

## **One-time request for funding to the White Mountain Research Station**

**March 2007**

**Summary.** White Mountain Research Station (WMRS) is an extremely valuable asset in the University of California that needs a one-time allocation of funds for facilities to sustain its value to the University and scientific community. The most urgent needs that are necessary to protect the University's investment will cost \$283,500. Another \$574,300 is necessary to bring facilities up to a base level which will make WMRS attractive for further investment by UC campuses and continued utilization by UC researchers. Finally, \$393,000 is needed for one-time investments to put WMRS on par with the best terrestrial field stations in the world in terms of functionality and safety. Together, with a one-time staff augmentation of \$60,000, the total need is \$1,310,800.

**Background.** WMRS was established in 1950 as a multicampus research unit (MRU) that has served a wide variety of scientific communities both inside and outside the University of California. WMRS consists of four laboratories spanning a 10,000 foot vertical transect from the floor of the Owens Valley to the summit of White Mountain at 14,256 feet above sea level. This altitude transect is absolutely unique in North America and has been utilized by scientific disciplines from human physiology (studying the effects of long-term exposure to low oxygen levels at altitude) to radio astronomy (measuring signals at wavelengths that are distorted by the atmosphere at low altitudes).

The University's investment in WMRS has paid off in terms of scholarly production, with over 100 dissertations and 1,000 refereed publications, leveraging external funds that always exceed the UCOP allocation (\$6.2M in 2006) and making critical contributions to high impact research. For example, Professor George Smoot (UCB) won the Nobel Prize in Physics this year for validating the "big bang" theory of the universe, based on experiments started at WMRS in the 1980s.

**Problem.** There is a critical need for a one-time infusion of funds for WMRS to protect the University's investment. At the last Fifteen-year review of WMRS in 2000, the need for \$300,000 of deferred maintenance and \$84,000 more in the annual routine maintenance budget were recognized and recommended. Unfortunately, budgetary limitations in the University and Office of Research did not allow this and the problem grew worse with rising utility costs, no inflationary adjustments to the WMRS budget, and permanent budget cuts of 21%. This has resulted in at least \$522,500 reduction in funding since 2001. In response to these cuts WMRS eliminated research support for UC faculty, decreased staffing by about 30%, and raised station use fees so as to bring in more outside income. In the face of all these changes, which might be expected to greatly decrease use of the station, recharge income has steadily increased. This demonstrates the importance and significance of WMRS to the scientific community. The national stature of WMRS is also demonstrated by its success for highly competitive infrastructure grants for \$255,000 from the NSF Field Station and Marine Laboratory program and a favorable score for a \$411,000 proposal to the NIH National Center for Research Resources, which was approved but not funded in this tight year for NIH.

These positive signs have been achieved in spite of the budgetary crisis, but at the expense of facilities and equipment which are aging and in need of repair and/or replacement.

**Proposed Solution.** To address the deferred maintenance/equipment replacement problem, WMRS requests a one-time allocation of \$1,310,800. These funds will not only allow the continuing safe operation of WMRS for UC researchers but they are designed to enhance efficiencies and move us toward sustainable operations without permanent augmentations in the UC appropriation for WMRS. This is especially important now with the impending reorganization of MRUs, which recognizes WMRS as one of only two or three facilities that have unique roles and needs within the MRU portfolio. Meeting these needs will greatly improve the general appearance and modernize infrastructure to make WMRS more attractive for investment by a campus and insure added value to the University's investment.

This request was discussed and endorsed by the President's Advisory Committee for WMRS at its annual meeting on March 7, 2007.

**SUMMARY: WMRS deferred maintenance/equipment needs:**

**Tier 1 Most urgent priority**

Water well	\$50,000
Energy efficiency and safety	\$162,000
Building preservation	\$37,000
Infrastructure for users	\$34,500
<b>Tier 1 subtotal</b>	<b>\$283,500</b>

**Tier 2 Repair/renovate poorest equipment and facilities**

Researcher housing	\$480,000
OVL shop renovation	\$31,500
Heavy Equipment replacement	\$50,000
Computer replacement	\$12,800
<b>Tier 2 subtotal</b>	<b>\$574,300</b>

**Tier 3 One-time investments that will make WMRS safer and more functional**

Computing	\$13,000
Renewable energy systems	\$200,000
Snowcat for winter access	\$180,000
<b>Tier 3 subtotal</b>	<b>\$393,000</b>

<b>One time staff augmentation</b>	<b>\$60,000</b>
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<b>Grand Total</b>	<b>\$1,310,800</b>
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**Tier 1 - Urgent and essential for safety or to prevent near-term damage that will greatly increase long-term expense.**

Water well	\$50,000
Energy efficiency – replacement of old, obsolete equipment	\$162,000
Building preservation	\$37,000
Infrastructure for users	\$34,500
<b>Tier 1 subtotal</b>	<b>\$283,500</b>

**Water well.** The current water well at the Owens Valley Laboratory is necessary to provide water for over 6,000 users per year but it frequently stops flowing because of sedimentation. This can lead to health problems as it is the only source of drinking water, as well as being essential to irrigation and laboratory operations. Hence, not only is there a basic need for a new well to at least provide back-up to the current well, but it is desirable to have another well for drinking water to insure health and safety. Cost \$50,000 to drill a new well and plumb in to the existing system.

**Energy efficiency – replacement of old, obsolete equipment.** WMRS embarked on a program to increase energy efficiency in response to rising utility costs. Previously, it was not cost efficient to make such improvements but with \$40,000 utility bills and external funding for renewable energy installations, it is becoming cost effective. An NSF grant is providing \$255,000 to the White Mountain Energy Project to modernize energy sources at the Barcroft facilities. Similar investments can pay off with decreased utility costs at OVL.

In the harsh climate of Bishop, reliable, *efficient HVAC (heating-cooling)* units are essential and we have four units that are so obsolete they cannot be repaired (two have already failed and have been replaced). (**\$36,000**). The lighting fixtures at all facilities are old and less efficient than modern equipment. Rebates are offered to help defray a proportion of the cost of the new *efficient lighting equipment* but there are considerable labor costs to plan and retrofit lighting in approximately 140 rooms (**\$15,000**). Old appliances are another source of inefficiency. Barcroft in particular needs new *refrigerators and freezers* as we transition to solar energy supply (**\$7,000**).

The **WMRS vehicle fleet** of 12 trucks enables staff to access the upper stations, via steep mountain highways and rugged, washboard dirt roads. We have implemented a special WMRS vehicle maintenance plan to ensure the safety of all vehicles. Nevertheless the fleet is very old (only three are newer than 10 years old) and many vehicles need replacement. Urgent needs include replacing our four small pickup trucks, all of which are 15-20 years old and have over 100,000 miles of use. We also need to replace our 22-year-old one-ton flatbed truck with a heavier 2-ton 4x4 truck for hauling heavy trailer loads up and down the mountain. Parts and repairs will cost much more than the purchase price of these five new vehicles over their projected lifetime (**\$110,000**).

**Building Preservation.** All of the existing WMRS buildings need immediate attention to protect the investment in the buildings themselves. The environment is very hard on the exterior finish, with 100 degree temperature fluctuations in the desert-like environment at the Owens Valley Laboratory and the extreme high altitude environment at the other laboratories. *Exterior paint* is needed for all of the buildings at OVL and Barcroft; most have not been painted in 10-20 years. This includes 27 buildings and trailers, and several

outbuilding/storage lockers, for a total of about 35,000 s.f. of wall surface (\$20,000). The log buildings at Crooked Creek, constructed in the 1990s, also need to be painted with *wood preservative*. It is time to repeat the process in order to protect the logs from drying and cracking (\$7,000). In addition, the interior of one of the main dormitory buildings at the Owens Valley Laboratory (Dorms 2-5) needs *interior paint and bathroom plumbing* to remain functional and preserve the structure (\$5,000). The Manis Lab and VIP trailer need new *flooring* to protect the understructure (\$5,000).

**Infrastructure for users.** WMRS receives a very high number of users each year and requires certain minimum requirements to meet this demand. In a modern field station, these include reliable telecommunications and computing. WMRS installed the basic computer network and laboratory with a \$99,000 grant from NSF and donations from industry but there are additional needs to *modernize the computer network*. Critical needs are for a new server for the WMRS web site and a new workstation computer for our network/GIS administrator (\$8,500). At the other end of the spectrum, the users need mattresses to sleep on and all of ours are 20 years old. New *mattresses* and mattress covers for 150 beds at all facilities (\$26,000).

**Tier 2 – Repair/renovate poorest equipment and facilities so as to make WMRS more attractive to future investors.**

Researcher housing	\$480,000
OVL shop renovation	\$31,500
Heavy Equipment replacement	\$50,000
Computer replacement	\$12,800
<b>Tier 2 subtotal</b>	<b>\$574,300</b>

**Researcher housing** at OVL primarily consists of old hand-me-down trailers that are mostly in very poor condition and unplumbed. Replacing these trailers with new/used trailers would cost \$200,000 (for 10 trailers). However, a better solution is a small *building (2,280 sq ft.) to house 10 individual researchers* with a common room with shared bathroom facilities (\$400,000). Visiting classes and researchers use our two bathhouses containing 6 bathroom/shower rooms. These are older units in need of renovation, which would cost at least \$5,000 to re-plumb, and which are in constant threat of winter pipe breakage. It would be much more efficient for future maintenance to replace them with a *permanent bathhouse (\$30,000)*. A trailer formerly used by a resident caretaker has been designated as long term housing for researchers. It was remodeled to include more space but now is in need of repairs to the roof, plumbing and HVAC, and needs painting, which would cost \$10,000. It would be more efficient to replace this unit with a small *double-wide unit for long-term researcher residence (\$50,000)*.

**Shop.** The OVL shop was built in the 1960's and has never been renovated. To *comply with OSHA and University safety standards*, all the old wiring needs to be replaced and the roof and walls need to be repaired and painted. A drop ceiling needs to be installed to

provide storage and improved working conditions. The shop also needs to be connected to the local area network and telephone (\$31,500).

**Heavy equipment.** A loader/backhoe is required for the varied maintenance projects at four laboratory sites in the Owens Valley and White Mountains; this is the most useful single piece of heavy equipment we need for overall operations. Our current backhoe is a tracked caterpillar machine which is too heavy to transport between stations using our station vehicles. The unit is currently broken and must be repaired before this summer. Replacing it with a lighter *rubber-tired backhoe and loader* would be much more cost effective over the long run and give us a reliable machine for carrying out repairs and projects at all the stations (\$50,000).

**Computer.** Absolutely essential upgrades to our computing resources were described in our first tier needs. However, we also need to replace three old laptop computers running windows 2000, a 10-year old large-format plotter, the maintenance office desktop computer, a new UPS for the web server and another to protect the laboratory computers, and a new wireless access point for Crooked Creek (\$12,800).

### **Tier 3- One-time investments that will make WMRS safer and more functional.**

Computing	\$13,000
Renewable energy systems	\$200,000
Snowcat for winter access	\$180,000
<b>Tier 3 subtotal</b>	<b>\$393,000</b>

**Computing.** The computer lab supports GIS capabilities used intensively by students and researchers. This service would be greatly augmented by adding a *dedicated GIS server and a large format scanner* (\$8,000). The station also needs new *computer projectors* and screens at all three laboratories (\$5,000).

**Renewable energy systems.** The White Mountain Energy Project at Barcroft is well underway with a \$255,000 grant from the National Science Foundation. However, project completion requires funds to add *thermal energy storage* capacity, a demonstration *wind turbine*, and the complete *controls and web-based display system* (\$100,000). The Owens Valley Labs and the Crooked Creek labs are in an ideal location for solar electricity generation and this could greatly reduce electrical consumption and the \$40,000 electric bill for the station. A *demonstration system could be installed at OVL for \$100,000*, with the ultimate goal of building a system to reduce net electric consumption to zero at OVL and Crooked Creek.

**Snowcat.** WMRS requires a rubber-treaded snowcat for safe snow-condition access to the high altitude stations. Our current snowcat is too light for access in deep snow and safety considerations require the need for a backup unit. Purchase of a *“trail groomer” snowcat with trailer* would greatly improve safety and make winter access much more reliable (\$180,000).

**One-time staff augmentation.**

WMRS current staffing levels are such that implementation of all or part of this wish list will require additional supervision and building maintenance worker assistance. Even though outside contractors are hired to carry out the principal work, on-site staff are required to support the work because of the remote nature of the sites and the idiosyncratic nature of the facilities. Depending on the magnitude of the task we would need to hire at least 1 seasonal employee (\$2,500/mo) and hire or reassign assign project supervision duties for an experienced contractor or tradesman (\$2,500/mo for 50% time project supervision) (**\$60,000**).