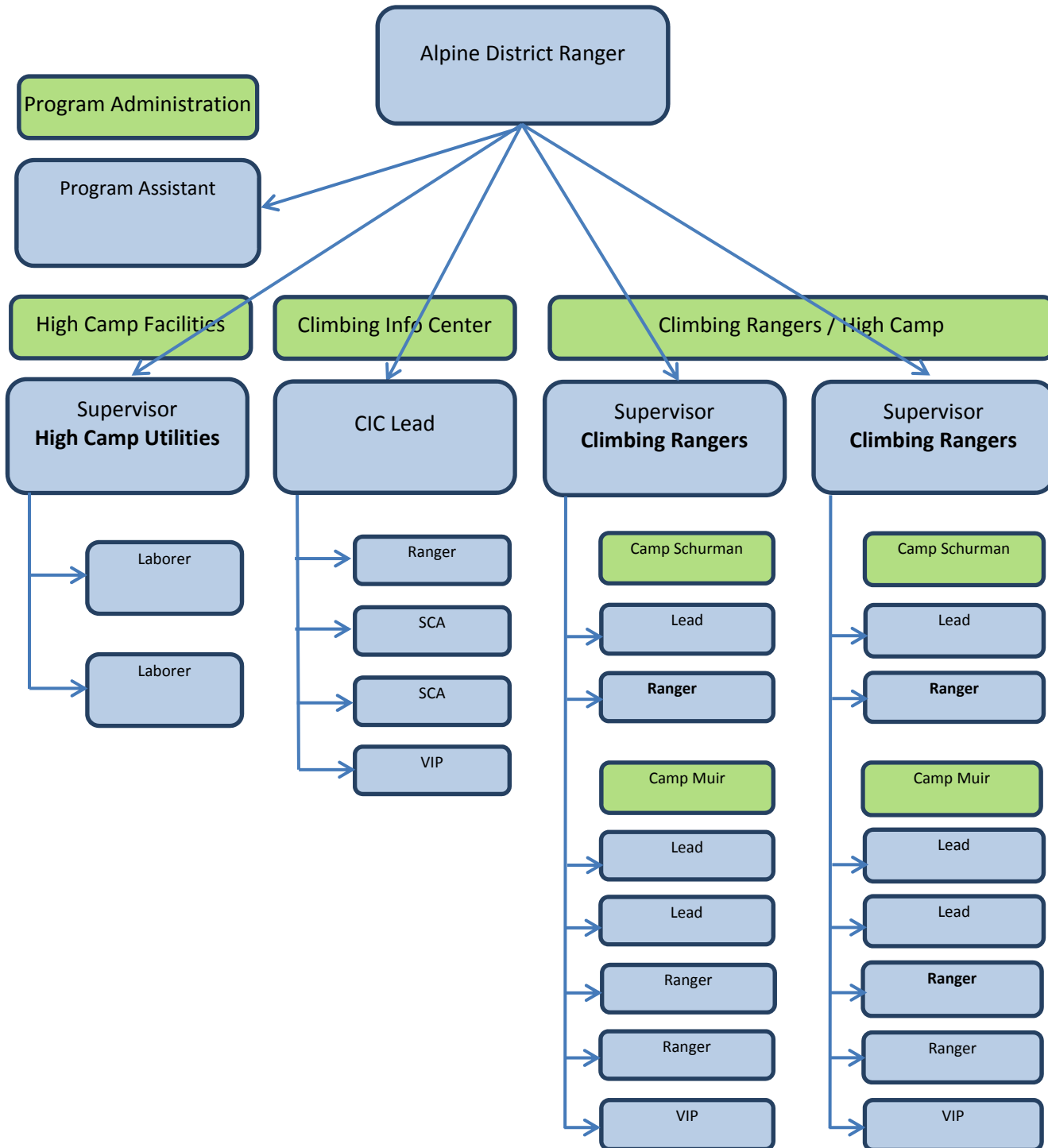


Figure 4 – Climbing Ranger Program Organization Chart

Mount Rainier National Park Mountaineering District - 2011



This program structure represented the most highly structured organization the program has ever had. The goal in this structuring is to decrease the span of control from as high as 10-15:1 as it has been historically, to 7-8:1 or less. This allows for better supervision. Decreased span of control is still planned for the 2012 season and aims for a target 4:1 or less.

Figure 5 – Ski Mountaineering on the Upper Nisqually



Because of the mostly returning staff, ranger qualifications and skills are at the highest level they have ever been. The climbing program has been in a transition of requiring its employees to attain the level of Emergency Medical Technician – Basic. This assures a high standard of care and also allows us to target and train all of us at the same level. We have contracted Remote Medical, Inc. to conduct our EMT refresher each season.

In 2010 and 2011, we have contracted Rigging For Rescue, Inc. to conduct our technical rigging and rope rescue refreshers, which are conducted as 5-day workshops. This leads to a high degree of safety and situational awareness required by high-angle rescues in our rescue environment.

Climbing rangers are also all Dept. of the Interior, Helicopter Crewmembers or Helicopter Managers, which are two certifications which take roughly one year and 5 years, respectively, to obtain. Since climbing rangers depend on aviation resources during emergency incidents as well as normal high camp operations and human waste removal, it is important that they have a strong aviation background on the safe use of those assets.

Nearly all the climbing rangers have a background in snow science. Reading the snow and evaluating snow stability is paramount to operating safely in the alpine environment, both in the summer and winter. Climbing rangers receive at least one day of continuing education (a refresher) in evaluation snow stability and are US Level 1 qualified.

Climbing rangers also receive a significant amount of incident management training. Among all climbing ranger staff in 2011, there were roughly 3,500 personnel training hours. Just as you would think that professional structural fire fighters at your local fire department are constantly training and maintaining their physical conditioning and technical skills, it is also a priority for climbing rangers to train in the same way.

Training

In 2011, the climbing ranger program recorded more training than ever before in their history. Nearly 3,500 personnel-hours of training were recorded. Trainings included these categories:

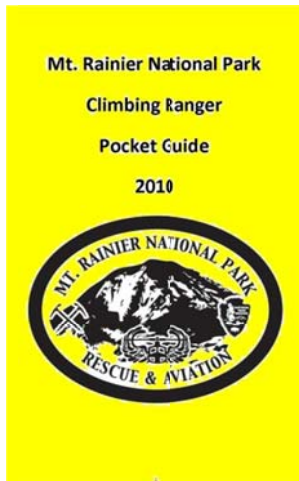
Figure 6 – Climbing Ranger Training 2011

Category	Number	Hours
Administrative	2 trainings	11 hours
Avalanche	7 trainings	43.5 hours
Aviation	3 trainings	58.5 hours
Climbing Ranger	14 trainings	67 hours
EMS	7 trainings	43.5 hours
Other	15 trainings	87 hours
SAR	22 trainings	146 hours
Ski Litter Training	2 trainings	12 hours

Supervisor	1 training	16 hours
Wilderness	3 trainings	20.5 hours
Wildland Fire	2 trainings	15 hours

Not all climbing rangers participated in all trainings. Since the climbing rangers are broken out into smaller work groups like working at the Climbing Information Center or at Camps Schurman or Muir, training can be more targeted to a specific group.

Figure 7 – Climbing Ranger Pocket Guide



Operational Guidelines

In 2010, the climbing ranger program created its first pocket-sized employee handbook called the climbing ranger pocket guide. This reference manual continues to evolve and has been updated each season. Indeed, 2011, and in 2012 it will be updated once more.

High Camps

There are two ranger-staffed high camps; Camp Schurman and Camp Muir, located on the NE and S side of the mountain. Over 80% of the climbing on Mt. Rainier happens through these two routes. Many people are surprised to learn that among all backcountry overnight use, including the Wonderland Trail, that the majority, or 55%

is associated with summit climbing.

The high camps take the brunt of the climbing use. 110 people are allowed to Camp at Muir each night and 36 are allowed at Schurman.

The climbing program was able to schedule at least two rangers at Camp Muir each night. This however, in practice, this is not always how many rangers are there. Rescues, illnesses, injuries, and other scheduling complications detract from two people. We were nearer to full-time 2-ranger staffing at Camp Muir than at Camp Schurman. Because of employee shuffling, Camp Schurman went without 2-rangers per night for 1-3 days per week. It is a priority in the 2012 season to obtain as close to 100% 2-ranger coverage as we can get at both high camps.

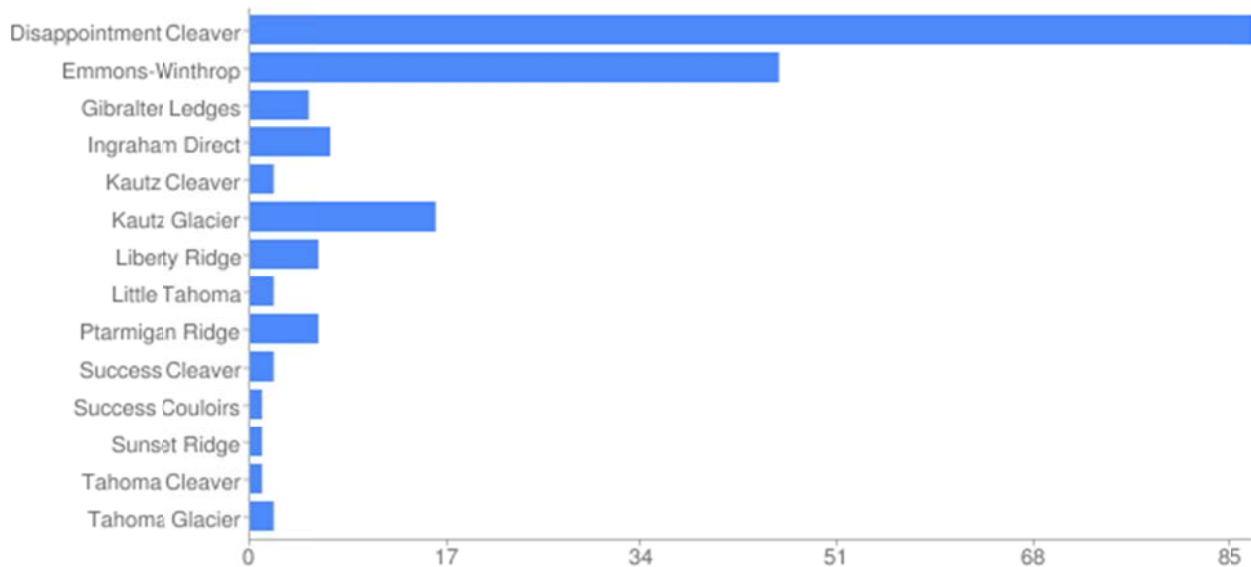
Patrols

We conducted more climbing patrols of Mt. Rainier this season than we have in recent years. Climbing rangers recorded over 180 summits. These summits enable several things:

1. Climbing rangers maintain a high state of physical conditioning. The average ranger summited 8 times in 2011. Many rangers can reach the top from Camps Schurman or Muir in two hours or less.
2. Climbing rangers are able to monitor the use of the mountain, provide input to climbing parties, keep litter and human waste picked up, and protect the alpine environment better.
3. Climbing rangers are able to provide more updated route conditions on the mount rainier climbing blog.
4. Climbing rangers are closer to emergencies when they arise by being on the mountain rather than at high camps.

Here are the routes that climbing rangers patrolled in 2011.

Figure 8 - Climbing Ranger Route Patrols



Climbing Information Center / White River WIC

The climbing information center at Paradise is the main climbing permit issuing station in the park. For the second year in a row, the climbing information center has been run by its own staff of rangers. This is a departure from the past where climbing rangers from the high camps have worked the CIC. The program configuration allows us to target training and simplify the skills that any one ranger must learn in order to be effective at their job. The downside to this is that the rangers who issue the permits are less familiar with the current conditions. Nevertheless, the same climbers who register will mostly be climbing through Camps Schurman or Muir where they will be talking to a ranger who has recently climbed.

The rangers who work at the CIC also have the collateral duty of preventative search and rescue. It is part of their work to travel between Paradise and Camp Muir and contact day and overnight hikers and climbers and make sure they are permitted, equipped and informed about the conditions and weather.

The White River WIC is staffed by the Camp Schurman rangers on Friday afternoons and Saturday mornings. The rangers then climb to Camp Schurman on Saturday afternoon. The east district backcountry staff registers all other climbers from Sunday to Thursday. A big thanks to them!

Mountrainierclimbing.blogspot.com

The climbing blog has been the best way the climbing rangers have been able to get updated route conditions out to the public in a timely way. The blog is immensely popular and takes hits from all over the world. In the past several years, there have been many hundreds of thousands of hits. We actually receive requests to advertise on it from large corporations.

Because of the installation of the network bridge to Camp Muir in 2011, the climbing rangers now have the ability to update the blog from Camp Muir, immediately after their climb. This should increase the timeliness of their route updates, reports, and communications.

Figure 9 – Blog Post Topic Distribution in 2011

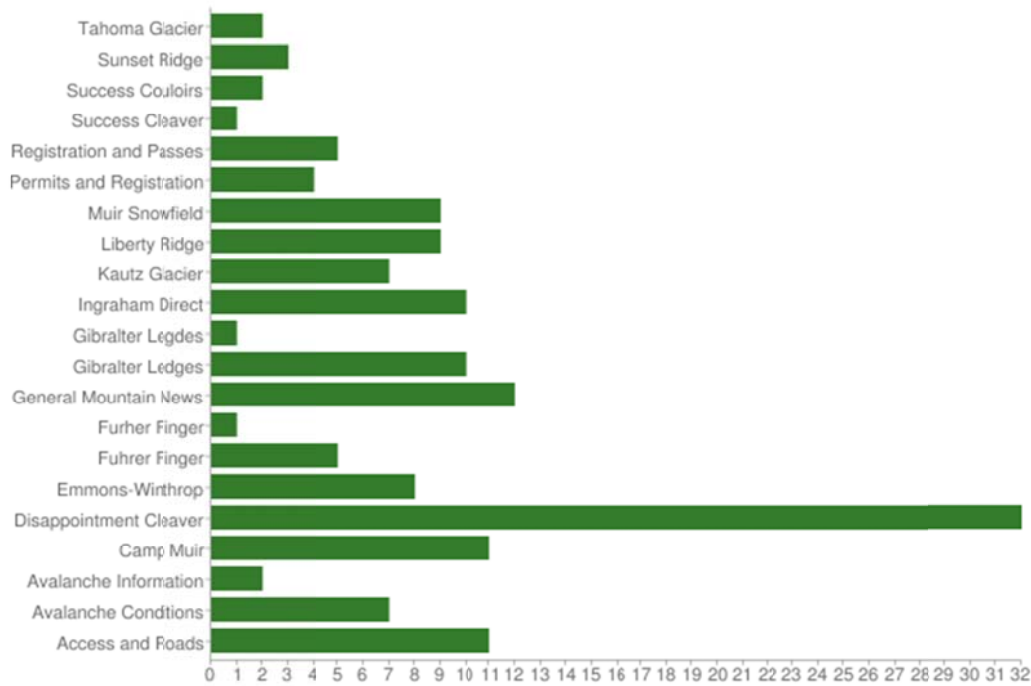
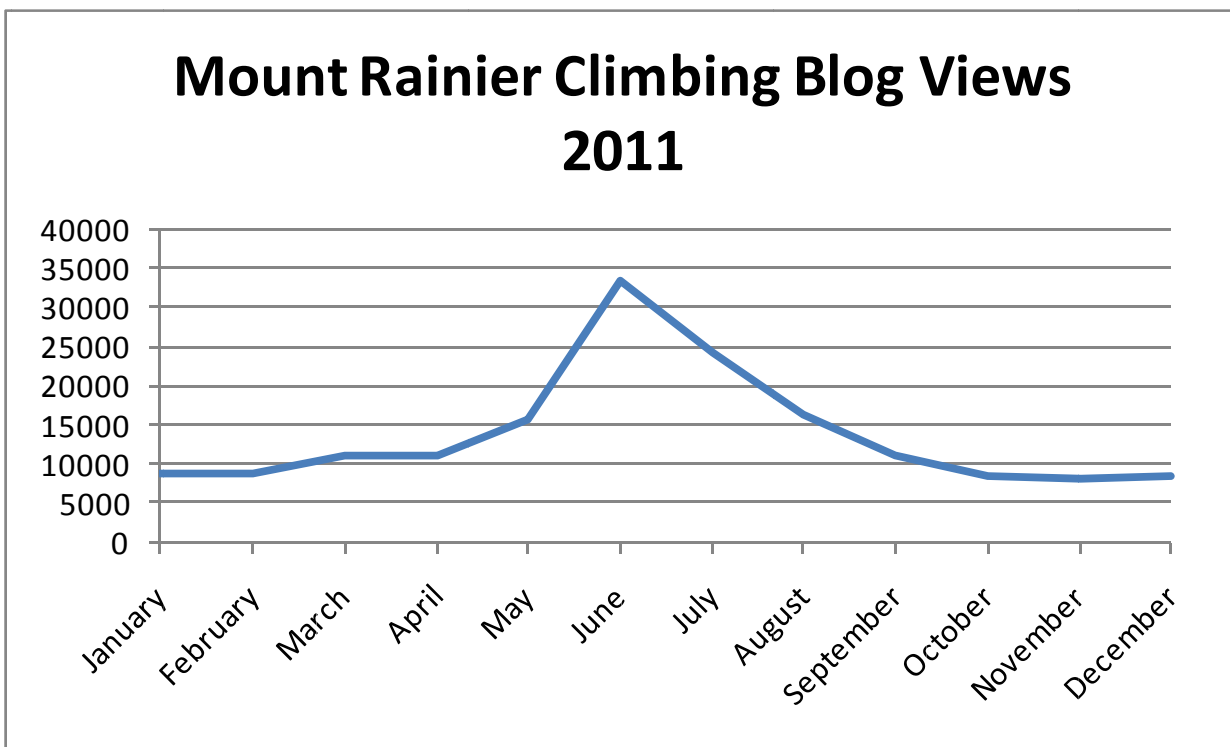


Figure 10 – 2011 Mount Rainier Climbing Blog Views. The annual total for 2011 was 165,317



Resource Protection

The climbing rangers are simply wilderness rangers who must have skill in climbing to access the area of land in our district, monitor its use, document impacts, and clean up areas of impact. As a part of each individual’s weekly climbing ranger patrol log, rangers are required to enter each impact they observe. There are roughly 62

impact categories under 8 general categories. The more impacts the rangers record, the better managers can make decisions and intervene to control or mitigate these impacts.

Climbing rangers recorded over 1400 individual impacts. This was a record number of impacts recorded in any year since the system was implemented in the 1980's – for the whole park. It is important to consider that this doesn't represent an increase in total impacts on Mt. Rainier, only that we have devised a way of more easily recording impacts and also making it a higher priority.

Figure 11 – Wilderness Impact Category Totals

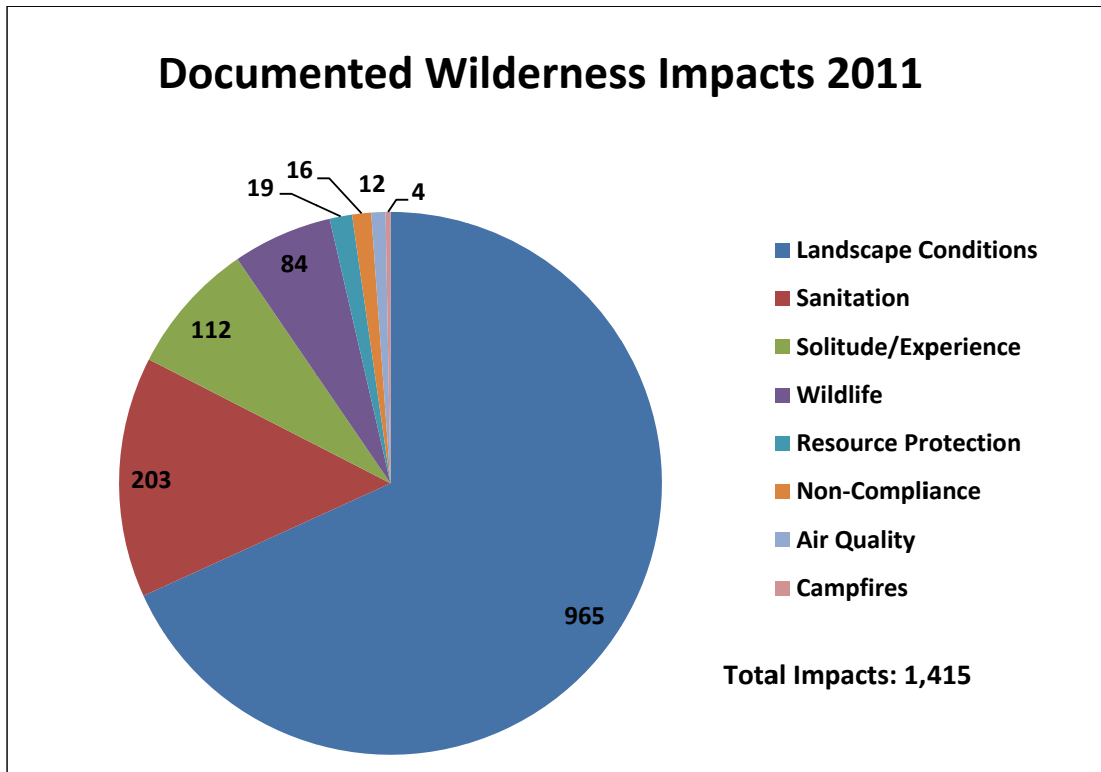


Figure 13- 2011 Wilderness Impact Observations Per-Week



Above, in figure 13, represents primarily litter and stray wands, which by the end of the summer, melt out of the snow and are just laying on bare ground. This doesn't necessarily show that more people are littering in August, but this is when we see most of the melted out litter on the ground. This figure also represent a large volume of meadow stomping, denuded vegetation, and campsite rings that develop later in the season after the snow has melted.

Here is an example of how an increased resolution of data has helped us manage our wilderness. At the end of June, the data showed that there was a high level of animal food habituation issues observed at Camp Muir, namely the fox getting into people's gear and food. We mulled over many solutions from requiring the use of animal resistant food containers that we would purchase and rent, issue, or lease to climbers to not doing anything at all about the issue.

In the end, we purchased 30 plastic buckets, packed them up to Muir, and asked people to put their food in the bucket while staying there, and returning the bucket to the Muir public shelter when they left. The number of food habituation observations plummeted to a tolerable level after we implemented this strategy.

The data also suggest several areas where we could develop strategies to lessen the impacts on the mountain and preserve the wilderness character. These include removing wands from the Muir snowfield and the climbing routes and also removing blue bags and human waste. The data we are currently collecting on commercial, single engine, and military over-flights is being used to in management plans to limit flights over the park.

Human Waste

Nothing much has changed from last year in our management of human waste. We have two systems, the toilets at the high camps and the blue bag system.

The toilets at high camps are not "composting" toilets, they work somewhat effectively at separating the solids and liquids. The liquids are dispersed directly back into the rock debris below Camps Schurman and Muir. The solids are somewhat dehydrated and then transferred to 40-gallon barrels, which in turn are flown off by helicopters. The barrels are then transported to a waste processing facility outside the park.

The blue bag system is used in areas where there are no toilets. Human waste is deposited on the ground or snow. The solids are picked up like you pick up your dog's poop in the park. The waste is transported by the visitor/climber to a high camp or ranger station where they are put in a barrel. The barrel is either flown from Camp Schurman/Muir or picked up by vehicle at ranger stations. These barrels are then transported to an incinerating facility outside the park.

The overhead in maintaining these two systems costs between 80,000 and 100,000 dollars, if you include all the people, materials, supplies, and transportation costs. Several 10's of thousands of those dollars are paid for by money not associated with the climbing program or the cost recovery fee (climbing fee). The exact cost of operating the system is not easy to figure because you have to put a percentage of several people's time who are not paid for out of cost recovery money.

In 2011, of the total cost of operating the human waste system in the alpine areas of Mt. Rainier paid for out of climbing fees was about \$45,000.

Below is the number of each type of human waste collected at Camp Muir.

Figure 14 – Total Human Waste Removed from Mt. Rainier

Human Waste Collected from Mountaineering Operations		
Location	Number of Barrels	Pounds of Waste
Camp Muir		
Raw Human Waste	11	4,500
Blue Bags	8	1,600
Camp Schurman		
Raw Human Waste	3	1,500
Blue Bags	2	
White River		
Blue Bags	0.25	50
Paradise		
Blue Bags	4	800
West Side Rd		
Blue Bags	0.1	20
Totals	28.35	8,470

In 2011, Seattle University completed a project in analyzing what technologies would work best to streamline and provide for better efficiency in managing our human waste in a more cost effective way. Several technologies were considered such as composting, urine separation, evaporation, dehydration, and removing all waste, liquids and solids.

In 2012, we plan on implementing some recommendations from this study and replacing one of the toilets at Camp Muir as an experiment. This toilet would be incorporate urine separation and then a direct deposit system into larger barrels, which could be flown directly to the parking lot. This would eliminate the marginally successful dehydration process and also the transfer process which puts rangers in Tyvek suits in very close contact with the human waste solids while they dump the buckets by hand into larger barrels.

Volunteer, SCA’s, and other partners

The climbing program has always relied on these partnerships to conducts its operation. Each year, approximately ¼ of all employee hours are volunteer. Volunteers aren’t exactly free.

Because of the complexity of the duties and the serious consequences of mistakes, the climbing ranger program only accepts volunteers who are able to commit to a April – September, 40-hour / week schedule. This allows for the volunteers to receive the same training as the climbing rangers they work with such as avalanche training, EMS training, technical rope rescue training, general operations training, safety policies, aviation training, and incident management training to name a few.

Each full-time volunteer also receives a \$20/day stipend and their housing is paid for. These costs average just over 4,000 dollars per volunteer per summer.

Another agency which provides us interns is the Student Conservation Association. The SCA is a notable organization with whom many parks rangers began their first seasons. Each SCA costs about \$6,000. They are slightly more expensive, but the SCA takes care of advertising, recruiting, vetting, and providing the NPS with a list of eligibles. We have from one to three SCA internships each season.

The entire volunteer program cost us about \$18,000 this year. The return on investment though is quite high.

Figure 15 – Total Volunteer Hours & Cost Valuation

VIP Hours 2011			
VIP	SCA	MRA	Total
2047	930	1194	4171
Paid Equivalent:		x \$20/hour	\$83,420.00

Guiding

This year was the 5th year of a 10-year contract with three commercial guide services. These contracts were openly bid. The companies were selected and the contract was signed on November 1, 2006. The three companies were Alpine Ascents International, International Mountain Guides, and Rainier Mountaineering, Inc. The climbing program maintains a positive and progressive relationship with the guide services, which makes sense because we work so closely together on the upper mountain and on search and rescue operations.

The contract is very specific on the numbers that each company is allowed to guide, the guide client ratios, and many other parameters. Here’s the results from the guide services end of season reports, which includes not only their normal summit climbs, but also their winter seminars, expedition seminars, and private climbs all around the mountain.

Figure 16 – Guide Service Client-Guide Ratios and Totals

Guide Service	Guides	Clients	Total
Alpine Ascents International	356	710	1126
International Mountain Guides	393	732	1123
Rainier Mountaineering, Inc	725	1992	2717
Total:	1474	3434	4966

Since the total number of climbers registering for Mt. Rainier was 10,830 people in 2011, this makes the ratio between independent and guided activity about 55% to 45%, respectively. This is consistent with historical ratios.

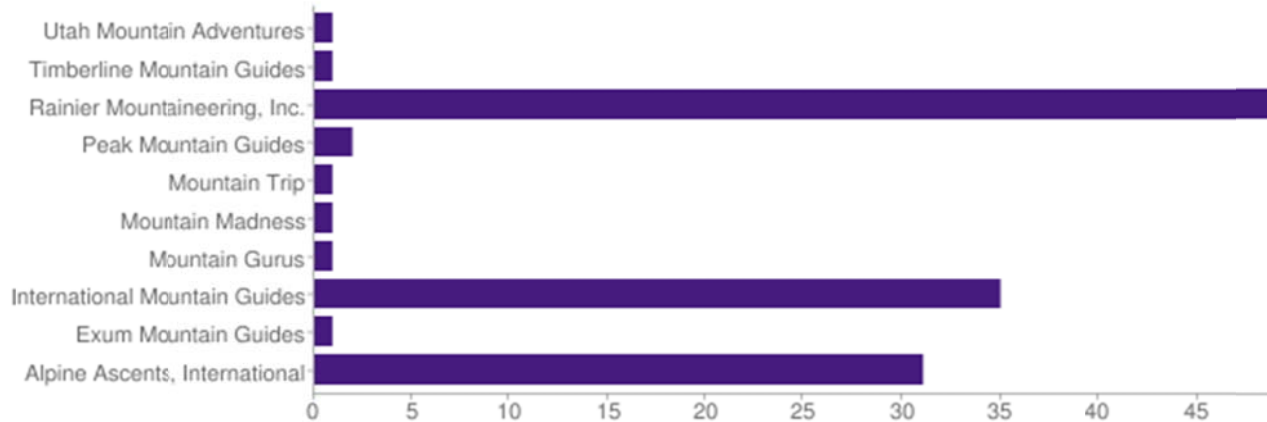
The guides work closely with the climbing ranger staff. In 2008, three joint trainings were held, with each partner, NPS, AAI, IMG, and RMI hosting a training. This allows the rangers to meet the guides, develop working relationships with them, so that they can better work together in stressful rescue situations.

In 2012, the NPS will be logging all the time that the guides help the NPS on search and rescue operations. We must make it plan that there are hundreds of hours that the guide services contribute to our overall search and

rescue response. They do often break a guide team away from a summit climb or a trip to respond to a call of an injured or overdue climber.

The climbing rangers also do random monitoring of the guide services for compliance to their contracts and operating plan. These monitoring forms are submitted electronically to the climbing program manager and the commercial services manager in the park. This allows any kudos or issues to be passed on or mitigated very quickly. In 2011, there were a 123 monitorings performed by climbing rangers. We were also to catch some of the approved single trip guide services, listed below.

Figure 18 – Commercial Guide Service Monitoring’s



Mountain Rescue Association

The MRA is of incredible importance to us. Mt. Rainier National Park currently has a patrol program with its Washington chapters where we invite them to come and practice their skills here; in turn they are given free admittance to the park. They can perform a climbing patrol of the mountain while training. This allows them to be “proximal” to incidents when they are occurring. Mountain rescue’s participation in our search and rescue incidents is invaluable because for each MRA volunteer rescuing, we can keep an NPS ranger in their job and keep a ranger station open or a ranger on patrol.



Figure 19 – A rescue with climbing rangers and the 214th General Support Aviation Bridge, JBLM, Tacoma, WA

During the recent rash of rescues in January 2012, Mt. Rescue contributed nearly 4000 rescuer-hours, which is the equivalent of over \$80,000 of paid time. Climbers and all outdoors men and women owe Mountain Rescue a high honor for their efforts.

During the 2011 climbing season, Mt. Rescue contributed over 1,500 hours of volunteer time on Mt. Rainier training and contributing to SAR operations.

The units that participated in our program in 2011 were Tacoma, Olympic, Seattle, Bellingham, Central, and also Chelan Co. Mt. Rescue, which is not officially a part of the MRA, but nevertheless volunteered their services.

Searches and Rescues

In fiscal year 2011, (Oct 1, 2010 – Sept 30, 2011) there were 33 search and rescue operations. This was an average year in the number of rescues. However, there were three upper mountain fatalities and two major searches. These two categories of incidents cost more than simple, one-day rescue operations due to the number of resources searches and fatalities take.



Figure 20 – Total Unprogrammed Cost of SAR Operations – Last 10 Years

2011	\$130,398.00
2010	\$160,689.00
2009	\$54,078.00
2008	\$68,740.00
2007	\$143,200.00
2006	\$62,303.00
2005	\$267,157.00
2004	\$272,451.00
2003	\$63,612.00
2002	\$136,566.00

These costs represent “un-programmed” costs, which are defined as overtime, gear, supplies, and aviation resources that are not a part of normal scheduled operations. This cost does not account for normal scheduled time rangers are on duty. In general, the larger years’ sums represent years where there were multiple major search operation or multiple fatalities.

No climbing fee money is dedicated to paying for any of these un-programmed costs. However, a small percentage of the climbing fee money does go to search and rescue in this way. The climbing fees do pay for climbing rangers. If during the course of their normal duty there is a search or rescue, their scheduled hours are billed to climbing ranger program. This most often represents about 5-10 % of the climbing ranger financial load. It is also important to remember that the entire climbing ranger program is roughly 80% funded by climbing fees and 20% funded by other monies.

We must also give a hearty thank you to the US Army Reserve’s 214th General Support Aviation Brigade from Joint Base Lewis-McChord. We train with this unit at Mt. Rainier and on base before the season in hoist operations. They do no charge for their services as civilian search and rescue is part of their mission! They helped us and climbers out on numerous rescues this summer.

Noteworthy Events



In 2011, a major chunk of Nisqually Cleaver at around 12,500 caved off and plummeted more than 4000 feet down the Nisqually Glacier. This is one of the largest rock avalanches recorded on Mt. Rainier in modern times. This will be seen for many years as a “scar” down the upper part of the glacier as the new snow melts out each year. Here is one of the many rock avalanches associated with this multiple event.

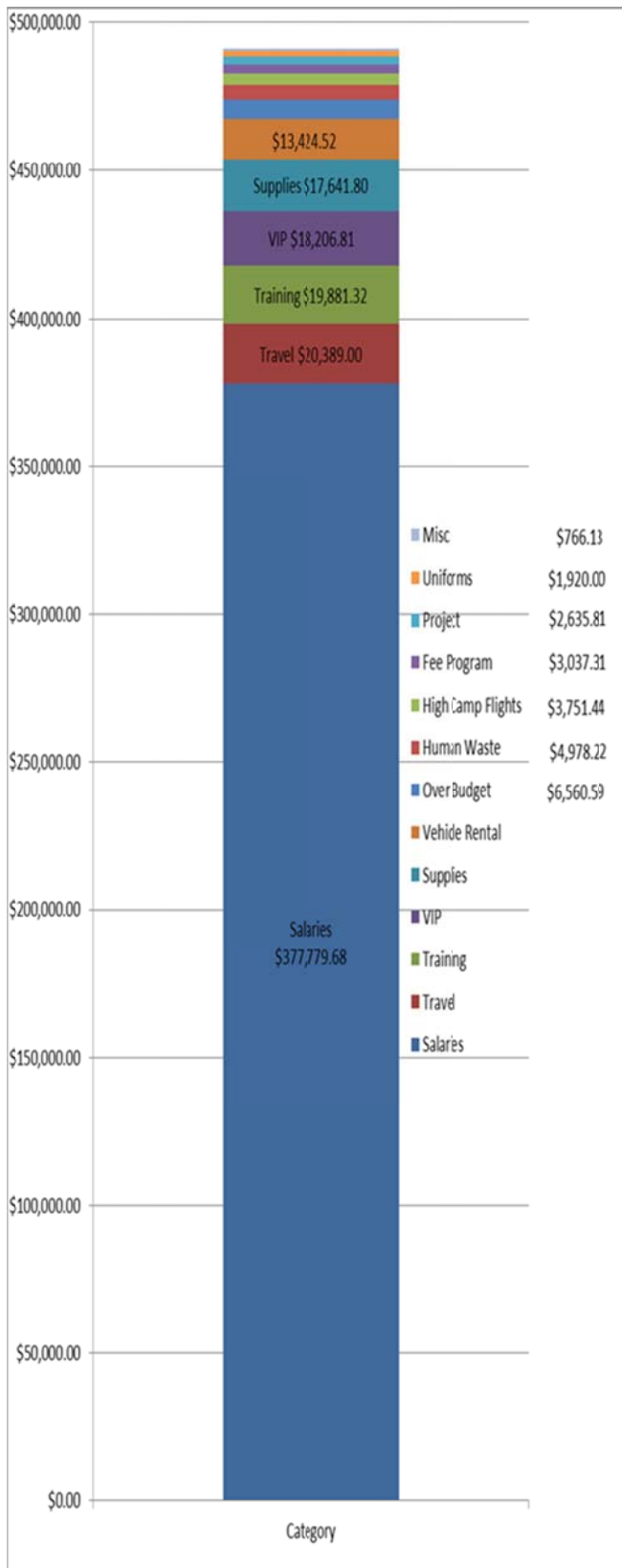
<http://www.youtube.com/watch?v=gzv-64uknXA>

Scientists from the University of Washington attempted to measure the glacier’s movement this year as it may be associated with a phenomena currently called Glacier Quakes. This is measurable near-surface seismicity that is at the moment baffling scientists on its exact cause. Researchers from the university set out equipment on the glacier and adjacent rocks to measure glacier movement and seismic occurrences. Read the article and watch the video here: <http://www.king5.com/news/Thousands-of-Ice-quakes-detected-on-Mt-Rainier--95996979.html>

The USGS has also cooperated with the climbing program to research the surface temperatures on the crater rim at Columbia Crest. This project is common to all Cascade volcanoes. This will establish baseline data to help detect change and if the volcano is heating up or cooling down.

The Mt. Rainier climbing program is also partly funded by glacier research money. Each year stakes are drilled into the glacier on the Nisqually and Emmons glaciers. These stakes are measured throughout the year most notably at the end of the summer melting period. The difference between the spring max and the fall minimum determines the “glacier budget”. This study determines if the winter accumulation was greater or less than the summer melt. It is an indicator of advancing or retreating glaciers and of climate change. For more information on this study, go to: <http://www.nps.gov/noca/naturescience/glacial-mass-balance1.htm>

The Nisqually glacier has been on a gradual retreat for many years. After an initial dataset taken by Lofgren in 2009, a much more thorough study was done by NPS geologists. Results are still pending, but it is likely that the Nisqually Glacier is currently at its historic minimum during modern times. Climbing rangers assisted a few days with the data collection.



Income, Expenditures, and Budget

Figure 21 – Program Expenditures

The climbing program’s budget is difficult to manage. The budget cycle is by fiscal year (Oct-Sept). The planning, hiring, training, and equipage of the climbing program needs to be taken care of before the climbing season has begun, and thus before the fees have been collected! This means that we commit to spending money before we know exactly what our budget is. However much this seems like a poor business practice, we have been able to make this work since the fee’s inception in 1995. In a few years, this has resulted in some rash decisions, like laying off rangers prematurely in order to save money and make budget.

The entire climbing program’s budget in 2010 was \$491,000. This does not include the climbing program manager’s salary who also has many park-wide responsibilities. This figure also does not include several hundred thousand dollars of help and assistance the climbing program gets from other divisions in the park who are just doing their job such as maintaining our radios, building and maintaining structures at high camps, and managing concessions operations.

In 2011, the climbing program consisted of 24 people. This breaks down into 1 program manager, 2 supervisors, 7 lead climbing rangers, 6 climbing rangers, 2 high camp maintenance rangers, 5 volunteers, and 1 administrative assistant.

Here are the expenditures of the climbing program roughly categorized from all funding sources combined.

Salaries of the permanent and seasonal staff account for roughly 76% of the climbing budget. These costs include regular hours, premiums such as overtime and hazard/environmental differential, as well as other benefits such as paying into unemployment insurance.

Travel is mostly in park and reimbursed as backcountry per diem.

Training cost include EMT refresher training, aviation training, and technical rope rescue training, as well as leave not trace and other wilderness training.

VIP costs are all costs associated with the VIP’s and SCA’s in the climbing program. This is their \$20/day volunteer reimbursement, a small amount of gear and equipment we buy for them, and paying for their housing.

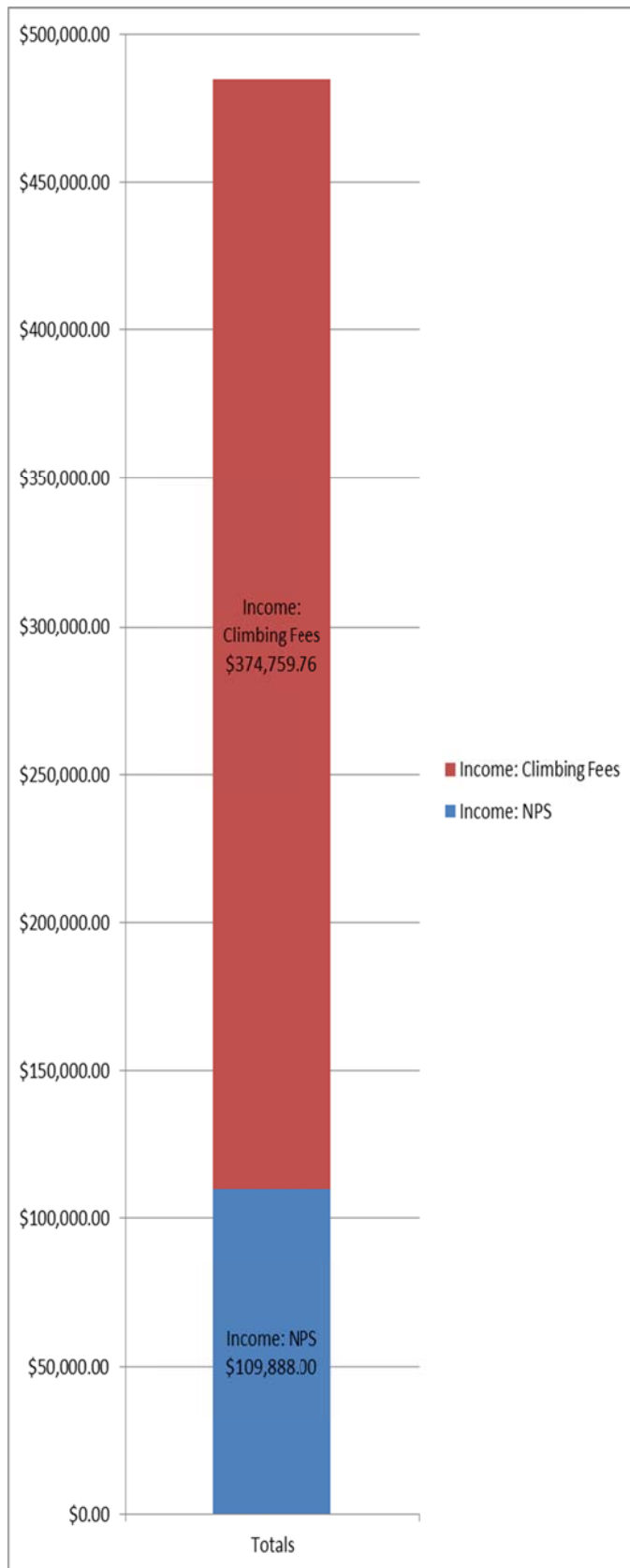
Supplies represented here are both administrative supplies such as paper, forms, booklets, pocket guides, computers, IT equipment, as well as operation supplies like carabiners, ropes, crampons, jackets, and other equipment.

Vehicle rentals are strictly the 4 vehicles the climbing rangers rent from GSA in order to provide transportation around the park while in duty status.

The \$4,978 quoted for Human Waste is only a equipment/supply cost. The personnel staffing is bound up in the Salary Category, which would roughly equate to about \$45,000 of the large blue column. Also, not included in the \$4,978 is the cost of helicopter flights. That is also bound up in the "high camp flights" category and represents over half of that sum.

The other categories are miscellaneous categories brought out here to show projects such as developing a solar water melting system, buying uniforms (NPS green/gray), fee collection supplies, and other miscellaneous infrastructure.

Figure 22 – Program Income and Funding



This graph represents all income categories. Roughly \$375,000 were collected from the sale of climbing passes at roughly a 10% / 90% split between youth passes and adult passes (\$30 / \$43). Also, for over half of this fiscal year, fees were collected at the old rate of \$30 per person until the new fee increase was implemented on March 15.

Roughly \$110,000 was allocated by the park to the climbing program. These funding sources included:

- \$71,000 concessions franchise fees
- \$28,000 centennial initiative
- \$3,500 glacier research/monitoring
- \$7,000 washington national parks fund grant

In fiscal year 2011, the climbing program was roughly 80% funded by climbing fees and 20% funded by Mt. Rainier National Park accounts.