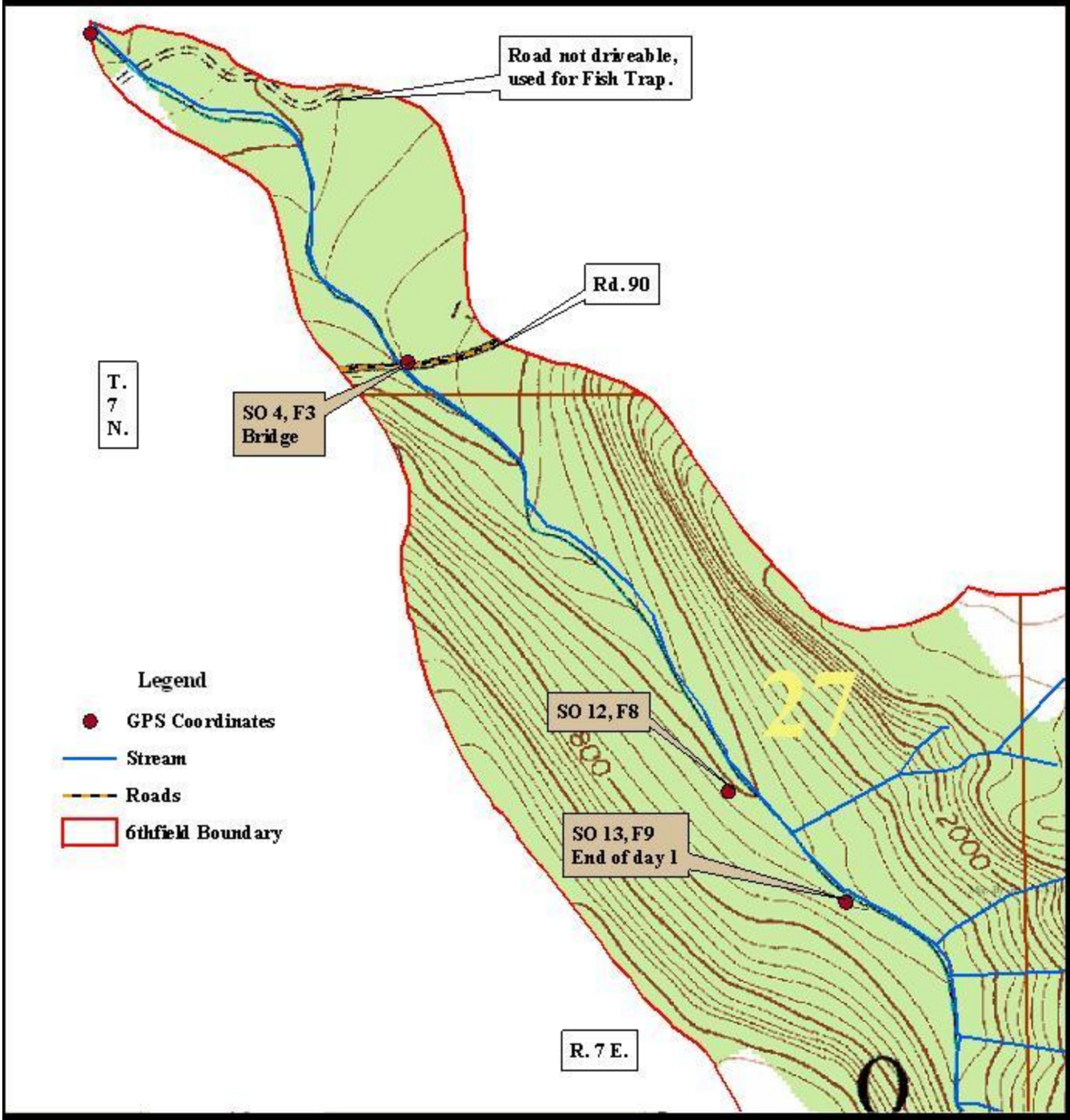
General

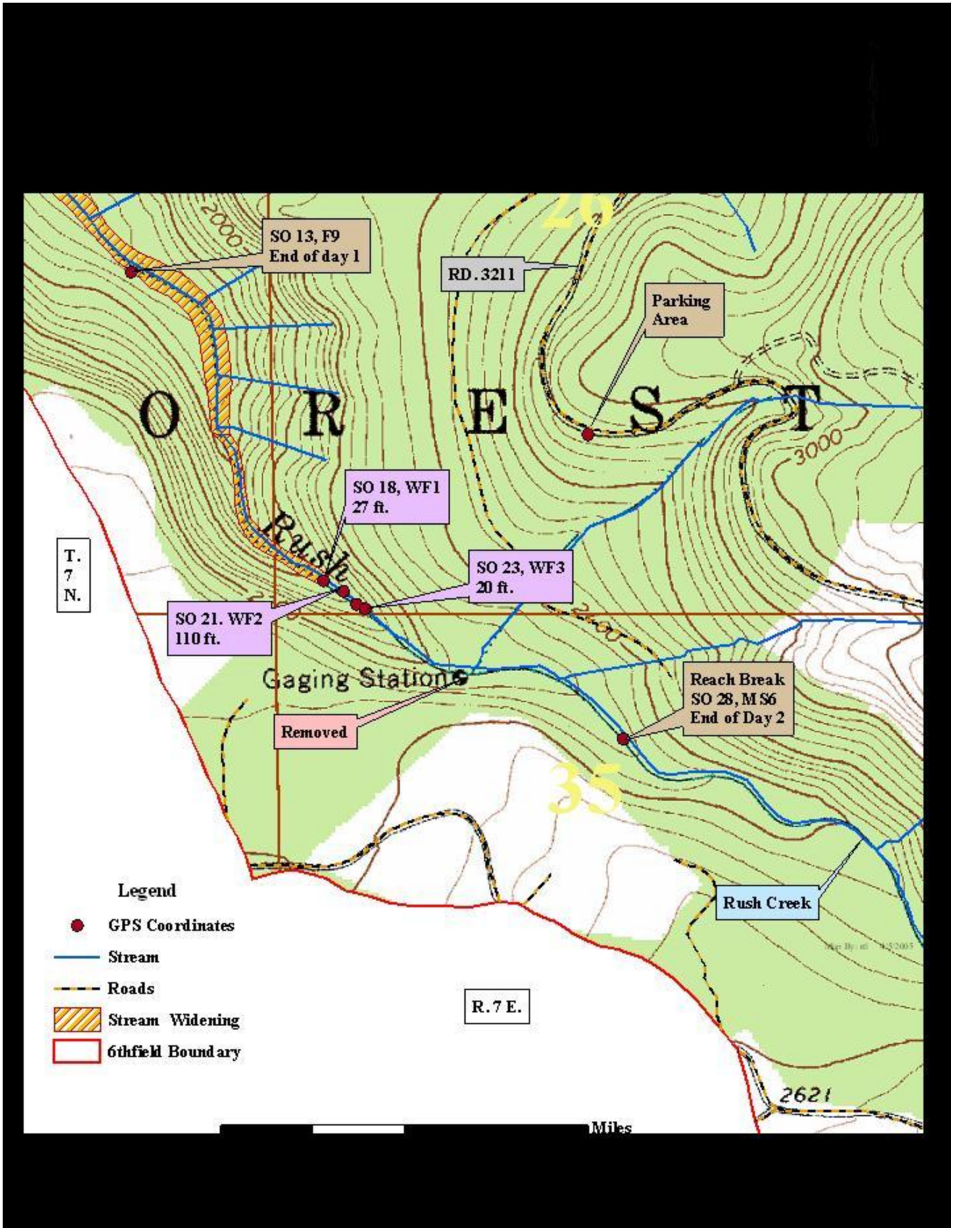
Stand Age

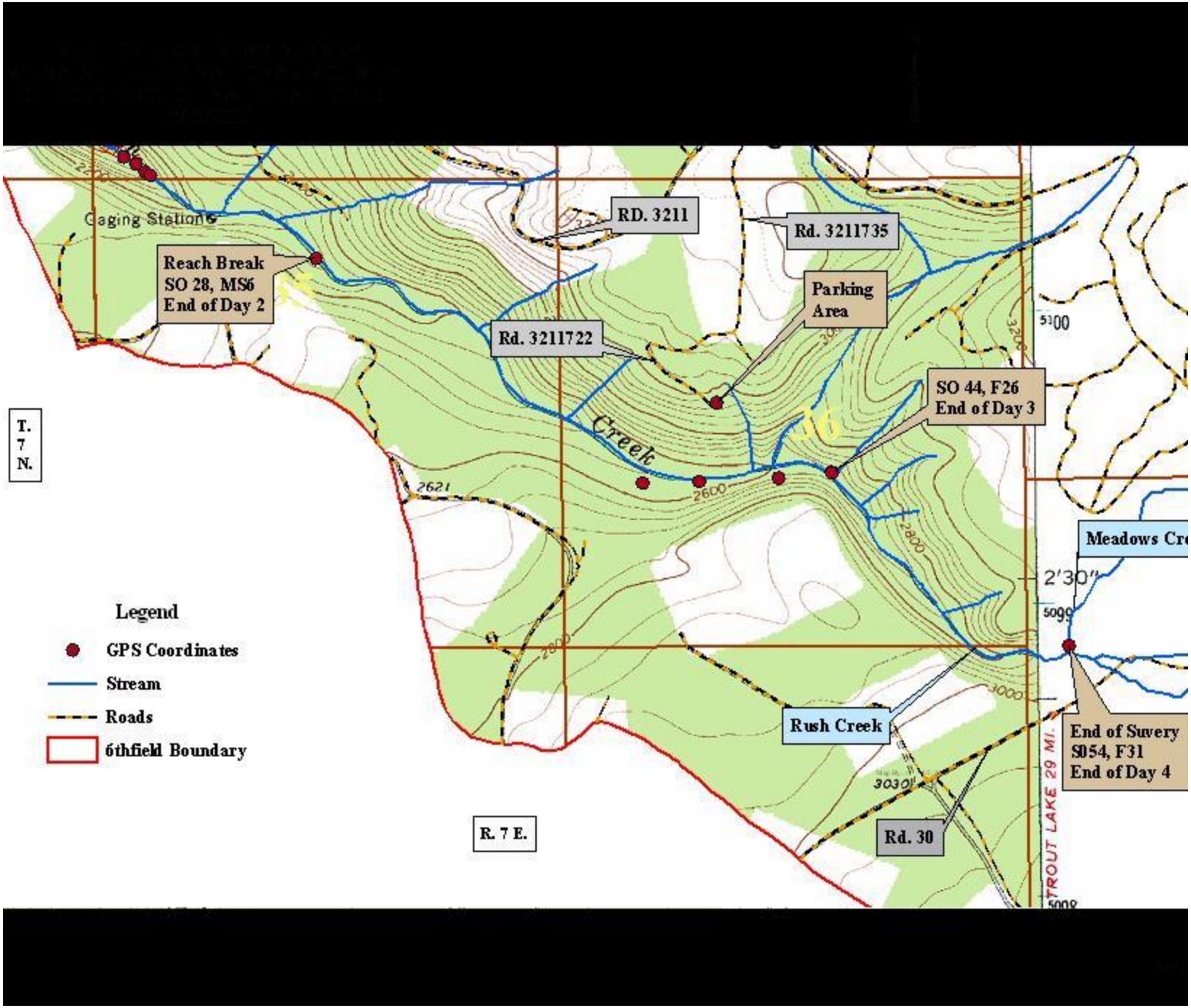
Reach


Rush Creek Watershed
Start of Suvery
Lat. N46 04' 28.37"
Long. W121 56' 11.91"
Rd. 3211
Rd. 90
Meadow Creek
Rush Creek
Indian Heaven Wilderness
End of Survey
Lat. N46 02' 22.556"
Long. W121 52' 25.05"
T. 7 N.
T. 6 N.
R. 7 E.
R. 7A E.
Legend
Stream
Roads
Lakes
Contours 40 Ft.
6thfield Boundary
0 0.5 1 2 3
Miles


6/10/2005
Rush Creek General Location
Map 2
Start of Suvery
Rd. 90
Rd. 3211
Parking
Rush Creek
Rd. 3211735
Meadow Creek
Rd. 3211722
Reach
Break
Parking
End of Survey
Parking
Rd. 30
T.
7
N.
T.
6
N.
R. 7 E.
R. 7A E.
Legend
GPS Coordinates
Stream
Roads
6thfield Boundary
Miles


Road not driveable, used for Fish Trap.
Rd. 90
T. 7 N.
SO 4, F3 Bridge
SO 12, F8
SO 13, F9 End of day 1
R. 7 E.
Legend
GPS Coordinates
Stream
Roads
6thfield Boundary


SO 13, F9
End of day 1
RD. 3211
Parking
Area
O R E S T
SO 18, WF1
27 ft.
Rush
SO 23, WF3
20 ft.
T.
7
N.
SO 21. WF2
110 ft.
Gaging Station
Removed
Reach Break
SO 28, M S6
End of Day 2
Rush Creek
R. 7 E.
Legend
GPS Coordinates
Stream
Roads
Stream Widening
6thfield Boundary
Miles
2000
3000
2621


Gaging Station
Reach Break
SO 28, MS6
End of Day 2
RD. 3211
Rd. 3211735
Parking
Area
Rd. 3211722
SO 44, F26
End of Day 3
Creek
T.
7
N.
2621
2600
2800
3000
3030'
5100
2'30"
5099
Meadows Cr
Rush Creek
End of Suvery
S054, F31
End of Day 4
Rd. 30
R. 7 E.
TROUT LAKE 29 MI.
5008
Legend
GPS Coordinates
Stream
Roads
6thfield Boundary

Appendix B

Global Positioning Satellite (GPS) Data

GPS Data collected during stream survey of Rush Creek, Gifford Pinchot National Forest, Washington State, using a Germin[tm] handheld GPS 72 unit.

Rush Creek August 4, 2004 to August 12, 2004

Point	Zone	Easting	Northing	Elevation	Error +/-	Comments
1	10	582230	5102662	1071	58	SO 1, Confluence with East Fork Lewis R.
2	10	582766	5102106	1156	20	SO 4. Bridge
3	10	583309	5101380	1475	78	SO 12, Start of the channel widening
4	10	583508	5101192	1705	45	SO 13, end of F9, End of day 1
5	10	587158	5098846	2886	35	End of Survey, Meadow Creek junction
6	10	584509	5100836	2763	20	Rd. 3211 Access for end of Reach #1
7	10	583929	5100515	1896	35	SO 16, F12, Logjam
8	10	583972	5100492	1989	35	SO 18, WF1, First Falls
9	10	584002	5100464	2194	62	Second Falls, the BIG ONE!
10	10	584020	5100453	2144	32	Third Falls
11	10	584586	5100169	2415	20	End of Day 2
12	10	585954	5099676	3012	15	Access from Rd. 3211722
13	10	585701	5099401	2888	42	SO 39, MS10
14	10	585895	5099407	2942	88	SO 41, S11, Corner of Plantation
15	10	586165	5099418	3012	121	SO 43, SIDEF2, Left Bank
16	10	586346	5099438	2464	22	Corner of Plantation, End of Day 3
17	10	586348	5099436	2755	35	SO 48, F27, Trib enters on rigth bank

Datum: NAD 1927 Zone 10

Appendix C

Reach Photographic

Aerial Photographic

Photo 1
August 4, 2004
Reach 1 – SO1, F1
Confluence of Rush Creek and Lewis River, looking up stream.

Photo 2
August 4, 2004
Reach 1 – SO1, F1
Looking up stream, notice medium size wood across stream.

Photo 3
August 4, 2004
Reach 1 – SO4, F3
Looking up stream, Forest Road 90 bridge across Rush Creek.

Photo 4
August 4, 2004
Reach 1 – SO9, CH1
Looking downstream, bedrock chute.

Photo 5
August 4, 2004
Reach 1 – SO10, F6
Looking up stream

Photo 6
August 4, 2004
Reach 1, SO13, F9
Log jam

Photo 7
August 10, 2004
Reach 1, SO14, F10
Looking up stream, large size wood laying across stream, boulder, bedrock substrate.

Photo 8
August 10, 2004
Reach 1, SO15, F11
Bank erosion on right bank

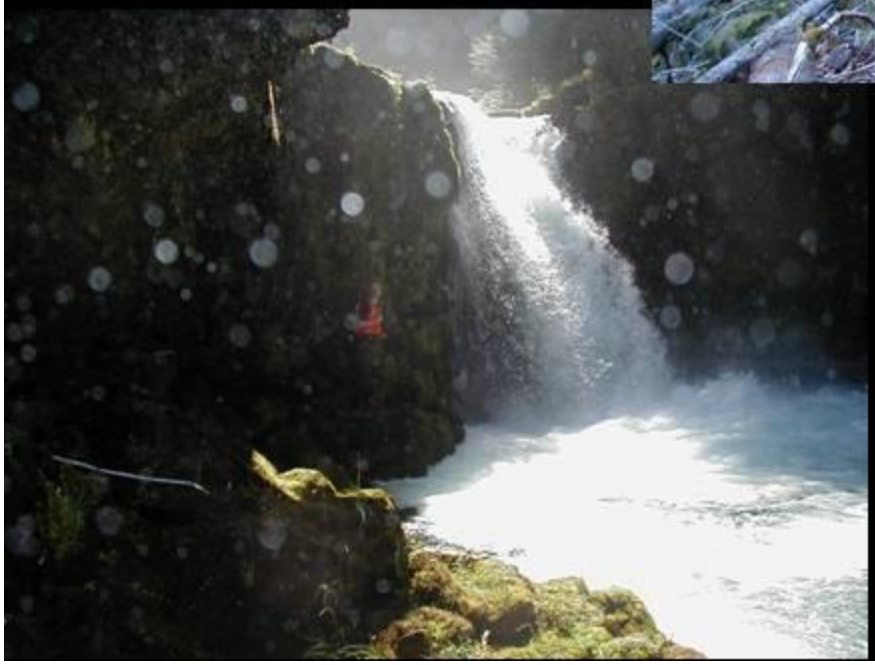


Photo 9
August 10, 2004
Reach 1, SO18, WF1
27 foot high falls, Fish barrier

Photo 10
August 10, 2004
Reach 1, SO21, WF2
Looking upstream
Estimated height of 110 feet

Photo 11
August 10, 2004
Reach 1, SO23, WF3
Looking up stream
Estimated height of 20 feet.

Photo 12
August 11, 2004
Reach 2, SO33, F19
Looking down stream
Bank erosion on left bank

Photo 13
August 11, 2004
Reach 2, SO38, F22
Looking up stream
Small and medium sized wood across stream.

Photo 14
August 11, 2004
Reach 2, SO42, F24
Looking up stream

Photo 15
August 12, 2004
Reach 2, SO48, F27
Looking up stream, clearcut on right side of photo.

Photo 16
August 12, 2004
Reach 2, SO48, F27
Tributary entering on left bank

Photo 17
August 12, 2004
Reach 2 - SO49, SideS1

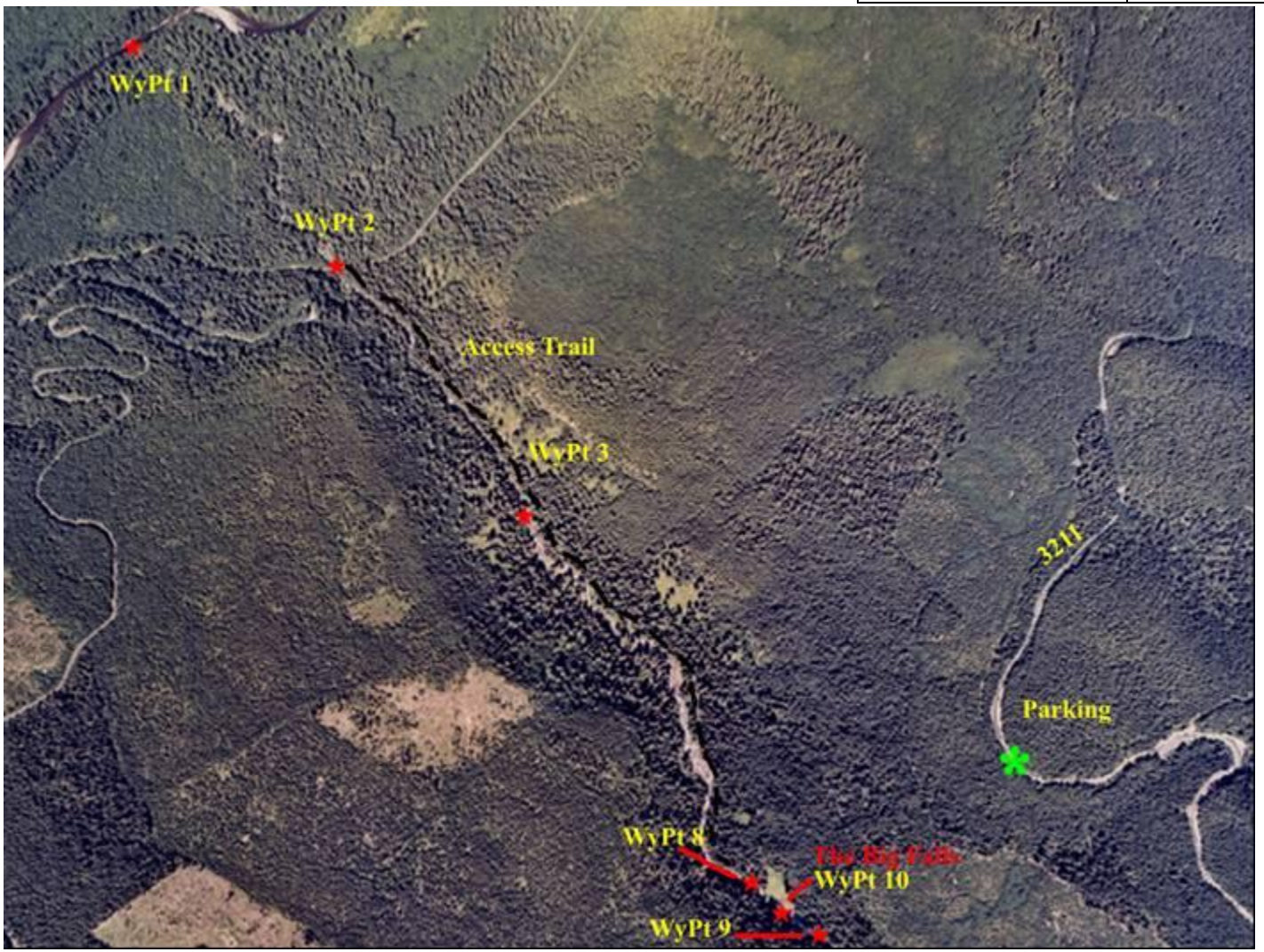
Photo 18
August 12, 2004
Reach 2 – SO 54, F31
Reach Break, End of Survey
Looking up Stream

Photo 19
August 12, 2004
Reach 2
Meadow Creek at confluence with Rush Creek, Looking up stream.

RUSH CREEK
MT. SAINT HELENS
NATIONAL VOLCANIC MOUNMENT
GIFFORD PINCHOT NATIONAL FOREST

Aerial Photograph #1

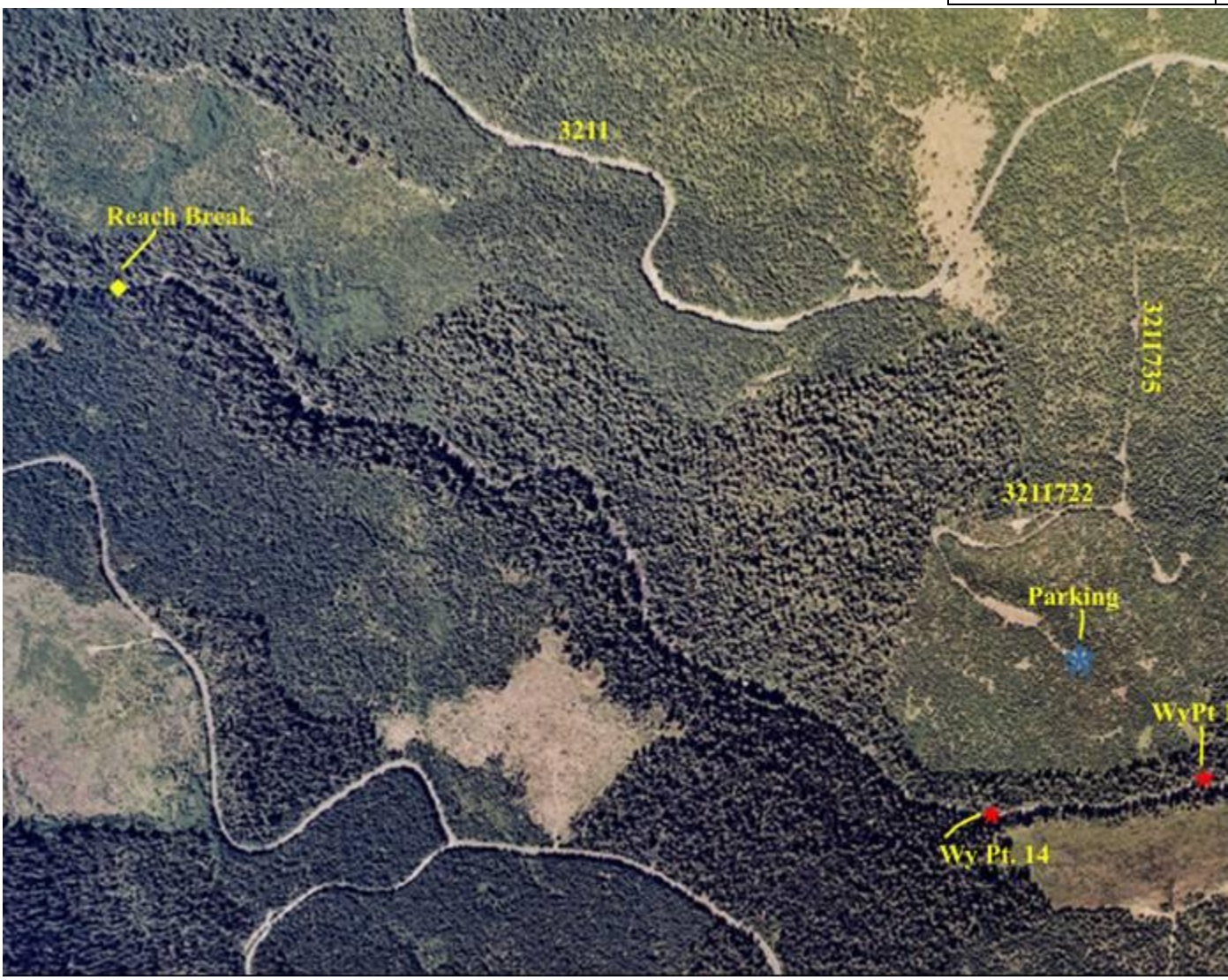
Date	7/24/2000
Scale	1:16000
Project Number	6165033
Photo Number	399-138



RUSH CREEK
MT. SAINT HELENS
NATIONAL VOLCANIC MOUNMENT
GIFFORD PINCHOT NATIONAL FOREST

Aerial Photograph #2

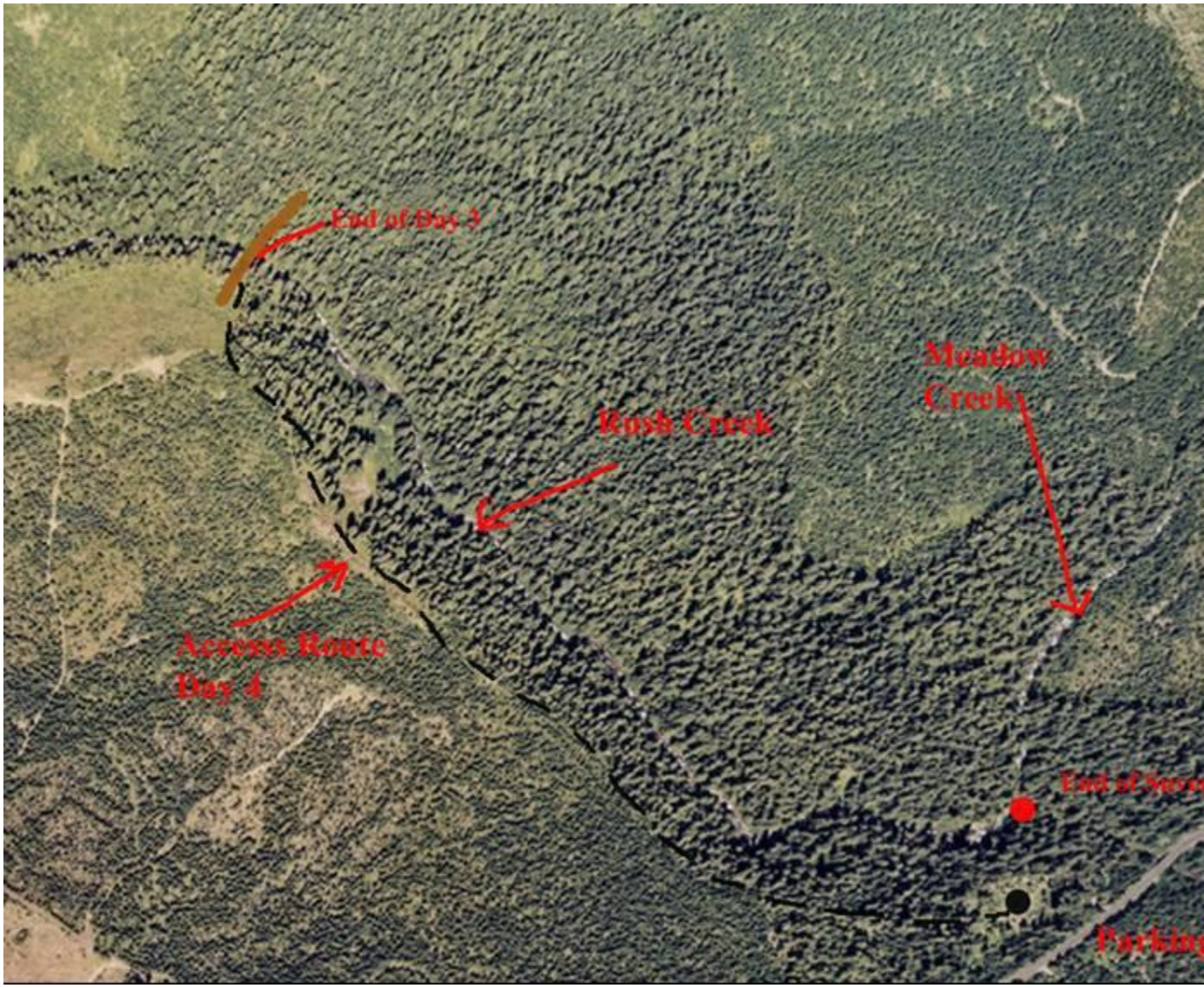
Date	
Scale	
Project Number	
Photo Number	



RUSH CREEK
MT. SAINT HELENS
NATIONAL VOLCANIC MOUNMENT
GIFFORD PINCHOT NATIONAL FOREST

Aerial Photograph #3

Date	
Scale	
Project Number	
Photo Number	


End of Day 3
Meadow Creek
Rush Creek
Access Route Day 4