

Taylor Wilderness Research Station 2010 Annual Report

By Tyler Morrison and Amie-June Brumble, Station Managers
March 25, 2011

2010 was a year of many changes and challenges at Taylor Wilderness Research Station. Jim and Holly Akenson, manager/scientists at Taylor for over 20 years, moved on to other employment (Holly as Director of the Willowa Mountain Institute in Joseph, OR, Jim as Executive Director of the Backcountry Hunters and Anglers). The annual summer internship was put on hold in 2010 so the curriculum could be redesigned. The Taylor power system, which had become overstrained as electric load increased since its installation in 1997, received a much-needed overhaul.

In 2010 we hosted a USFS Lead Working Group meeting and discussed potential research collaborations between Taylor Wilderness Research Station and the USFS. Meanwhile, ongoing programs continued and field station use remained consistent with previous years, despite challenges imposed on station users when lodging fees were more than doubled in May 2010. New facility instrumentation was acquired and installed, and interagency continued to grow.

New connections with the USFS could lead to valuable research collaborations at TWRS, and the successful installation of the new power production system will greatly improve the ability of TWRS to adequately support users and instrumentation over the long-term. Station use in the off-season is likely to increase, and concerns about lodging fees hampering station growth were addressed when fees were returned to the previous rate in 2011.

New in 2010

The following are new activities in 2010. See the appropriate sections for more details on these projects.

Administration: University of Idaho President Duane Nellis visited Taylor Ranch for the first time.

Administration: Dr. Kurt Pregitzer was hired as the new dean of the CNR in August 2010, replacing interim dean Dr. Bill McLaughlin. Pregitzer also traveled to Taylor for the first time with President Nellis.

Administration: Taylor hosted a Lead Working Group meeting of UI and Taylor staff, and leaders from the Payette, Salmon-Challis, and Bitterroot National Forests and the Bitterroot Foundation.

Collaboration: TWRS joined the Discover Life network in Fall 2010, which uses photos uploaded to an online database to catalog plants, fungi, and microfauna. Pending NSF funding, TWRS will

be among the first stations in the network to receive fully-funded REU students to expand the project.

Collaboration: Station Managers Amie-June Brumble and Tyler Morrison traveled to the Organization of Biological Field Stations annual meeting in Pellston, Michigan (September 2010).

Donor News: Taylor donors Jim and Janet Pope visited Taylor twice in 2010.

Donor News: Positive relationships built with a visiting group of recreationalists in November led to strong interest in contributions to a Taylor endowment, particularly from visitors Bill Heig (MN) and Bud Shaitberger (MN).

Donor News: Dr. Jim Morris started the Taylor Ecosystem Research Endowment, a new support fund for long-term ecological research.

Donor News: Potential donor Bud Ford visited TWRS in November 2010. Ford was accompanied by CNR Development Director Kim O'Neill, UI Gift Planner Pete Volk, Development Coordinator Nat Reynolds, current TWRS donors Jim and Janet Pope, and UI donors Karl and Elizabeth Berkenkamp.

Facilities: Following winter breakage, station manager Tyler Morrison replaced over 50% of the main water line in spring 2011.

Facilities: The TWRS power system received an extensive overhaul, with the installation of 18 solar panels, a new micro-hydroelectric generator, and large battery bank.

Marketing: Station managers worked with CNR information specialists throughout the latter half of 2010 on a new working draft of the TWRS website.

Marketing: A TWRS Facebook page was launched. The page is updated and co-administered by station manager Amie-June Brumble and TWRS donor Janet DeVlieg Pope.

Monitoring: Amie-June Brumble continued to lead TWRS data observations for the National Phenology Network, a nationwide climate change monitoring program tracking hundreds of plant and animal species. Regular observations throughout 2010 placed TWRS in the top 1% of observers in the network.

Monitoring: Tyler Morrison and Amie-June Brumble continued Jim and Holly Akenson's practice of logging wildlife observations.

Research: TWRS hosted four undergraduate research students in the summer of 2010; Amber Lankford (UI, Berklund Scholar), Matt Schenk (ISU, DeVlieg Scholar), and REU students, Will Stauffer-Norris and Elise Otto. Ph.D student Teresa Lorenz (UI, DeVlieg Graduate Scholar) and M.S. student Justin Schlee (UI, DeVlieg Graduate Scholar) also worked at TWRS for part of the season.

Research: 2010 was the fourth year of operation for the IDFG anadromous fish smolt screw trap, operating for 185 days from March to November.

Safety: Station Managers Tyler Morrison and Amie-June Brumble were recertified for Wilderness First Aid in June 2010.

Station Instrumentation: Beginning in October 2010, observations for the National Weather Service station are now uploaded daily by station managers to an online database, rather than sent in by radio and mail. Weather observations at this station are the longest-running dataset at TWRS.

Station Use: TWRS logged its second highest-ever use in 2010, with 1267 user days. As consistent with the previous four years, IDFG had the greatest number of user days at TWRS,

with a fisheries technician on-site operating the IDFG-TWRS anadromous fish smolt screw trap daily from March to November (267 user-days in 2010).

Administration

Taylor Wilderness Research Station has undergone several major administrative shifts over the past three years. In 2008, University President Timothy White retired, and Dean Steven Daley Laursen departed the College of Natural Resources to become the new interim university president. Conservation and Social Sciences professor Bill McLaughlin became the CNR interim dean later that season. Dr. Duane Nellis (Kansas State University) was announced as the new University of Idaho president in April 2009, but former dean Daley Laursen did not return to the CNR.

Taylor Wilderness Research Station Manager/Scientists Jim and Holly Akenson, who had managed Taylor for over 20 years since 1980, announced in late 2009 that they would be departing Taylor for new employment elsewhere. Holly Akenson was hired as the Director of the Wallowa Mountain Institute in Enterprise, OR, and Jim Akenson was hired as the Executive Director of the Backcountry Hunters and Anglers Association. Tyler Morrison, Assistant Manager (2008, 2009) and Amie-June Brumble (Administrative Assistant 2008, Data Manager 2009) were invited to become the new station managers, and accepted in early 2010. Tyler and Amie-June first traveled to Moscow for an administrative visit, and arrived at Taylor Wilderness Research Station on April 3, 2010. There was a management overlap of approximately one month with Jim Akenson, as Holly had already departed to begin her new job. Jim Akenson departed Taylor on May 4th, 2010, and Tyler and Amie-June assumed full management responsibilities at that time.

The CNR selected its new dean, Dr. Kurt Pregitzer (formerly of the University of Nevada), in the summer of 2010. Dr. Pregitzer visited Taylor for the first time on June 25, 2010, as part of an administrative visit that also included Jim Gosz, Bill McLaughlin, University of Idaho Provost Doug Baker, and University of Idaho President Duane Nellis and wife Ruthie. This also marked President Nellis' first visit to Taylor since he had begun the presidency of the university a year before. Dr. Pregitzer officially began his tenure as Dean of the College of Natural Resources in August 2010.

Work load at TWRS continues to increase with new programs, more users, and infrastructure needs. TWRS hired University of Idaho undergraduate student Landon Moore as the 2010 Assistant Manager. Landon had previously worked at TWRS while assisting graduate research students Ben Hoppus and Javan Bauder. Landon's experience, skills, work ethic, and positive attitude proved invaluable over the 2010 season, and were major assets for TWRS, particularly during periods of peak use. It was also optimal for TWRS facilities and users to be operated by an experienced assistant manager when station manager were absent.

Long Term Trends in Station Use

Despite having no interns at Taylor in 2010 and fewer students overall, Taylor Wilderness Research Station use was still strong. We recorded 1267 user days in 2010 compared to 960 days in 2009 and 1431 in 2008. We recorded 206 unique overnight visitors, which may be attributed to the visits of many large short-term groups. . Among these, we counted a total of 36 students (26 undergraduate and 10 graduate), 16 faculty members, 39 non-university researchers, 33 educational visitors¹, 9 facilities-related users², 13 personal visitors, and 60 "other"³. The presence of Assistant Manager Landon Moore was vital for keeping the facilities operating effectively during the summer months, but off-peak use was unusually high this year (226 user-days, or 18% of total use) and having no support staff at this time was difficult.

Of our total user days, 178 (14%) were associated with education, down from 26% in 2008. However, 868 user days (69%) were associated with research projects, exactly on par from 2008. By far, the primary user at Taylor in 2010 was Idaho Fish and Game, operating the fish screw trap daily for 192 days (267 user-days, March 10-November 12), exactly on par with 192 days of operation in 2008⁴. This is the fourth year of collaboration between TWRS and IDFG in monitoring anadromous juvenile salmonids in Big Creek.

The significant increase in 2010 lodging earnings (from \$11,919.42 in 2008 to \$26,825.72 in 2010) is attributed not to use, but to the steep increase in lodging fees at beginning of the 2010 season. All users had previously been charged a flat rate of \$15/night. Starting in 2010, this rate was increased to \$38/night in peak season and \$33/night in off season (\$32 and \$27, respectively, for stays longer than seven days).

Several long-term users expressed displeasure with the rate increase, while some users reduced the length of their stays at TWRS or camped off the property in order to save money, which initiated concern about research efficacy and station image. Several researchers specifically scaled back the length of their stays as a result of these changes, and the high rates were particularly difficult for our long-term users, primarily students and IDFG. As of the time of this writing, lodging fees have been reduced back to the \$15/night rate.

The work-for-lodging program, in which TWRS students provided labor and were compensated with an in-kind reduction in lodging fees (at the rate of \$10/hour) was also discontinued in 2010. This program had previously been a mutually beneficial arrangement, as TWRS received much-needed help, and students were able to work to offset their lodging costs in their spare time. Students would often factor a set number of work hours into their lodging budgets prior to the season opening. Therefore, the loss of this program as a resource for both students and

¹ 13 K-12 visitors and three support staff from McCall High School, 17 visitors from MOSS in training for K-12 education, primarily graduate-level AmeriCorps students.

² Station winter caretakers, volunteer Liam Junk, carpenters, electricians, and IT staff associated with solar panel installation.

³ University or agency administration, TWRS donors, USFS, emergency shelter, etc.

⁴ The trap was inactivated due to spring flood levels and debris for 56 days in 2008 and in 2010.

TWRS facilities was a significant problem. As of the time of this writing, the work-for-lodging program has not been reinstated.

Research and Monitoring

Tim Copeland, Kim Apperson, Laurie Janssen, and crews (Idaho Department of Fish and Game, funded by Bonneville Power Administration). Idaho steelhead monitoring and evaluation study 2007-2009. The primary research/monitoring activity in 2010 was the operation of the rotary screw trap maintained daily by Idaho Department of Fish and Game personnel for 192 days between March and November⁵. This project, originally planned as a 3-year study, is in the fourth season of what is now a 10-year collaboration between TWRS and IDFG. The objective is to monitor wilderness populations of steelhead and Chinook salmon in the Big Creek drainage to assess population dynamics and life history characteristics through the daily operation of the rotary screw trap for juvenile salmonids, 8 months per year. Big Creek serves as an indicator watershed for the Middle Fork Salmon River drainage and the wilderness area. The TWRS monitoring site is part of the IDFG statewide Idaho Natural Production Monitoring and Evaluation Project. The screw trap was primarily operated throughout 2010 by biological technicians Kevin Poole and Nina Selvage. A total of 12,971 fish⁶ were captured at the trap in 2010, compared with 8,775 in 2008 and 19,512 in 2007. Of these, the trap captured 8,350 juvenile Chinook salmon and 3,162 juvenile steelhead.

Kim Apperson and crews (Idaho Department of Fish and Game): Chinook salmon redd and juvenile salmonid counts and snorkel surveys. Since 1985, IDFG has used snorkel surveys to monitor the abundance of juvenile salmonids as part of the Idaho Natural Production Monitoring and Evaluation Project (INPMEP). Long-term annually monitored trend sites surveyed in Big Creek are located at TWRS and two other sites, with other sites throughout the Big Creek watershed surveyed less frequently. Survey data are maintained in the IDFG Statewide Stream Survey database. Kim Apperson and five crewmembers visited TWRS for their annual survey in August 2010, but a sediment blowout upstream restricted visibility and made snorkeling impossible. A second, successful attempt was made the following week.

Steve Achord, collaborators, and crews (NOAA/NMFS/QCI): Migrations of wild Snake River spring/summer Chinook salmon smolts. Taylor collaborates with NOAA on another in-stream collaborative project, the detection of tagged fish using two antenna arrays. The project is coordinated by Steve Achord (Northwest Fisheries Science Center), and monitors migrations of wild Snake River spring/summer Chinook salmon smolts. The project, initiated at TWRS in 1994, monitors migration timing, parr-to-smolt survival rates of ESA-listed fish populations, and examines how fish densities, water quality parameters, weather, and climate influence fish movement and survival. Current infrastructure includes an in-stream PIT-tag monitor with two antenna arrays (allowing for information on detection rates and fish movement directions), a

⁵ The trap operated for 192 days out of a 248 day span, and was pulled due to adverse stream conditions (flood and woody debris) April 20-24, May 16-24, May 29-July 7, August 8, and October 25.

⁶ This total includes non-target species. Total capture of Chinook and steelhead salmon was 11,512.

satellite Internet link, and a Sonde water quality monitor (installed on Big Creek at TWRS in 2006). This site is one of NOAA's primary monitoring nodes.

NOAA sent a crew of 11 people to TWRS in early September for their annual fish tagging effort, coupled with maintenance work on the antennas and batteries. Second and third maintenance visits were made by workers subcontracted through Quantitative Consultants, Inc., in October and November. All equipment at the sites is run on power from NOAA solar panels and uploaded via a separate satellite uplink, and is completely independent from the Taylor electrical and wireless system. NOAA installed subterranean fiber-optic cables between the two sites in 2009 to improve site-to-site communication, but the installation of a second transmitter at the lower site in 2010 made this physical connection redundant. It is likely that NOAA will salvage and repurpose this cable in the future. Project leaders also indicated that they planned to change the current in-stream antenna configuration in spring 2011⁷.

Dr. Colden Baxter, collaborators, and students (Idaho State University): Long-term monitoring of stream-riparian system responses to wildfire. Dr. Baxter's research focuses on following the movement, mobility, and scour of streambed material, and studying the mechanisms and responses of organisms to changes in stream flow regime accompanying wildfire, beetle kill, or changing climate. This is a long-term (25 yr.) study initiated by Dr. Wayne Minshall, aimed at defining the recovery sequence for stream communities. Dr. Baxter hiked to TWRS for a 5-day stay at TWRS in July 2010 and mentored two students at TWRS in 2010; undergraduate Matt Schenk ("Investigating Relationships between Flow, Bed Mobility, and Stream Organisms: Steps Toward Predicting Climate Change Effects in Tributaries of Big Creek, A Wilderness Watershed of Central Idaho") and graduate Ryan Blackadar ("The Price of Ice: Ecological Consequences of Changing Ice Regimes for Linked Aquatic-Terrestrial Food Webs").

Dr. Brian Kennedy, collaborators, and students (University of Idaho): Juvenile anadromous fish energetics, habitat, and consequences of life history variability for population structure in a wilderness watershed. Dr. Kennedy's research is summarized as 1) drivers of spatial variation in growth and survival of juvenile salmonids; 2) causes and consequences of life history variation in migratory populations; 3) projected impacts of climate change on the bioenergetics and life history strategies of salmon in a wilderness basin; and 4) establishing a basin-wide sensor network for monitoring aquatic and hydrologic metrics of change in an undisturbed basin. Dr. Kennedy is developing research collaborations with IDFG, NOAA Fisheries, and Flathead Lake Biological Station, and is assisting in the incorporation of the Big Creek into the long term Salmonid Rivers Observatory Network (SaRON). Dr. Kennedy led an REU student field trip into TWRS in July 2010, and also led the University of Idaho Fish Ecology (WLF 314/315) class field trip to TWRS in September 2010. Dr. Kennedy co-mentored two REU students at TWRS with Dr. Alex Fremier in 2010; Elise Otto ("Function of Large Woody Debris in Creating Fish Habitat, Big Creek Watershed, ID") and Will Stauffer-Norris ("Effect of Fire Intensity on Large Woody Debris Distribution in the Big Creek Watershed").

⁷ Completed by Quantitative Consultants, Inc. on March 7-11, 2011.

Dr. Benjamin Crosby, collaborators, and graduate students (Idaho State University): Quantifying the timing and magnitude of water and sediment flows in Big Creek and its lower tributaries. Dr. Crosby is currently studying connections between physical and ecological processes in streams, including 1) topographic controls on Big Creek catchment hydrology and 2) temporal response of Big Creek sediment flux following wildfire. Project objectives are to better understand runoff dynamics at the cusp between rain and snow dominated hydrologic regimes and to provide water and sediment discharge data for other researchers. The study, begun in 2008, measures water level using non-invasive pressure loggers in tributaries and a radar sensor on Big Creek to constrain how aspect, elevation, and vegetation affect timing and magnitude of runoff. Measurements are correlated to manual measurements of water discharge. Sediment is measured with automated and manual water sampling on and near the Taylor property. The gauging station, which is connected to and powered by a NOAA installation, has had several technical problems and was briefly sent out for servicing in August 2010.

Dr. Katy Kavanagh and collaborators (University of Idaho): Developing atmospheric and vegetation models to assess global climate change. The objective of Dr. Kavanagh's research is to improve monitoring tools for understanding biophysical processes influencing productivity in complex mountainous ecosystems, while specifically addressing the depth and magnitude of the cold air pool surrounding the TWRS National Weather Service station. Temperature and relative humidity are monitored using small "climate buttons" along an elevational transect installed upslope of the weather station.

Dr. Kavanagh is also in the process of planning a new project set to start at TWRS in 2011, titled "Major Research Instrumentation development of a smart 3D wireless sensor network for terrain-climate research in remote mountainous environments." Project leaders will install a smart wireless integrated sensor network to measure atmospheric, hydrologic, geospheric and biological processes along climatic, forest productivity and land-use gradients at TWRS. The network will allow researchers to conduct climate change research in remote mountainous regions where data to support climate and ecological models are lacking. Model outputs include soil moisture, net primary productivity (NPP), and net ecosystem exchange of carbon (NEE). The network will also integrate with RiverNet installations managed by Dr. Brian Kennedy (UI). Dr. Kavanagh visited TWRS in July 2010 to download climate information and make site assessments, and is including Tyler Morrison and Amie-June Brumble in the project's planning phases.

Tyler Morrison and Amie-June Brumble (Taylor Wilderness Research Station, University of Idaho): NOAA National Weather Service Cooperative Weather Station "Taylor Ranch", Station Index No. 109000. The climate data at TWRS is one of the few long-term data sets within a wilderness area, and is extremely valuable for assessing potential impacts of climate change on ecosystem productivity. This installation of this weather station was initiated by the Akensons in 1983 and has operated continuously since then; some data is also available from the late 1970s. Observations are recorded every day at 8:00 AM. Until recently, observations were logged in a booklet, called in daily over radio, and mailed to the NWS in a monthly digest.

Starting in October 2010, daily observations are now uploaded to an online database (www.wxcoder.org). The "Taylor Ranch" station is part of the nationwide National Weather Service's Cooperative Station Network. Data can be accessed through the National Climatic Data Center at <http://www7.ncdc.noaa.gov/IPS/coop/coop.html>.

Tyler Morrison and Amie-June Brumble (Taylor Wilderness Research Station, University of Idaho): Wildlife Observation Journal. An ongoing but informal monitoring effort is the Taylor Ranch Daily Wildlife Observation Journal, kept since 1982. This journal is used as an index for measuring changes in wildlife distributions and habits, such as ungulate, amphibian, or avian migratory habits, response to climate change, or habitat shift post-fire. It has also been used to track plant and animal phenology, although this is now monitored to a greater extent with the National Phenology Network system.

Amie-June Brumble (Taylor Wilderness Research Station, University of Idaho): National Phenology Network. TWRS joined the National Phenology Network (NPN) in 2009. Amie-June Brumble and station manager/scientist Holly Akenson selected observation species at TWRS along three observation transects, and Amie-June recorded phenology observations approximately once a week with the occasional help of that year's interns. Amie-June continued weekly observations in 2010, the second year of TWRS participation in the study. Owing to regular observations of a large number of species, the NPN publicly recognized TWRS at the end of 2010 for reaching the top 1% of nationwide observers⁸. TWRS is also the sole observer of bighorn sheep (*Ovis canadensis*) in the network.

Amie-June Brumble and Jim Gosz (University of Idaho): Taylor Wilderness Research Station Data Management. An upswing in research and monitoring efforts at TWRS have led to the need to develop data archiving, use policies, and data management/QC protocols, and the MOU with the USFS specifies management in the Frank Church River of No Return Wilderness as a cooperator responsibility. Primary goals for information management are to 1) maintain database integrity, 2) create a powerful and accessible environment for retrieving information, 3) facilitate linkages among diverse data sets, and 4) provide adequate metadata for interpretation and analysis. Amie-June Brumble worked in 2008 and 2009 to archive all known TWRS publications on an Endnote database, including .pdf copies of nearly every document. These documents are not web-accessible, but can be sent to any interested parties upon request. New policies for TWRS researchers and students will include stipulations for sharing datasets with TWRS, and efforts to draft these policies (including examining policies from other field stations) are currently underway. In the future, TWRS data will be managed and archived in cooperation with the University of Idaho Northwest Knowledge Network (NKN) and INSIDE Idaho (<http://insideidaho.org/>).

Jim and Holly Akenson/Idaho Wild Sheep Foundation: Annual bighorn sheep survey? In past years, Jim and Holly Akenson (University of Idaho) would conduct an annual survey of the Big Creek bighorn sheep population each December with the collaboration of volunteers from the

⁸ TWRS presently ranks 12th for total observations among 1,200 observers.

Idaho Wild Sheep Foundation. These data (herd size, sex ratio, age ratio, health) are particularly valuable, as they bridge the information gap on IDFG bighorn helicopter surveys, which can only be flown every 3 years. Reports and annual survey data from 2001 through 2008 are available at TWRS. However, the Idaho Wild Sheep Foundation did not contact TWRS about sheep surveys in 2010, and the survey was not conducted. The future of this survey at TWRS is uncertain.

Educational Activities

2010 Graduate Students:

Two graduate students worked on their research projects at Taylor in 2010. Justin Schlee (University of Idaho, M.S., Engineering) arrived at Taylor on May 2nd to begin the physical application of his project, which was the overhaul of the TWRS power system, including the installation of 18 solar panels and a new stream engine (see **Facilities** for details). Teresa Lorenz (University of Idaho, Ph.D, Wildlife Resources) arrived on May 26 to begin her research surveying Lewis' woodpeckers in the FC-RONR. The study was broadened later in the summer to cover all whitebark pine seed dispersers, with special focus on Clark's nutcrackers. Owing to her decision to shift her study area beyond Taylor Wilderness Research Station, the decision was made to award the DeVlieg Graduate Scholar funding to another student in 2011 so that DeVlieg funding would remain focused on TWRS projects. Teresa is not expected to return to TWRS in 2011.

2010 TWRS Graduate Students and Research Titles:

Teresa Lorenz (University of Idaho, Ph.D, Wildlife Resources): "A comparative study of whitebark pine seed dispersal in burned and unburned forest patches." DeVlieg Graduate Research Scholar.

Justin Schlee (University of Idaho, M.S., Engineering): "Taylor Ranch renewable power system expansion project." DeVlieg Graduate Research Scholar, National Science Foundation grant recipient

Undergraduate Students:

Four undergraduate research scholars conducted research projects at TWRS in summer 2010. DeVlieg scholar Matt Schenk (Biology/Geosciences, ISU) studied aquatic invertebrates and stream bed mobility. Berklund scholar Amber Lankford (Natural Resource Ecology, UI) conducted research on birds as a partial continuation of her 2008 DeVlieg research project on reproductive success and survival of Lewis' woodpeckers, and also served as a research assistant to graduate student Teresa Lorenz. DeVlieg Foundation President Janet Pope visited the scholars in the field in July. Two REU students, Elise Otto (Geology, Whitman College) and Will Stauffer-Norris (Environmental Sciences, Colorado College) also studied large woody debris at Taylor for approximately one month.

Owing to complications from changes in station management and needs to reexamine program goals, content, and funding, the Bleak Wilderness Internship was placed on hold in 2010.

2010 TWRS Undergraduate Students and Research Titles:

Amber Lankford (University of Idaho, B.S. Wildlife Resources. Advisor: Dr. Kerri Vierling). 2010 Berklund Undergraduate Scholar, 2008 DeVlieg Undergraduate Scholar, Bleak Wilderness Education Fellow. "Bird abundance and diversity in high-severity post-burn riparian areas on Big Creek and its tributaries."

Elise Otto (Whitman University, B.S. Geology. Advisors: Dr. Brian Kennedy and Dr. Alex Fremier) 2010 REU Student. "Function of Large Woody Debris in Creating Fish Habitat, Big Creek Watershed, ID."

Matt Schenk (Idaho State University, B.S. Geosciences. Advisor: Dr. Colden Baxter). 2010 DeVlieg Undergraduate Scholar. "Investigating Relationships between Flow, Bed Mobility, and Stream Organisms: Steps Toward Predicting Climate Change Effects in Tributaries of Big Creek, A Wilderness Watershed of Central Idaho."

Will Stauffer-Norris (Colorado College, B.S. Environmental Sciences. Advisors: Dr. Brian Kennedy and Dr. Alex Fremier). "Effect of Fire Intensity on Large Woody Debris Distribution in the Big Creek Watershed."

Field Trips and Workshops:

Debbie Fereday, May 2010: McCall High School Environmental Science class field trip.

Dr. Brian Kennedy and Dr. Alex Fremier, July 2010: REU student field trip.

McCall Outdoor Science School, August 2010. Educator field trip.

US Forest Service, September 2010: Lead Working Group meeting.

Dr. Brian Kennedy, September 2010. Fish Ecology class field trip.

Collaborations

An ongoing goal for program growth at Taylor Wilderness Research Station has been to develop collaborations between TWRS/University of Idaho and other organizations and institutions. Such collaborations provide added financial or project value, create new research and educational opportunities, and improve the connection of TWRS programs to regional, national, and international networks. TWRS is currently in the process of drafting an open-access data policy that will greatly improve these cooperative efforts. Current collaborations include:

University of Idaho /Payette National Forest– USFS Rocky Mountain Research Station: Forest Service research special use permits, establishing a framework for research collaboration and information exchange on wilderness related research needs and findings and connecting TWRS with the USFS National Experiment Stations network. UI Contact: Jim Gosz.

University of Idaho/Idaho Fish and Game (2007-2010): IDFG installed a rotary screw trap at TWRS to monitor migration of juvenile anadromous fish in Big Creek.

University of Idaho/National Oceanic and Atmospheric Administration Fisheries (2006-2010): NOAA Northwest Fisheries Science Center researchers (Steve Achord) installed an in-stream PIT-tag monitor in Big Creek at TWRS incorporating antenna arrays that detect PIT-tagged fish and send data to the Columbia River Basin PTAGIS database via satellite Internet. Data from the "TAY" site are accessible on the PTAGIS website www.ptagis.org or http://www.ptoccentral.org/dbaccess/InStrmDtctn/InStrmDtctn_query.html. The TWRS antenna arrays represent one station within a network of detection sites from the Salmon River headwaters to the dams on the Columbia River. Researchers from IDFG and UI (Brian Kennedy) have also PIT-tagged juvenile salmonids in Big Creek to utilize the in-stream monitor to address other research questions. Water quality data is downloaded several times per year and is accessible (along with data from other water quality monitors in the Salmon River Basin) on the Water Quality Baseline Environmental Monitoring Program website <http://webapps.nwfsc.noaa.gov/WaterQuality/>.

University of Idaho/Idaho State University (2008-2010): Both Dr. Colden Baxter and Dr. Ben Crosby maintain long-term monitoring sites at TWRS. Dr. Crosby installed instrumentation at TWRS for his research on the effects of abiotic factors on ecological processes in streams and to provide baseline data on hydrology and stream flows for studies of aquatic and riparian ecology and geomorphology. A precipitation isotope sampler measures isotopes of oxygen and hydrogen from rainwater. An automated stream gauge (radar sensor), was attached to the underside of the Big Creek Bridge in 2008 and continues to run. This station is used to monitor discharge and water quality year round and transmits this data by satellite for real-time monitoring. Data is archived at the ISU campus.

Organization of Biological Field Stations Meeting, Pellston MI, September 23-25, 2010.

TWRS station managers Amie-June Brumble and Tyler Morrison traveled to the University of Michigan Biological Station in Pellston, MI to attend the annual meeting of the Organization of Biological Field Stations (September 23-25, 2010), viewing it as a chance for valuable information-gathering and a potential collaboration opportunity. Station managers learned of many ways to encourage station growth and improve station visibility, and participated in several discussion panels to discuss common station problems and solutions. The successful installation of the new power system at TWRS several months prior was also an excellent example of sustainable energy production at a field station, and many members expressed interest in learning project details. TWRS also joined the Discover Life network (University of Georgia) at this meeting.

Donors

Taylor Wilderness Research Station owes much of its facility improvements and student research program success to the generosity of its donors. The major contributors in 2010 include:

The DeVlieg Foundation and Janet and Jim Pope continue to generously support student programs and research at Taylor Wilderness Research Station. In 2010, the DeVlieg Foundation funded one DeVlieg Undergraduate Research Scholar (Matt Schenk, Idaho State University), and one DeVlieg Graduate Research Scholar (Teresa Lorenz, University of Idaho). The foundation also provided partial funding for the Taylor Wilderness Research Station Renewable Power System Expansion Project (Justin Schlee, M.S. Engineering). Jim and Janet Pope visited Taylor in late July 2010, and again with a larger donor group in early November.

The Taylor Ecosystem Research Endowment was begun by donor Jim Morris in 2010. Morris is an electrical engineer currently residing in Pennsylvania, but is greatly interested in ecosystem studies and has visited TWRS with Idaho State University faculty and students on stream ecology trips many times. The endowment, which will be partially funded by Morris' estate, will focus on long-term ecosystem studies at TWRS.

The Friends of Taylor Ranch Endowment was started in 2006 to establish a source of sustainable funding for educational and research activities at Taylor Wilderness Research Station, and continues to grow.

In November 2010, a private outfitting group was hosted at TWRS for two and a half days owing to adverse weather conditions. While TWRS does not ordinarily host non-research groups, an exception was arranged in advance, as the outfitter stock was needed to graze down the TWRS pasture. Amie-June Brumble and Tyler Morrison toured the 10-person group through the facility, provided for computer connections and other lodging needs, and talked about TWRS research programs.

The group, which had originally been scheduled to stay at Taylor for a few hours, was very appreciative of the generosity in lodging and the opportunity to stay in a historically significant place, and several members expressed interest in repaying the station in some way. Amie-June Brumble created a take-away pamphlet on TWRS research programs and suggested a contribution to TWRS endowments, which was enthusiastically received. Two members of this group (Bud Shaitberger and Bill Heig, MN) have since met with College of Natural Resources Development Director Kim O'Neill to discuss possibilities, and both have expressed interest in staying connected to TWRS developments.

Facilities and Operations

Labor

Landon Moore was the Assistant Manager in 2010. Landon was responsible for all maintenance of the pastures, lawns, irrigation, and propane during his 3-month tenure, and brought additional mechanical expertise that was invaluable for making repairs to our backhoe. He regularly met and oriented visitors, managed air traffic and safety, and managed TWRS during any station manager absence. Because we had no interns or work-for-lodging program, and because Landon's work period was only three months long, we experienced a significant labor shortage in 2010. This was mitigated somewhat by the efforts of many volunteers

*2009 DeVlieg undergraduate scholar Liam Junk volunteered at Taylor from May 12 to May 25, and was of great assistance in repairing our broken water line and restoring it to full function. Liam assisted Tyler in hand-digging the last of the line, replacing the last portions of the broken pipe, troubleshooting the last leaks, and reburying part of the line. Liam volunteered approximately 96 hours.

*2008 Berklund undergraduate scholar Tati Gettelman volunteered at Taylor from August 8 to August 20, and assisted with the cutting and hauling of logs for winter firewood. Tati camped off the property and volunteered 48 hours.

*Marcie Logsdon, personal visitor of Landon Moore, visited from August 4 to August 18, and also assisted with the cutting and hauling of logs. Marcie volunteered 50 hours.

*University of Idaho Experimental Forest Manager Ross Appelgren visited Taylor on April 13th with graduate student Brad French to provide an assessment of Taylor's firewood resources and advise staff on harvesting methods and tools. Appelgren also offered the loan of several pieces of logging equipment from the Experimental Forest, which were later provided by Interim Instructor of Forest Operations Rob Keefe. After logs had been felled, limbed, and moved, the University of Idaho Logger Sports club visited Taylor from September 30th to October 3rd to provide assistance with bucking, splitting, and stacking. The club processed 13 cords of wood for Taylor during their visit, volunteering ~96 hours.

*University of Idaho Emeritus Professor Jim Kingery (Range Resources) visited Taylor from September 29-30 to give an assessment of pasture conditions and maintenance or rehabilitation needs, and to explore volunteer opportunities for the Range Club. Six members of the University of Idaho Range Club visited Taylor from November 5-8, and assisted Tyler Morrison in moving hay from the Taylor haystack to the upper (off-property) water line as an insulating precaution, and in moving rocks from the main pasture electric trench (a future mowing hazard) and relocating them to Pioneer Creek to resubmerge the DeVlieg and Lab water line crossings for winter insulation. The club volunteered ~120 hours.

In total, Taylor benefited from a minimum of 376 recorded volunteer hours (a low estimate). As the work-for-lodging program reimbursed students for work at the rate of \$10/hour, this labor can be valued at roughly **\$3,760**.

Two undergraduate students doing summer research at Taylor also volunteered their assistance on a regular basis, to the degree that station managers arranged to have them hired by the University of Idaho as IH employees so they could receive compensation for their time. DeVlieg Undergraduate Research Scholar Matt Schenk (ISU) and Berklund Undergraduate Research Scholar Amber Lankford (UI) worked as needed for a large portion of the summer, mowing lawns, applying linseed oil to log cabins, applying stain to the new solar shed, and assisting with the summer logging.

TWRS Renewable Power System Expansion Project

Taylor's first electrical system, a micro-hydroelectric generator, was installed in 1997. Although successful, progressive station growth had begun to overtake system output in recent years. The consequences of this strain included frequent blackouts during periods of high use, the need to finely coordinate usage of electrical appliances by Taylor visitors, and the need to use the generator to supplement power supply with increasing frequency, resulting in an increase in Taylor dependence on gasoline.

University of Idaho graduate student Justin Schlee (advisor: Dr. Herb Hess) planned an upgrade of the power system as his M.S. study in Engineering. Justin visited Taylor in Fall 2009 with several undergraduate students to plan locations, and began flying in hardware shortly thereafter. He arrived on-site on May 2nd, 2010, along with carpenters John and Richard Burkenbine and Keith Copperholl, who had previously completed the renovation of the Dave Lewis Cabin in 2008 and the interiors of the DeVlieg Cabin in 2004. The carpenters completed construction of a new shed in the northeast corner of the main pasture, which houses the inverters, a transformer, and 32 flooded 440 amp-hour lead acid batteries. During shed construction, Justin used the Taylor backhoe to dig a trench in the main pasture for the electric cables that would connect the transformer in the solar shed to that of the hydro shed. Power generated by the new stream engine, similar in size to the old stream engine but of a more efficient design, is conducted to the solar shed and converted to DC current and into the battery array. Power is then converted to AC, sent back to the hydro shed for voltage conversion, and conducted to each of the cabins from that point, thus avoiding the need to change the hydro shed as a power "hub." University of Idaho electrical engineers Chris Shelley and Mark Brooker flew into Taylor on three separate occasions to lay cable and connect the high-voltage equipment.

The system also included two arrays of 9 photovoltaic panels each, which were erected in early June. Each panel is capable of producing 235 watts of energy, for a total potential system output of 4200 watts. The arrays are also designed with adjustable pitch, which the station managers change quarterly for maximum efficiency.

The new power system (both stream engine and solar panels) was brought online on June 18th. A computer and wireless receiver were installed in the solar shed by CNR Server Systems Analyst Jory Shelton on June 22nd, which had the dual purpose of enabling the system to send automated system-generated emails summarizing power output to the University of Idaho on a weekly basis, and giving Taylor managers the ability to track system output and station electric load in real time.

Although the Taylor generator has been connected to the power system to provide auxiliary power if needed, Taylor has not had to operate the generator since the new system came online, which has been a huge step toward making Taylor more "green," and has also saved the station a significant amount of money on gasoline.

On July 13th, 2010, Tyler Morrison and Landon Moore shut down the stream engine after noticing unusual noises from the stream engine, which were later discovered to be the result of a bad rectifier in a solar shed transformer which had begun to arc. The rectifier was replaced on July 24th and the stream engine was restarted, but the solar system alone met all the electrical needs at TWRS without any problems for 12 days during a very high-use time of the year.

Maximum energy production at Taylor currently stands at 60 kwh. A battery storage capacity of 80 kwh can provide full power to the facility for two to three days. Tyler Morrison refills the batteries with deionized water and equalizes them monthly, and will replace the bearings in the stream engine once a year. Justin Schlee recommends starting the generator once monthly to keep the connections in good condition.

TWRS Main Water Line Replacement

The TWRS main water line froze during a caretaking period in December 2009. As a result, the DeVlieg Cabin, Taylor Cabin, Hornocker Cabin, and Lanham Lab were all without running water until the system was repaired in May 2010. The loss of the water line also temporarily stopped hydroelectric power production for the duration of the repair, forcing TWRS to operate on generator and battery power alone.

Station manager Tyler Morrison made the repair of the water line his top priority upon arriving at TWRS in April 2010. Caretaker Isaac Babcock dug by hand to unearth 50-foot section of broken pipe at the top of the water line, which was subsequently replaced. However, upon reactivating the line, Tyler discovered that the damage was worse than previously thought. Tyler used the TWRS backhoe to dig up over 400 feet of broken pipe, starting at the property line and moving downward to the orchard, bleedout, Taylor Cabin, and hydro shed. He removed all the broken pipe fragments, and then used the backhoe to re-dig the depth of the trench from 12-18 inches to 5-6 feet in an effort to move the pipe below frost line and forestall future damage. Tyler ordered replacement pipe and valves and worked with volunteer Liam Junk to replace the water line, which was successfully reactivated on May 15, 2010. Tyler Morrison and assistant manager Landon Moore worked together to rebury the line, move unearthed rock, relocate the emergency bleedout, and reseed the trench. This task completely

dominated the first two months of Tyler's work year, which exacerbated the existing shortage of labor.

Due to wilderness regulations, Tyler was not able to use the backhoe to dig the upper (off-property) length of water line any deeper than it currently exists, and hand-digging presents an extreme challenge due to the high frequency and large size of rock. To protect the line from frost damage, Tyler covered much of this section of water line with a few inches of sawdust, then worked with volunteers from the University of Idaho Range Club in November 2010 to move several tons of old hay from the hay barn to cover the upper water line.

Backhoe

The TWRS backhoe was heavily used this season. It was monopolized for the digging of the new water line and electrical trench for two months, and all heavy lifting and pulling at the station must now be conducted by the backhoe, as TWRS no longer has stock on-site. The backhoe moved batteries, lumber, roofing, and other building equipment for the construction of the solar shed, moved batteries, antennas, and other research equipment to the two NOAA sites, moved 13 cords of firewood, and was used to pull the mowing machine on the airstrip.

Consequently, the backhoe also needed extra maintenance work this year to keep it in good working condition. TWRS donor Jim DeVlieg assisted Amie-June Brumble in ordering a new choke cable and all new hydraulic cables, which were badly in need of replacement, and these parts were installed by Tyler Morrison and Landon Moore. In October 2010, a flat tire necessitated the purchase of a new tire and tube, and the inability of the backhoe battery to sustain a charge for more than a few hours led to the purchase of a new battery at the end of the year.

Logging

TWRS requires approximately 10 cords of wood annually to heat its cabins. Unfortunately, the Diamond Point Wildfire which burned throughout Big Creek in 2000 has greatly reduced available firewood supplies. Cutting live trees is undesirable and unsustainable due to the need for forest regeneration, most of the remaining burned snags are beginning to rot. A visit by Experimental Forest Supervisor Ross Appelgren in spring 2010 estimated two years of available fuel remaining for TWRS. Due to the long-term need for firewood and the rapidly-approaching issue of wood decay, station managers decided to attempt harvest of as much firewood as possible in 2010 and generate a surplus.

Based on the recommendations of Ross Appelgren, station managers ordered 1,200' of steel cable and 1,100' of rope to assist in hauling logs from the steep north-facing hill overlooking the airstrip. Other logging equipment was borrowed from the University of Idaho Experimental Forest. With assistant manager Landon Moore and significant volunteer assistance from other station users, Tyler Morrison supervised the felling and limbing of 22 snags. Two rock gabions were constructed on the airstrip to serve as anchor points for pulleys, and trees were pulled down the hill to the airstrip using the backhoe. Most of the logs were dragged to the cabins and

bucked to length, and subsequently split and stacked through the volunteer efforts of the UI Logger Sports club. Club members estimated total firewood production in 2010 as 13 cords. Several limbed trees were not moved to the cabins in 2010, as the necessary totals had already been reached and labor was in short supply. These trees will be the first to be processed in 2011.

While successful, logging efforts in 2010 did not address long-term solutions for heat at TWRS. Flying firewood or propane to Taylor is neither sustainable nor cost-effective. It would be prudent to begin to improve the energy efficiency of TWRS dwellings (particularly insulation) as soon as possible to slow consumption of remaining firewood. Station managers are also exploring alternative heat sources. A small, portable electric heater has proved effective in the Taylor Cabin, provided the weather is good and solar power production is high (daylight hours only). Tyler Morrison is also constructing an alternative style of wood stove which will hopefully consume a fraction of the amount of fire wood currently burnt, and holds heat for a longer time than existing models. This new type of stove is also designed to make use of small-diameter wood, such as limbs and tree trimmings, and could expand our sources of usable firewood to include coppicing.

Pasture Maintenance

All stock pastured year-round at TWRS over the past decade has been the personal property of manager/scientists Jim and Holly Akenson. Jim and Holly departed TWRS in May 2010, and returned briefly on July 4 to lead the pack string out. There has not been any long-term stock at TWRS since that time, although passing packstrings occasionally stay at TWRS and pasture their stock overnight.

The departure of stock animals at TWRS has freed up a significant amount of staff work time. Time that was previously spent on fence repair, moving animals from pasture to pasture, irrigating the pasture for better hay production, and the massive week-long effort of putting up hay for the winter can now be applied towards other projects. However, loss of the stock also comes with a cost. TWRS must now rely heavily on the backhoe for heavy moving projects on the property, such as dragging logs, moving equipment, or mowing the airstrip. TWRS also no longer has any way to assist researchers in moving heavy equipment off the property. Most noticeably, there are no longer any controls on the height of the pasture grass, which was very tall by the end of 2010.

Tall grass creates several problems. It presents a fire hazard in late summer, and also harbors rodent colonies and conceals snakes. Woody species are also beginning to encroach on the margins of the airstrip and north pasture. Curbing growth by halting pasture watering is not an option, as dry pastures are quickly overtaken by invasive weeds (the dry lower pasture and the driest parts of the main pasture are extremely weedy areas) and poses an unacceptably high fire risk.

Several solutions have been proposed. The first is to reintroduce stock at TWRS without pasturing them there year-round, therefore reaping the benefits of pasture use without

needing to spend time in the summer on haying. This could be accomplished by leasing stock from an outfitter or neighboring ranch. Any other use of the stock would need to be negotiated. At time of writing, TWRS will be pasturing two to three stock animals on loan from the Flying B ranch from June to September 2011 (free of charge).

Another solution is to purchase a large mower for the pasture grass. TWRS already needs a new lawn mower for cabin areas, and we are exploring options for an electric mower to reduce fuel consumption. However, a mower for the pasture would need to be a large, durable riding mower or a machine pulled behind the backhoe, and so electric options are unlikely. UI construction manager Butch Fullerton also suggested purchasing a small tractor and using it to pull the existing sickle-bar mower. This would still be a two-person operation, but would likely be faster and more fuel-efficient than the existing system, which is pulling the sickle-bar mower behind the backhoe. However, the sickle-bar does not provide an option for mulching or removal of the grass clippings, which would block light and kill the growth below if mowed when grass is long. Therefore, any mowing system for the pasture must either include a mulching option (to be conducted once or twice in a season), or be both fuel-efficient and time-effective enough to be conducted on a weekly basis throughout the summer.

Finally, the digging of the electrical trench from the solar shed to the hydro shed created a noticeable disruption in the pasture. Tyler Morrison and Landon Moore worked to mitigate the uneven surface of the finished trench, and volunteers from the University of Idaho Range Club worked to move loose rocks from the trench (a hazard for any future mowing efforts) and move them to Pioneer Creek to re-submerge the DeVlieg water line and guard against freezing. The majority of the trench length is fully rehabilitated, but the last 100 feet of it still requires care before it can be safely mowed.

Brushpiles

TWRS generates a large amount of brush each year from normal trail maintenance, brush pruning (for visibility) and downed limbs. Historically, this brush would be mounded into piles and periodically burned. This method produced no useful byproducts, and could only be done at certain times in order to reduce the very real risk of brushfires. In 2010, station manager Tyler Morrison experimented with using a small electric wood chipper (personal property) to reduce the brushpiles to mulch, which was used for fill around bridges, waterline insulation, and to reduce erosion and improve traction on trails. This method was very successful, as it did not draw prohibitive amounts of electric power, posed no safety risk to the station, and generated a useful byproduct. We plan to continue this method in 2011, and we strongly recommend the purchase of a new wood chipper for indefinite TWRS use, preferably one that can process large-diameter limbs.

Fire

2010 was not a significant fire year in Payette National Forest. The Bighorn Fire, a small ground fire, burned 7 miles downstream of TWRS, while the Copper Fire burned 20 miles upstream. TWRS station managers sent updates to the Payette National Forest and ensured that TWRS

users were kept aware of safety protocol. Fire hoses and pumps were deployed around the property in case of emergency, but no structure protection from fire was needed at TWRS this year.

Flood

During spring snowmelt and subsequent high water, the TWRS airstrip flooded for its third consecutive year in the first week of June. Fortunately, the flood period was brief, and the strip was stable enough to receive air traffic after one week. Station managers were off-property for safety training at this time, and all station operations were coordinated by Assistant Manager Landon Moore.

Other Facility Improvements (2010)

***New DeVlieg Cabin Hot Water Heater:** The existing hot water heater in the DeVlieg Cabin (installed in 2004) had been undependable for several years, and completely failed at the start of the 2010 season. The same model of hot water heater, installed in the Hornocker Cabin at the same time, has shown no problems. A new hot water heater was purchased through May Hardware in McCall and installed in May 2010, and has operated without problems since that time. May Hardware also supplied a new exhaust vent, as the port in the side of the DeVlieg cabin had to be widened for the new model. The broken hot water heater was returned to the company for possible repair.

***New Taylor Cabin Floor Finish:** Tyler Morrison refinished the living room floor of the Taylor Cabin prior to move-in in May. The floor had previously been treated with oils and showed significant signs of deep wear. Tyler sanded away the softened surface and refinished it with finish left over from a previous project, making the new floor hard and durable.

***New Taylor Cabin Sink:** The kitchen sink in the Taylor Cabin had a long-standing leak, and water from this leak was seeping behind the countertop and beginning to rot the wood. Tyler Morrison replaced the sink faucet in June 2010 and added a splashguard to the rear of the countertop.

***Worm Bin:** Taylor has a compost pit south of the orchard to reduce food waste in fly-out garbage. However, this pit sometimes attracts scavengers and pests. Tyler Morrison installed a worm bin in the Taylor Cabin basement is currently testing the efficacy of the bin in processing compost without attracting pests.

***Log Treatment:** The Lanham Lab, Taylor Cabin, and Dave Lewis Cabin exteriors all received a protective coat of linseed oil during the summer. Ideally, all log buildings on the property should be treated with linseed oil every two years.

Facility Needs (2011)

***Log Treatment:** The Hornocker Cabin, Arlow Cabin, corral shed, and hay barn are all due for linseeding in 2011, and TWRS already has sufficient linseed oil for the task. The DeVlieg Cabin will also be treated, but the logs require a different product, which Tyler Morrison is investigating with May Hardware.

***DeVlieg Cabin Deck:** The DeVlieg Cabin deck was not finished with a durable, weatherproof product at its installation in 2004, and nearly all the finished surface has worn away to bare wood. We plan to sand down and refinish the deck in 2011 to protect it against further wear and weathering. The product required to finish the deck was ordered in 2010 and is already at Taylor.

***Taylor Cabin Roof:** The Taylor Cabin exhibited several leaks near the ridgepole during the winter of 2010-2011, and currently has a temporary tarpaper patch. Previous managers had discussed the possibility of replacing the Hornocker, Taylor, and Arlow cabin roofs. If the Taylor Cabin roof is not to be replaced in 2011, a patching solution will need to be found.

***Lawnmower:** The existing Taylor lawnmower is broken beyond repair. The purchase of a new lawnmower was approved in 2010; managers are currently consulting with University of Idaho Facilities/Construction Manager Butch Fullerton about recommendations and resources. The best solution at present for Taylor lawns appears to be a low-cost electric lawnmower for TWRS cabin lawns (reducing TWRS fuel dependence). For Taylor pastures, we recommend either a small lawn tractor to pull the large sickle-bar mower on the airstrip (historically pulled by stock, currently pulled by the backhoe), or a large mulching mower (see **Facilities, Pasture Maintenance**).

***Refrigerator:** The propane refrigerator in the Lanham Lab failed often in 2009 and 2010, and attempts to repair it have not proved successful. IDFG expressed dissatisfaction with the refrigerator due to occasional food spoilage during their stay. The purchase of a new refrigerator was approved in 2011, and M.S. student Justin Schlee confirmed that the new power system could support an energy-efficient electric refrigerator. A suitable model was found and purchased in February 2011⁹.

***Energy Efficiency:** TWRS stands to gain much from improvements in energy efficiency, as the cost of transporting fuel is extremely high. The installation of the new hydroelectric generator and solar panels did much for "greening" the station in 2010. Further improvements for increasing passive energy efficiency include rethinking cabins with durable, synthetic materials, adding insulation to roofs and floors, and installing double-paned windows, with first priority to cabins with winter habitation. Estimates of chinking needs and material costs for the Taylor Cabin were completed in June 2010.

⁹ Installed March 25, 2011.

***Hornocker Flooring:** A winterizing problem in the 1990's caused leakage problems in several Taylor cabins. While the leaks were quickly addressed, water damage occurred in the flooring and foundations of some of the buildings. One damaged area, the floor of the Taylor Cabin bathroom, was fixed several years ago. In summer 2010, we noticed the floor around the toilet in the Hornocker Cabin (west) was becoming unstable, and is also due for replacement. Amie-June Brumble has a personal contact that may be willing to repair for the floor in summer 2011 if UI can provide for the cost of materials. Until then, that bathroom has been closed off as unsafe.

***Hornocker Shower:** The stall shower in the Hornocker bedroom (east) was damaged around the time of its installation, and is now very badly rusted. The shower's performance is satisfactory, but it appears unsanitary, which is an undesirable condition in a room frequently occupied by donors and other Taylor guests. We would like to replace this stall shower when possible.

***Webcams:** Plans for the installation of two TWRS webcams were established in summer 2010. The intent of the webcams was primarily for use of TWRS-associated aviation services (Arnold Aviation in Cascade, McCall Aviation in McCall, Sawtooth Aviation in McCall, G&S Aviation in Cascade, Middle Fork Aviation in Challis, and Interstate Aviation in Moscow), but also for general public interest. These webcams would provide all area pilots with precise, current, visual information on flight conditions, allowing them to make critical decisions regarding route planning and passenger safety. It would also reduce the need for station managers to spend large amounts of time contacting the companies with regular weather updates when flights are expected. Finally, it would save a significant amount of money on flights by reducing the number of initiated flights turned back due to weather¹⁰.

Two webcams were purchased in summer 2010, but returned to the vendor when funding for the project was later rescinded. All area pilots had expressed great enthusiasm for the webcam project for the efficiency and safety it would provide, and were greatly disappointed to hear of the project's cancellation. We strongly urge the restoration of this project in 2011.

***Woodchipper:** The use of a wood chipper at TWRS has proved to be an excellent alternative to burn piles. However, the existing TWRS wood chipper is the personal property of station manager Tyler Morrison, and is also old, beginning to wear out, and is capable of processing only small-diameter limbs. We recommend the purchase of an electric wood chipper for long-term use at TWRS in 2011 (see **Facilities, Brushpiles**).

¹⁰ Pilot Mike Dorris (Sawtooth Aviation) estimates the cost of the webcams to be offset after preventing only one to two flights turned back due to weather. Depending on time of year, the webcams easily could be considered "paid for" in under ~4 months.

Outreach

The McCall-Donnelly High School Environmental Science class flew to Cabin Creek and hiked to Taylor Wilderness Research Station on May 23, 2010, for a weekend of wilderness field experiences directed by Amie-June Brumble. The class sampled stream invertebrates in Pioneer Creek, learned about our renewable energy project, visited the IDFG screw trap, and went on a plant identification and phenology hike with Amie-June Brumble. This was the first year that the group was required to pay regular lodging fees, rather than the work-for-lodging arrangement of previous years. Teacher and trip leader Debbie Fereday reported on the difficulty of raising the lodging funds in addition to flight costs.

Rick Fereday, Debbie's husband and owner of May Hardware in McCall, accompanied the group in his private aircraft. Amie-June and Tyler met with Rick during the group's visit to reestablish a Taylor account at May Hardware, and discussed recommendations and needs for facility repairs and upgrades. Rick's expertise combined with firsthand knowledge of TWRS was extremely helpful, and many projects in 2010 were completed with his help and advice.

Marketing

Efforts to redesign and update the TWRS website and bring it into compliance with the new University of Idaho Sitecore system began in mid-2010. Information specialists Johanna Blickenstaff and Scott High worked closely with TWRS donor Janet DeVlieg Pope and station manager Amie-June Brumble on website structure and content. Station managers Tyler Morrison and Amie-June Brumble also traveled to the University of Idaho in October 2010 to receive Sitecore training, better allowing them to make remote changes as needed.¹¹

Janet DeVlieg Pope and Amie-June Brumble also worked together in September 2010 to create a TWRS Facebook page, as a way for past, current, and upcoming users to stay in touch with each other and with Taylor events. At present the page has 82 members and over 100 photos of recent events (<http://www.facebook.com/pages/Taylor-Wilderness-Research-Station/140957592612304>).

Upcoming Activities

*McCall-Donnelly High School Environmental Science Field Trip: Teacher Debbie Fereday will accompany a class of approximately 20 students (the largest group on record) to Taylor in late May 2011. The class will do aquatic invertebrate sampling, visit the IDFG screw trap, and compare climate and phenology trends between McCall and TWRS. The class will also visit the archaeology site if time allows. The visit will proceed under the previous arrangement of work-for-lodging, which will provide TWRS with approximately 30 hours of volunteer work.

*Hiring Assistant Manager: We hope to hire an assistant manager to be on-site by May 15, or sooner. This position will cover the heavy use period of May-August.

¹¹ The new website was launched on February 10, 2011 (<http://www.uidaho.edu/cnr/taylor>)

*Internship: The research internship program was restarted for the 2011 season. We expect to have four interns arriving at Taylor on May 29th.

*DeVlieg Undergraduate Scholars: We expect 2-3 research undergraduate students at TWRS this season, under the mentorship of Brian Kennedy and Colden Baxter.

2010 Publications, Reports, Theses, and Presentation Abstracts

Arkle, R. and D. Pilliod (2010). "Prescribed fires as ecological surrogates for wildfires: a stream and riparian perspective." Forest Ecology and Management **259**: 893-903.

Arkle, R., D. Pilliod, et al. (2010). "Fire, flow, and dynamic equilibrium in stream macroinvertebrate communities." Freshwater Biology **55**: 299-314.

Copeland, T. and R. V. Roberts (2010). Idaho Steelhead Monitoring and Evaluation Studies Annual Progress Report, January 1 2009-December 31 2009. D. o. Energy. Boise, ID, Idaho Department of Fish and Game.

Cornell, J. P. and J. M. Davis (2010). Effects of earlier spring snow-melt on periphyton biomass: potential climate change implications from a 20-year study of a wilderness stream ecosystem. North American Benthological Society Annual Meeting. Santa Fe, NM.

Davis, J. M. and C. V. Baxter (2010). Do indirect effects of global climate change on forest, fire, and flow dynamics mediate responses of stream-riparian ecosystems? North American Benthological Society Annual Meeting. Santa Fe, NM.

Hamann, E. J. and B. P. Kennedy (2010). Quantifying straying rates of adult Chinook salmon (*Oncorhynchus tshawytscha*) based upon reconstructions of juvenile rearing habitats from otolith microchemistry fingerprints. International Symposium: Advances in the Population Ecology of Pacific Salmonids, Luarca, Spain.

Kennedy, B. P. (2010). The integration of microhabitat behaviors and migration decisions to aid our understanding of the causes and consequences of juvenile salmon life history diversity. Advances in the Population Ecology of Stream Salmonids International Symposium, Luarca, Asturias, Spain.

Malison, R. L. and C. V. Baxter (2010). "The "fire pulse:" wildfire stimulates flux of aquatic prey to terrestrial habitats driving increases in riparian consumers." Canadian Journal of Fisheries and Aquatic Sciences **67**(3): 570-579.

Malison, R. L., J. Benjamin, et al. (2010). "Measuring adult insect emergence from streams: the influence of trap placement and a comparison with benthic sampling." Journal of North American Benthological Society **29**(2): 647-656.

Vallis, K. L. and E. J. Rosi-Marshall (2010). Past and present aquatic invertebrate diets as indicators of climate change: The River Continuum redux. North American Benthological Society Annual Meeting. Santa Fe, NM.

Wipfli, M. S. and C. V. Baxter (2010). "Linking ecosystems, food webs, and fish production: Subsidies in salmonid watersheds." Fisheries **35**: 373-387.