THE ROLE OF SCIENCE IN WESTERN GRAY SQUIRREL ENHANCEMENT IN OAK WOODLANDS OF SOUTH PUGET SOUND

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Abstract

Western gray squirrels (Figure 1) are extremely rare, wary, and sensitive to disturbance in the Puget Sound lowlands of western Washington. A pilot project was implemented to test a non-invasive survey technique to determine the current distribution of western and eastern gray squirrels in historic western gray squirrel habitat on the Fort Lewis Military Base for the purpose of guiding and evaluating management actions in Oregon white oak – conifer woodlands. We baited and distributed 130 hair snagging tubes in historic western gray squirrel habitat and monitored them at two – six week intervals for the presence of hairs. Dorsal guard hairs were identified to squirrel species based on their color banding patterns under 30X magnification. A total of 77 tubes yielded 146 hair samples: 45 samples contained western gray squirrel hairs, and 79 contained eastern gray squirrel hairs. Oak – conifer woodlands yielding hairs of western gray squirrels are targeted for foot surveys to monitor changes in relative abundance of squirrels. A data base that integrates distribution and relative abundance data through time is being developed to produce maps to guide, evaluate, and inform management actions. Hair snagging tubes, combined with foot surveys, show promise as a non-invasive approach to providing information on the distribution and relative abundance of a rare and secretive squirrel population to guide and evaluate management actions designed to enhance its population.

Figure 1. Western Gray Squirrel.

Background

Western Gray Squirrels in Western Washington

- Western gray squirrels (*Sciurus griseus griseus*) were once described as one of the most abundant mammals in the Northwest (Bowles 1921), and historically ranged throughout Washington's oak-conifer forests.

- Western gray squirrels are associated with Oregon white oak (*Quercus garryana*) – Douglas-fir (*Pseudotsuga menziesii*) and/or ponderosa pine (*Pinus ponderosa*) woodland communities in the South Puget Sound lowlands of western Washington. Most of these oak woodlands have been converted or degraded over the course of the last century.

- The Fort Lewis Military Reservation now contains the least fragmented and most ecologically intact area of oak woodland communities in Puget Sound, along with the only remaining population of western gray squirrels in western Washington.

- Western gray squirrels have become increasingly rare in recent years, and are currently listed as 'threatened' by the Washington Department of Fish and Wildlife.

Western Gray Squirrel Research on Fort Lewis

The western gray squirrel population on Fort Lewis appears to have declined in recent years.

- A 1992/93 study on Fort Lewis reported sightings of 81 squirrels (not a population estimate) in 44 oak stands (Ryan and Carey 1995).

- Foot surveys, calling surveys, live trapping, and camera surveys were employed in a 1998/1999 survey effort, yet only 6 western gray squirrels were detected (Bayrakci et al. 2001).

Additional survey techniques are required for monitoring this difficult-to-observe population if management programs are to be effective.

Pilot Research Project to Test Survey Technique

We initiated a pilot project in February 2004, to assess the potential for using hair snagging tubes as a survey technique for the difficult-to-detect western gray squirrel population on Fort Lewis.

Methods

The collection of squirrel hairs in baited tubes (Figure 2) is a simple and inexpensive way of identifying the presence of squirrels in an area (Gurnell et al. 2001). As animals enter the tubes to obtain food, they leave hairs on sticky tapes, which are collected for identification under a microscope.

- We installed 130 baited hair snagging tubes among interior Oregon white oak - conifer woodlands in historic western gray squirrel habitat on the Fort Lewis Military Reservation during the period February – September, 2004.

- We located tubes in sites with minimal understory cover to increase the likelihood of visitation by squirrels (Figure 3). At the same time, tubes were hidden from view to avoid detection by military personnel and recreationists.

Figure 2. Hair snagging tube baited and secured at the base of a Douglas-fir tree in an oak-conifer woodlands on Fort Lewis, Washington.

Figure 3. Hair snagging tube at the base of a Douglas-fir tree (arrow) in habitat with a relatively open understory on Fort Lewis, Washington.

- We recorded UTM coordinates of the tubes with a GPS system.

- We visited tubes at 2-6 week intervals to collect hair samples where present, and re-bait and/or re-tape tubes as necessary.

- We identified hair samples (Figure 4) from the three largest squirrel species (western gray squirrels, eastern gray squirrels [*Sciurus carolinensis*], and Douglas' squirrels [*Tamiasciurus douglasii*]) on Fort Lewis using a combination of characteristics based largely on the color and size of alternating light and dark bands on dorsal guard hairs viewed through a 30x binocular microscope.

Figure 4. Sticky tapes containing dorsal guard hairs from an eastern gray squirrel (above) and western gray squirrel (bottom), from Fort Lewis, Washington.

Results

A total of 130 Tubes were monitored between February – December, 2004

- 313 observations were made on 130 tubes
- 146 hair samples were collected and identified
    - 45 samples from 21 tubes contained hairs from western gray squirrels
    - 79 samples from 40 tubes contained hairs from eastern gray squirrels

- 15 samples from 15 tubes contained hairs from Douglas' squirrels
- 7 samples from 7 tubes contained hairs from unknown species

A map was generated to display distribution data gained from the hair snagging tubes for western and eastern gray squirrels, the two squirrel species of primary interest (Figure 5).

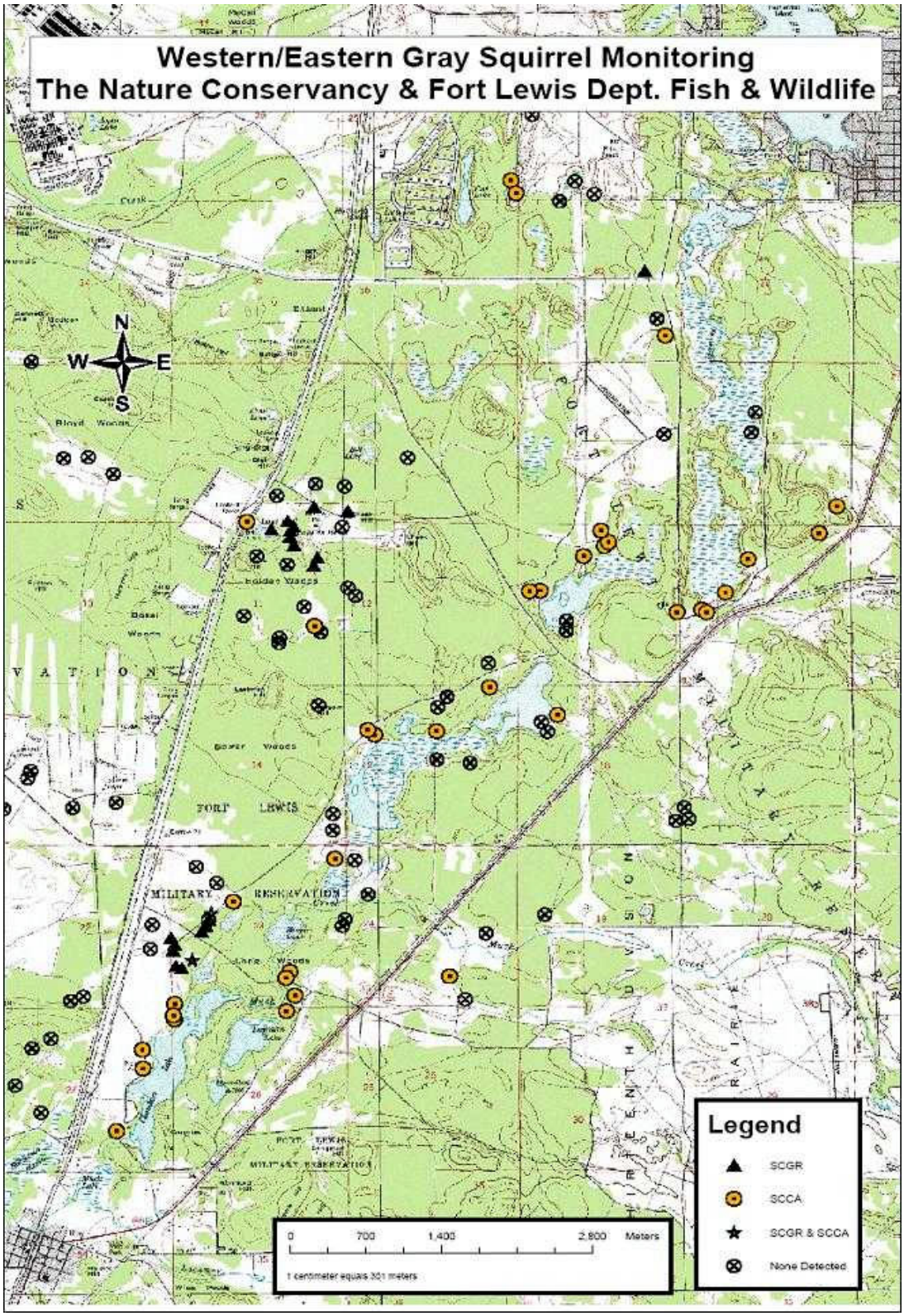

Figure 5. Map showing locations of hair snagging tubes with western gray squirrel (SCGR) hairs, eastern gray squirrel hairs (SCCA), both species, and no gray squirrel hairs on Fort Lewis, WA, February - December, 2004.

Conclusion

Hair snagging tubes appear to provide a relatively effective, non-invasive, and inexpensive method for documenting the distribution of western and eastern gray squirrels on Fort Lewis.

Integrating Research and Management

The two main goals of the research program designed to inform western gray squirrel management on Fort Lewis are as follow:

- To document the distribution and relative abundance of western gray squirrels and eastern gray squirrels in historic western gray squirrel habitat to guide management actions.
- To document the general response (distribution and relative abundance) of western gray squirrels to management actions.

A combination of hair snagging tubes and foot surveys are proposed as a survey approach to help meet the two goals noted above. Foot surveys directed in time (periods of peak squirrel activity in the fall) and space (stands where western gray squirrels are known to be present) should be a useful complement to the distribution data generated from hair snagging tubes by adding a measure of relative abundance.

Goal 1: A macro-scale approach to distribution and abundance information to guide management actions for western gray squirrels.

Up-to-date distribution and relative abundance maps are essential for guiding management actions (Figures 6 and 7) in and around habitat occupied by western gray squirrels. This distribution and abundance information will be used to:

- Target woodland stands for habitat restoration adjacent to currently occupied stands.
- Avoid large-scale management actions in sensitive core use areas.
- Implement eastern gray squirrel control where these non-native squirrels are colonizing important western gray squirrel habitat.

Figure 6. Dense understory of oak-conifer woodland before management to improve habitat for western gray squirrels on Fort Lewis, WA.

Figure 7. Same location as Figure 6 after mowing to improve habitat for western gray squirrels.

Goal 2: A micro-scale approach to distribution and abundance information to evaluate the impacts of management actions on western gray squirrels.

Hair snagging tubes tubes installed and monitored in and around stands targeted for a management action before, during, and following implementation will aid in evaluation of the impacts of management actions on western gray squirrels. Foot surveys are planned for sites determined to contain western gray squirrels to monitor changes in relative abundance as a response to the management action. The distribution and abundance information will be used to:

- 2 Ensure that the management actions are not negatively impacting resident squirrels.
- 2 Determine the actual impacts of the activities on the squirrels.
- 2 Gain information to refine recommendations concerning habitat improvements designed to enhance western gray squirrel populations.

References

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