Taking the Classroom into the Field—Continued from page 4

rier. Winning students received photos of the telemetered hawk. The highlight of the classroom sessions, however, was the construction of cardboard Microwave PTTs and their deployment on "balloon birds." The most impressive birds had color-coordinated antennas—something Microwave Telemetry might consider as an option!

Student's balloon bird with cardboard PTT

Results

After weeks of anxious anticipation, the students were provided Argos locations of hawks to begin plotting in the classroom and for web page mapping, and estimating rates of migration. Between 10/16/01 and 11/11/01, the northern harrier migrated 2,407 km from Chelan Ridge to Lake Mead, Nevada. The hawk migrated an average of 89 km/day during the 27 days. Maximum distance recorded during a 27 hour period was 253 km; a rate of 9 km/hr. Flight estimates for consecutive locations were analyzed for three diel movements between 3 and 7.5 hours; flight speed ranged from 14.7 to 32.5 km/hr. There was no evidence of night migration. During the period between 11/11 and 12/25, when the hawk became localized, she occupied a winter range of 36,031 square kilometers in southern Nevada and Arizona, based on 108 locations. The hawk made a quick visit to the Grand Canyon just before Christmas and returned to Nevada, about which time the activity sensor indicated the PTT became stationary. As of early February, biologists in Nevada have been unable to verify the status of the bird, but the PTT continues to function.

The northern goshawk provided only a brief glimpse of migration. One location was received from the hawk within a week after she was telemetered, showing she had moved about 60 km northwest. After that time, a location was received in December, and another in January. These locations were of too low quality to reveal her location, but the temperature reading and activity sensor suggested she was still mobile. It is quite possible she damaged the antenna resulting in the poor-quality transmissions, but that could not be confirmed.

Although we anticipated being able to monitor hawk movements through spring migration, the two subjects we selected did not allow this aspect to work out. The main goal of enlightening students at an age where they can choose to pursue scientific endeavors was realized very successfully. Some of the students have indicated a desire to help with the project in coming years. Overall, this cooperative project has stimulated student thinking far beyond that achieved in only a classroom setting. Through hands-on experience students have learned how state-of-the-art technology (i.e., satellite telemetry) is used to answer biological questions, including: the unpredictable nature of biological field work; facts concerning hawk morphology and physiology, migration ecology, and survival; how the scientific process is conducted, from generating hypotheses or questions to be answered, to collecting the data, interpreting it, and reporting it; how to interpret and plot map information, and use of the internet for communicating that information; and a greater appreciation for the treasure of Chelan Ridge in their own backyard.

Migration of female northern harrier from Chelan Ridge,Washington to southern Nevada

Future

Students are preparing a web page of the study to be accessed by other students in and outside the school from the school web site (www.methow.org). The web page will provide an "ask the expert" section, where students will have the opportunity to ask questions that will be answered by the biologists on-line. Although it appears no further data will be provided from the study birds, Hawkwatch International is providing data from other telemetered birds from Chelan Ridge, so students can use real-time downloading and tracking of hawks on classroom maps. At the conclusion of the study students will provide comments to evaluate the project. This is important, because the success of the project has prompted the cooperators to look at how to continue the study in future years including the selection of student interns who will participate in upcoming hawk capture, banding, and telemetry studies. ❖