

Olympic NP Mountain Goat Removal Project

Subject of Risk Assessment Report

By Seth Tuler and Chuck Janda

Mountain goats were first introduced to the Olympic Peninsula by sport hunters in the 1920s. In the 1970s, studies by the NPS and the University of Washington found that the original 11 or 12 had increased to one of the highest density populations in North America. In 1983 the park counted an estimated 1200 goats on Olympic Peninsula; about 1000 were in the park.

Disturbances from these exotic animals have been documented for portions of the unique ecology of Olympic NP (*Olympic National Park* 1987). They include erosion problems created by wallows, trails, and dusting, disturbance of endemic and preferred forage species, and alteration of the structure and productivity of alpine and subalpine ecosystems. As goat populations and human interest have grown, potentially hazardous encounters between salt hungry goats and curious visitors also have grown. (*Park Science*, Fall 1981, p.5).

To prevent further damage to the sensitive high country, Olympic NP began an experimental program to rid the park of mountain goats in the early 1980s. Various techniques were tried, ranging from backcountry operations to sterilizing goats to the capture of goats in drop nets and foot snares. In 1988, after a 10-year review process, Olympic NP began a live-capture and removal program, requiring innovative and difficult activities in some of the park's most remote and rugged backcountry.

In brief, a pilot and "gunner" perform high risk helicopter flights to identify, select, pursue, and capture goats. After goats are darted or netted, the gunner must alight from the helicopter, restrain ("bag"), and secure the goat to the helicopter. The animal is then flown to a staging area at Hurricane Ridge and transferred to another agency (such as the Washington Dept. of Wildlife) for release into native populations elsewhere. (The sequence begins with preparations of personnel and equipment, and proceeds to "fly-out," search and selection, capture and restraint, medical assessment and preparation, goat transport, crew recovery, flight-in, demobilization, and postcapture tasks.)

Multiple goat captures may occur during one day's activities. In 1989 the average number of captures per day was six. Successful completion depends on effective, safe, and reliable human and equipment performance at all times.

The program has been performed with high degrees of safety for project personnel despite the many risks they face. Ranger Rich Olsen has been instrumental in the design of special project activities and development of unique equipment and protocols. However, the numbers of goats captured have been smaller each year. In 1988, 80 goats were captured; in 1989, only 67. Some of the goats die from stress induced complications or bones broken during capture. In 1988 the mortality rate was 9 percent; in 1989, it was 19 percent. Risks to both personnel and goats have risen over time. "The general impression was that the goats were

improvement of safety and performance in similar tasks, leading to identification of methods that can improve safety, reliability, and performance.

The social sciences have devoted much attention to individual, group, and organizational behavior, and they provide a useful perspective from which to assess and improve safety. Task requirements of complex helicopter flights, difficult capture of goats from the air, and handling of goats on rugged terrain combine with social factors that influence the capabilities of personnel to operate safely and reliably for intensive periods during the summer. The combination of these specifics creates physical and social hazards for personnel.

While humans apparently are capable of completing complex tasks in difficult environments, the evidence shows that humans also are variable in their capabilities. The literature suggests that human variability can interact with task requirements and technical components in such a way that accidents and mishaps occur. The research has identified a number of factors that contribute to variability in human behavior and decision making—factors that may be rooted in the physical, physiological, or social characteristics of individuals and their work environment. Several important issues were reviewed, including (1) individual characteristics such as decision making and judgments, attitudes and motivation, mental workload, stress, and fatigue; (2) group characteristics including decision making and stress, and (3) organizational characteristics such as constraints on behavior, hazard management, and training.

As tasks and interactions of machines and people become more complex and the situations in which they must be performed become more difficult, the likelihood of accidents grows. Any person, regardless of skill and experience, can contribute to, or cause, an accident at any time. To accommodate the always present possibility of human error, systems should be designed to be "goof proof" and provide buffer zones that mitigate potentially dangerous consequences of mishaps and accidents. Systems that push the bounds of human and mechanical capabilities are also pushing the luck of those involved.

The specific requirements of each stage of the task can create a complex and dangerous set of activities that is not "goof proof." For example, social factors can create sources of stress and high workload, lead to

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in less accessible areas of the park, they were harder to get to, and we were forced to take greater risks with the animals and staff in order to get them." (Chief Ranger Chuck Janda, from *Animals*, p. 24). As a result of the concern for both personnel and goats, critical reviews have been done in June and July each year prior to the next season of live capture.

Here, we summarize the results and implications of two program reviews completed in spring 1990. The first, a report on the social factors that contribute to risks, was prepared by the NPS/CPSU at U/ID. We also describe the results of a review by the Interior Department's Office of Aircraft Safety.

A Social Risk Analysis Of Olympic NP Mountain Goat Removal Project

In the winter of 1990, the U/ID/CPSU was asked to prepare a report on the "social risks" of the Olympic NP Mountain Goat Removal Project (Machlis et al 1990). In the report, "social risks" refers to those caused by interacting personnel in the project and the social environment in which they work. The report is based on information collected by a review of relevant literature on social risk and aviation safety. It provides a review of the task of mountain goat removal from Olympic NP and a summary of social science research relevant to

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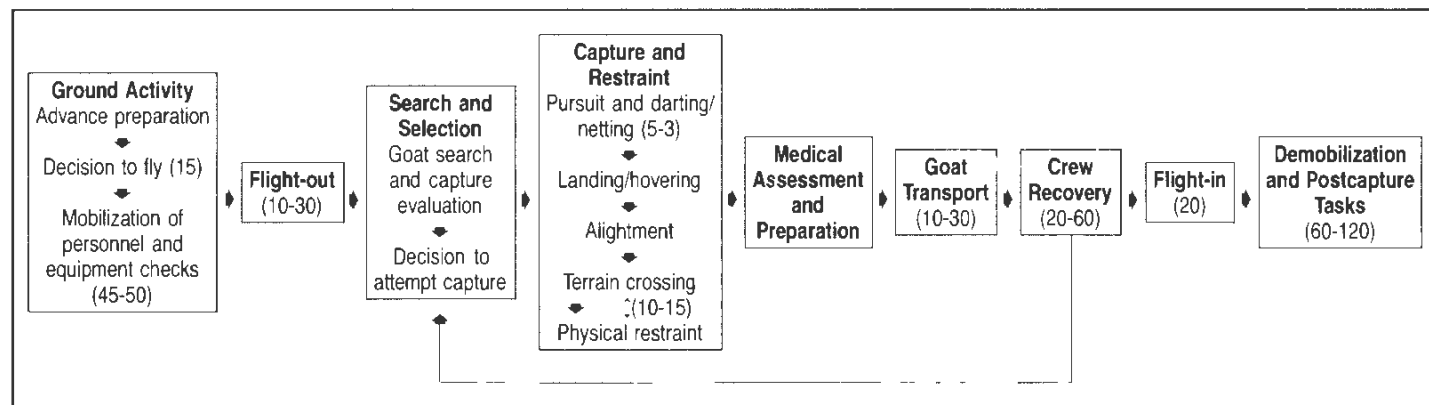


Figure 1. Stages of the technical task (minutes)



Recently captured mountain goats arriving at the staging area of Hurricane Ridge. (Olympic Natl. Park Photo by Janis Burger)



Removing the special carrying sling from a mountain goat before transport by the WA Dept. of Wildlife. (Olympic Natl. Park Photo by Janis Burger)

The authors presented these recommendations to park personnel at a May 1990 workshop.

Expanded Applications

The review of social risk factors in the Olympic NP project has importance for other NPS programs. While specific activities and characteristics of the task at Olympic are unique, the objectives of wildlife translocation and removal are common to a number of programs in the U.S. and abroad. Deer have been the subject of translocation and removal programs in Florida, Big Bend NP, and New Zealand; wild horse and burro removal has taken place at Grand Canyon and Death Valley, and big horn sheep operations occurred at Lake Mead and in Idaho. Common features have included use of dart or net guns, helicopters, specialized restraint techniques, decision making and judgment difficulties, and the interactions of individuals and organizations. Many of the social factors that influence risk and the hazards faced by personnel also are similar. Thus, the perspective used in this report and the analysis of social risk factors can be usefully applied in a much broader context.

The Office of Aircraft Safety also reviewed the project in the spring of 1990. While they had been informed of the project during its early stages in 1988, the OAS had never formally reviewed it for safety. In January 1990, an OAS Operational Procedures Memorandum (#90-5) was issued that prohibits, because of their dangerous nature, certain types of helicopter flight maneuvers: toe-in landings, single-skid landings, or step-out landings, unless prior written exemptions are obtained. The performance of the mountain goat removal project requires the use of toe-in and single-skid landings for almost all goat captures. These are landings that require full power to be maintained and during which the helicopter is not completely at rest on the ground.

In addition, although they had allowed the program to continue for two years, the OAS now believes that the helicopter flights are among the most dangerous it has seen in federal aviation programs. The outcome of the OAS team's review was not to provide exemption for such landings during the summer of 1990. This required cancellation of the project for that summer.

Future Plans

Termination of one-skid landings essentially elimi-

nates live capture as an option in removing Olympic's remaining goats. While other capture methods are available, none has proven workable in terms of effective rate or reasonable cost.

Efforts in the summer of 1990 focused on completing field work on vegetation impacts, primarily along the park's eastern periphery where endemics occur in relatively high concentrations. Another goat census also was conducted. The total population on the Peninsula now is calculated at 389 plus or minus 106. This is a substantial decrease from the 1,175 plus or minus 171 counted in 1983. The live capture program can be credited with only a portion of the decrease. Park personnel believe environmental factors such as abnormal temperatures and snowpack may have had at least an equal impact.

An EIS is now in preparation. Currently only two alternatives are being considered: terminating all goat removal operations and allowing the population to return to pre-removal levels, or eliminating the remaining goats by shooting. The latter alternative will also propose making the entire park goat-free. An earlier Environmental Assessment required a goat-free core area and a 50 percent reduction in the subpopulations along the park's east side. The abundance of endemic vegetation in this area precludes goat control as an effective option in protecting these plant communities.

Regional, if not national, public interest is expected to run high once the draft EIS is distributed. While the park has long maintained a running dialogue with animal activist and sportsman groups, shooting remains an emotion-charged issue in spite of broad agreement that goats have no place in Olympic's otherwise natural environment. A classic case history is thus about to take another unpredictable turn, with no absolutes and no "right" answers.

Tuler is a research assistant with the NPS/CPSU at Clark University in Worcester, MA; Janda is Chief Park Ranger at Olympic NP.

References

- Olympic National Park, 1987.
- Moorehead, B. (1981). Olympic NP State Well-Run Removal of Exotic Goats. *Park Science* 2(1):5.
- Sleeper, B. (1990). Out on a Ledge. *Animals* 23(4): 18-25.
- Machlis, G., S. Tuler, and R.E. Kasperson (1990). A Social Risk Analysis of the Olympic National Park Mountain Goat Removal Project. *National Park Service Reference #D-173*.

difficulties in interpersonal relationships, and influence organizational planning. Three important levels can influence and shape performance:

(1) individual factors, including "subculture" attitudes and personal characteristics;

(2) interpersonal factors, including group planning activities and communications, and

(3) organizational factors, including liaison among agencies and agency mission requirements.

Hazards to individuals result from failures in goat capture and removal tasks (e.g. technical failures, human errors, or mismatches between demands and personnel capabilities). Two principal types of hazard to personnel in the mountain goat project are:

(1) physical injuries, including back pain, abrasions, sprains, fractures, accidental drug overdose consequences, and death; and

(2) psychological, social, or economic dislocations such as a loss of confidence in management or one's peers, loss of wages or career opportunity, loss of self-image, impacts on one's family, stress, and anxiety.

Our analysis of the social science literature and the task suggested that specific changes might be useful to enhance safety, reliability, and performance. Suggestions for improving safety and performance were of four types:

(1) altering the task to reduce social risk factors;

(2) altering the social environment to reduce social risk factors;

(3) monitoring social risk factors associated with the task, and

(4) additional options, such as the role of training.