Appendix

Organization and Conduct of Ecological Research Programs in the Vicinity of Mount St. Helens

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ABSTRACT

Ecological scientists interested in conducting research at Mount St. Helens after the eruption faced logistical and legal hurdles that prevented easy access to the volcano. Also, coordination among scientists was necessary to ensure effective field studies and to protect research sites. A variety of successful responses dealt with these problems, including support of early reconnaissance and planning efforts by the Pacific Northwest Forest and Range Experiment Station, research field sampling sessions, encouragement of coordinating efforts by the National Science Foundation, and creation of the St. Helens Forest Land Research Cooperative. Ecological research at Mount St. Helens has been active and productive; however, funding has not been adequate to allow full advantage of research opportunities. Improved communication between geologists and ecologists, coordination of research projects (including integrated ecosystem investigations), and protection of important research sites are considerations for future research on Mount St. Helens.

INTRODUCTION

The eruptions of Mount St. Helens provided unique opportunities for ecological research in a relatively accessible region and created a huge field laboratory in which the following question could be addressed: What happens when 100,000 ha of forests and meadows are covered with varying depths and textures of volcanic tephra and when all the above-ground plant and animal life on adjacent clearcut and virgin forest lands is destroyed? Basic theories of primary and secondary succession, population biology, ecosystem recovery, and land–water

interactions could be tested on a previously unimaginable scale. Also, ecologists could provide essential technical information to land managers and planners interested in natural recovery rates, artificial revegetation, and erosion control.

Research on and around Mount St. Helens created a number of special challenges. Many scientists were interested in initiating studies that required funding and access to the affected areas. Organizations potentially responsible for conducting or funding research quickly expressed concern about the coordination and duplication of research efforts. Land managers were faced with promptly screening large numbers of scientific requests for access to the volcano and ensuring that not only the needs of basic research but their own requirements for information were addressed during the development of scientific programs.

Logistics and restricted access to areas near the volcano created other concerns. A special access permit was necessary for the restricted "red zone" (the most endangered area subject to closure during threatened or actual volcanic activity), and entry required special equipment (e.g., radios and four-wheel drive vehicles), had restricted time limits, and was influenced by the constant possibility of rapid eviction whenever further eruptions threatened. Since expensive helicopters were the only means by which to reach much of the devastated region, adequate funds, weather conditions, and limited air space around the volcano had to be considered. The large geographical extent of the affected area made it difficult to select a manageable number of sites for scientific studies. Finally, recognition that many important but short-lived phenomena were occurring required prompt initiation of scientific observations.

Responding to these challenges, the scientific community, institutions, and organizations developed procedures for organizing and coordinating the ecological research program at Mount St. Helens which may provide useful guides for future situations. Several important factors contributed to the success of these procedures: (1) research programs (as well as their administration) were flexible, because altered physical conditions, restricted access, legal limitations, funding levels, and experience required a more evolutionary approach; (2) the scientific community received extensive cooperation from the Gifford Pinchot National Forest and the Weyerhaeuser Company; (3) cooperation among scientists contributed to research successes; and (4) a basic administrative infrastructure for interdisciplinary research—National Science Foundation sponsored ecosystem programs—provided a basis for a coordinated approach to research at Mount St. Helens.

INITIAL CHALLENGES

Challenges to conducting research on Mount St. Helens generally fell into three categories: (1) logistical and legal access to areas in the vicinity of the volcano, (2) coordination and duplication of research efforts, and (3) cooperative efforts.

LOGISTICAL AND LEGAL ACCESS

During 1980 and 1981, access to study sites in the red zone around Mount St. Helens was legally restricted and limited to helicopters. As time went on, the area of the red zone decreased in size, rules governing research effort in the zone eased, and ground access (some of which was possible almost immediately following the eruption) increased greatly. Nonetheless, restrictions on access during the first 18 months following the eruption created significant constraints on research objectives, although institutions controlling access considered them necessary to protect the safety of involved scientists.

Access to the red zone was controlled by the Gifford Pinchot National Forest, the Washington State Department of Emergency Services, and the local county sheriff departments. The U.S. Geologic Survey provided these agencies with information concerning volcanic hazards. During the summer of 1980, blanket entry permits for multiple trips were generally not issued, and scientists with valid research projects had to be certified before they were issued entry permits by the Emergency Coordination Center of the Gifford Pinchot National Forest. Also, during that summer, the red zone was closed when volcano warnings were issued or when direct observation of the mountain by airplanes or remote television cameras was restricted due to inclement weather.

Activity inside the red zone was governed by regulations, most of which were made to ensure the safety of researchers. During the first two summers following the eruption, regulations required that researchers stay within 15 min walking time from a helicopter or ground vehicle in the red zone and 30 min in the blue zone. No dropoffs or overnight stays were permitted in the red zone. Furthermore, all parties were required to maintain radio contact with the Volcano Control Center in Vancouver, Washington, or with a patrolling aircraft. Alternatively, scientists could be in radio contact with a base station outside the restricted zone that, in turn, was in phone contact with the Volcano Control Center. Obtaining necessary USDA Forest Service radios was often difficult, because purchase of radios with appropriate crystals was restricted and only a limited number of radios

were available for loan. These rules were periodically modified as perception of the volcano and its hazards changed.

Access to the red zone required helicopters during the summer of 1980. These were frequently unavailable (especially on short notice), expensive when available, and restricted by poor weather. Permission to enter the red zone by helicopter could be denied because of excessive traffic in the restricted airspace. By 1981, however, reconstructed roads permitted access to most of the northwestern and eastern portions of the blast zone, and much of the remainder of the zone had roads by the fall of 1982. Helicopters might be necessary to provide transportation for some research projects for many years to come on Mount St. Helens, on Mount Margaret and associated peaks, and in parts of the upper North Fork Toutle River basin.

COORDINATION AND DUPLICATION OF RESEARCH EFFORTS

Since there was considerable duplication of interests among scientists, agencies funding scientific studies and land management organizations responsible for the accommodation of scientists wanted to limit research duplication. They hoped that efforts by various scientists on similar research topics would be coordinated, and thus everyone's needs for information would be met. Plans and information were initially exchanged, thereby preventing accidental duplications in proposals and providing opportunities to develop compatible or joint studies.

Independent site selection by each scientist threatened to clutter the landscape with plots, creating duplication and reducing the certainty of adequate documentation. It became essential to identify a series of common sampling sites in the blast zone and in the extensive region of tephra deposition to the northeast to provide the best possible investigative efficiency, site preservation, and ease of access. Data gathered at these sites could be shared among projects, thereby satisfying common needs and integrating the studies. Direct comparisons of results were possible. In addition, land management agencies could more easily protect carefully chosen sites.

One major tactic supporting coordination and logistical efficiency in research was the intensive field sampling sessions or "pulses" during several 2-week periods in 1980 and 1981. Research in the restricted zones on Mount St. Helens was facilitated by provision of living and working accommodations, equipment, ground vehicles, and helicopters and by an easing of restrictions on permits. These sessions were organized by the Pacific Northwest Forest and Range Experiment

Station (PNW Station) personnel, were financed by the National Science Foundation (NSF) and the PNW Station, and were based at the Cispus Environmental Center located about 16 km south of Randle, Washington, and 32 km northeast of Mount St. Helens. The first pulse was from September 7 to 20, 1980, and involved about 125 scientists; participation averaged 40 persons per day. The second pulse was from August 23 to September 5, 1981, involved about 170 scientific personnel, and averaged 60 persons per day.

The pulses had four major objectives. First, regulations on access into the red zone could be dealt with more efficiently. It was advantageous to both researchers and administrators to have one person act as pulse coordinator to handle clearances, obtain radios, and check procedures for as many as 12 research teams. Second, a scarce resource—helicopters—could be used more efficiently. With many scientists working simultaneously at Mount St. Helens, helicopter missions could be contracted for continuous availability at reduced rates, which allowed for more efficient scheduling. The ability of many scientists to schedule their sample collection and plot establishment during this common period saved time and money and reduced logistical concerns. It also made it possible for administrators to accommodate more scientists in the area than would otherwise have been possible.

The third and fourth objectives of the pulses were coordination and information sharing, respectively. Coordination between two or more research teams was facilitated by simultaneous field sampling sessions on the volcano. Information sharing took many forms, including regular evening "show-and-tell" sessions during which each team reported on hypotheses, accomplishments, and difficulties. Many research projects were altered and alternative hypotheses generated during these discussions.

COOPERATIVE EFFORTS

Scientists and scientific organizations joined to minimize logistical problems and coordinate research programs. Officials of the Gifford Pinchot National Forest and the Pacific Northwest Region 6, parts of the National Forest Systems branch of the USDA Forest Service, recognized a need for a group of ecologists to screen biological research proposals. The PNW Station, a unit of the research branch of the USDA Forest Service, became the coordinating and certifying body for biological and management research in the restricted zones. An in-house group of subject matter coordinators was established to assist in evaluating proposals. Once a request for research within the restricted

zone was certified by the PNW Station, necessary approvals were provided by Pacific Northwest Region 6 and permits were issued by the Gifford Pinchot National Forest.

In late May of 1980, the NSF and PNW Station organized a meeting of approximately 30 interested ecological scientists from several universities to discuss possible research projects on Mount St. Helens. At this meeting, scientists became acquainted, shared plans for research projects, and pooled information on access, conditions within the area, and funding. Dr. David Johnson, representing NSF, announced that the Foundation would expedite the consideration of short proposals for new grants or supplements to conduct research on transient phenomena at Mount St. Helens. As promised, paperwork was minimal and these emergency grants were awarded promptly.

When access to the blast areas became possible in July, the PNW Station sponsored a series of reconnaissance flights in large helicopters for 8 to 10 scientists. Following these flights, meetings to plan research programs and develop common sampling strategies were held for groups of researchers interested in the effect of tephra deposition on ecosystems, terrestrial ecology of the blast zone, lake ecology, and stream ecology and erosion.

The St. Helens Forest Land Research Cooperative was established for communication and cooperation among the three major landowners in the affected area: the Washington State Department of Natural Resources, the USDA Forest Service, and the Weyerhaeuser Company. Land managers and scientists were included in their deliberations. A major activity of the Cooperative was the "Technical Needs Workshop" held on September 4–5, 1980, and November 4, 1981, in Olympia, Washington. The objective of the workshop was to identify technical information required for the rehabilitation of volcanically impacted lands around Mount St. Helens. Attendees included scientists from major universities in Oregon and Washington and from sponsoring organizations. Although the Cooperative had only limited ability to ensure that its recommendations were carried through, it continued to encourage information exchange among scientists and between the scientific community and forest land managers to promote implementation of rehabilitation.

INSTITUTIONAL RESPONSES

Institutional responses to opportunities for scientific research at Mount St. Helens were generally rapid. Some delay did occur, how-

ever, while administrators of the restricted zones developed procedures for a totally novel situation.

The Division of Environmental Biology of the NSF responded to the unusual opportunity by providing modest amounts of money for critically important early studies (critical since the landscape, with many transient phenomena, was changing rapidly). Twenty grants or supplements were made by August 7, 1980. The NSF also furthered research by encouraging collaboration and information exchange and by providing a grant for helicopter support to the scientific community.

PNW Station developed a research plan for Mount St. Helens during the first week after the May 18 eruption. A supplemental appropriation by the U.S. Congress provided approximately $600,000, of which about one third went for grants and contracts to non–Forest Service scientists, one third for in-house research, and one third for logistical support.

The Weyerhaeuser Company has a substantial staff at the Forestry Research Center in Centralia, Washington, and thus was able to promptly direct efforts toward timber salvage and reforestation of its lands. The earliest reforestation and grass seeding studies were initiated by company personnel who also began erosion, watershed, wildlife, and other research projects. Weyerhaeuser continued to cooperate with Mount St. Helens researchers and periodically updated its master list of research projects.

SUBSEQUENT PROCEDURES

Thirty months after the eruption, research at Mount St. Helens began to follow more normal procedures as ground access to the blast zone became greatly improved because of the advent of timber salvage sales and activities by the U.S. Army Corps of Engineers. Helicopters continued to be essential for research in the areas of Mount St. Helens, Spirit Lake, and Mount Margaret. Restricted zones continued to shrink. There was also a reduction in the administrative complexity associated with scientific permits and regulations for the red zone. Improved access was a mixed blessing, because it permitted activities that could have had significant negative impacts on research opportunities and increased problems associated with vandalism and general public use.

Coordination among scientific groups continued to be important. A vegetation-oriented group met to share information and plans for

research. An interdisciplinary research group, funded by NSF and led by L. C. Bliss (Chairman of the Botany Department at the University of Washington) focused on effects of the eruptions on timberline vegetation. At an ad hoc workshop, chaired by J. Winjum of the Weyerhaeuser Company and Bliss, scientists met in October, 1981, to discuss the need for additional research and coordination and concluded that a central repository for publications and other information was needed. Subsequently, the Washington State Library at Olympia was selected as the repository site. Communication between the geological and ecological researchers was inadequate despite the critical role that geological events and substrate played and continue to play ecologically. A workshop was held in May, 1982, under the joint sponsorship of the USDA Forest Service and NSF to facilitate information exchange between the two groups of scientists. The St. Helens Forest Lands Research Cooperative continued a series of technical information workshops in 1982 for land managers.

Funding from all sources for Mount St. Helens research became much more limited than it was during the first 6 months following the eruption. General budget reductions and the lack of supplemental appropriations for the volcanic research were major factors. Neither PNW Station nor the NSF could continue to provide general helicopter support or to organize and fund research pulses, and Mount St. Helens research began to compete with other programs and topics for continued support.

When the amount of the investment is considered, Mount St. Helens ecological research has been very productive to date, although only time will determine its value to basic science. Much information has been generated, with some surprising findings concerning revegetation and linkages between organisms and their environment. These findings have begun to appear in the scientific literature and in this volume.

Scientific data and results were quickly utilized by land managers. A number of informal communication channels developed to meet the managers' needs for the best current information to develop plans for protection, timber salvage, and revegetation of the volcanically affected region. In the USDA Forest Service, area ecologists, staff specialists at the Gifford Pinchot National Forest, and silviculturalists on the Ranger Districts all functioned as intermediaries in a two-way flow of information. PNW Station personnel improved normal (and typically slow) reporting processes by providing frequent briefings on the latest findings for National Forest personnel. The forestry research staffs of the Weyerhaeuser Company and the Washington State

Department of Natural Resources continued to work closely with their respective foresters near Mount St. Helens. Throughout, the objective has been to ensure that the best available technical knowledge provided, and will continue to provide, the basis for management decisions.

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