



United States
Department of
Agriculture Forest
Service



Sierra Nevada Forest Plan Monitoring Accomplishment Report **2012**

Sierra Nevada Forest Plan Monitoring Accomplishment Report for 2012

Sierra Nevada Forest Plan Implementation

In 2012 the Forest Service, Pacific Southwest Region, which includes California, Hawaii, Guam, and the Trust Territories of the Pacific Islands, continued several long term monitoring studies in the Sierra Nevada. The studies focus on developing scientifically valid assessments of the status of several species and increasing understanding of how forest and rangeland management under direction in the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision 2004 may affect species, ecosystems, and processes. This year, we also feature a report on the Kings River Fisher Project, conducted by scientists with the USFS Pacific Southwest Research Station on the Sierra NF.

Contents

[Kings River Fisher Project](#)

[Fisher Status and Trend Monitoring](#)

[Amphibian Status and Trend Monitoring](#)

[California Spotted Owl – Eldorado Study](#)

[Sierra Nevada Adaptive Management
Project](#)

[Management Indicator Species](#)

[Forest Monitoring Summary](#)

[Forest Relations with Tribes](#)

For more information:
Patricia Flebbe
Monitoring Coordinator
707.562.8682

Kings River Fisher Project

This study, conducted by Drs. Craig M. Thompson and Kathryn Purcell, USDA Forest Service, Pacific Southwest Research Station (PSW), is a major component of our fisher monitoring in the Sierra Nevada.

Background

Historically, the Sierra Nevada was characterized by frequent, low-intensity surface fires that reduced fuel loads and created a mosaic of diverse habitat patches. However, during the 20th century, forest management was dominated by fire suppression efforts and a gradual buildup of fuels. As a result, today's forests are denser and dominated by smaller trees, while fires are larger, more intense, and outside the range of historic variability. Faced with this situation, forest managers are searching for ways to reduce fuel loads and bring the fire regime back within historical bounds without harming native species.



Photo 1. Adult female fisher resting on the top of a broken conifer snag in the Sierra NF.



Photo 2. Female fisher perched on a large downed log in the Sierra NF. Her kit can be seen emerging from the base of the log.

In particular, fishers' preference for dense, structurally-diverse forests presents a conservation challenge: how do we balance the short-term risks associated with forest thinning and fuel reduction with the larger risk of a habitat-destroying catastrophic fire? The southern Sierra fisher population is isolated, reduced to fewer than 400 individuals, genetically homogeneous, and considered to be at high risk of extinction. In 2004 the U.S. Fish and Wildlife Service found that protection for the west coast population of fishers was warranted, and a decision is expected in 2014.

The California Department of Fish and Wildlife is currently reevaluating a petition to list the species as state endangered.

In response to the challenges outlined above, the Kings River Fisher Project (KRFP) was initiated in 2007 by the USDA Forest Service Region 5 and the Pacific Southwest Research Station to: 1) fill gaps in our current understanding of fisher ecology and habitat requirements; and 2) address

the uncertainty surrounding the effects of timber harvest and fuel reduction on select response variables of interest, including fishers and their habitat. Specific objectives include:

- Document population parameters such as survival and reproduction and identify potential limiting factors such as disease, predation, and habitat.
- Overlap multiple survey and monitoring techniques to increase the precision of population parameter estimates as well as identify behavior-specific requirements, such as habitat related to foraging, resting, and denning.
- Identify habitat and landscape elements that dictate selection at multiple spatial scales.
- Document the responses of fishers to changes in forest structure and composition, both natural and management-related.
- Collaborate with other ongoing fisher research projects to better understand the short and long term viability of fishers in a managed, heterogeneous forest landscape.



Photo 3. Female fisher and kit emerging from a den in a black oak in the Sierra NF.

Research Summary

Capture success: 106 fishers captured between Feb 2007 and October 2012 (57% female, 43% male).

Reproduction: Each year, an average of 79% of the adult females gives birth. Since 2007, 54 litters have been documented, averaging 1.7 kits per litter.

Scat detector dog surveys: Since 2007, 2,680 scats have been collected during detector dog surveys. Approximately 60% have been genetically verified as fisher, providing fine-scale data on active locations and relatedness of individuals.

Den and rest site habitat: Prior to the initiation of the KRFP, only 5 fisher dens had been located in the southern Sierras. Since 2007, 165 dens and 683 rest sites have been located in the Kings River area, greatly expanding our ability to identify and conserve fisher habitat. Black oaks are used extensively (50% of dens and 23% of rest sites), followed by white fir (25% of dens and 32% of rest sites).



Photo 4. Adult fisher resting in an abandoned stick nest in the Sierra NF.

Mortalities: 42 fisher mortalities have been recovered on the KRFP since 2007 (55% female, 45% male). The dominant source of mortality is predation, primarily mountain lion (38%) and bobcat (23%).

2012 Research Applications

Over the past six years, PSW researchers have amassed a significant amount of information on the ecology and behavior of fishers in the Kings River area. This information is now being used to guide management actions and develop tools to assist Forest Service and other land managers in designing and implementing forest management actions. In this section, we discuss several actions taken in 2012.

Implementation of GTR220/237 concepts: In 2010, PSW published a General Technical Report (GTR 220) outlining how both conservation and forest resilience might be achieved by using topography and historic fire regimes to guide management. A follow-up report, PSW-GTR-237, in 2012 provided examples of how these concepts can be implemented, including a chapter by KRFP researchers summarizing the latest relevant research results on fishers (Purcell et al. 2012). In 2011 we developed and published a landscape trajectory model combining fisher habitat use data with forest growth and simulation models. The combined model will help land managers design wildlife-friendly fuel reduction projects and better predict the risk to threatened species. Through a series of presentations and webinars in 2012, we assisted stakeholders on the Sierra NF with understanding and incorporating these concepts and tools into an adaptive management framework designed to integrate fuel reduction with fisher conservation.

Effects of spring burns on denning fishers: We collaborated with the Sierra NF, High Sierra Ranger District fuels crew to burn experimental plots around historic fisher dens. Results suggest that while cavities are extremely well-insulated against the increased temperatures (Figure 1), smoke accumulation in the cavity may pose a risk to unborn kits depending on timing and cavity depth. These results will help land managers better plan and implement prescribed burns in areas where fisher den locations are unknown.



Photo 5. Sierra NF, High Sierra Ranger District fuels staff igniting an experimental prescribed burn in the vicinity of a historic, unoccupied fisher den.

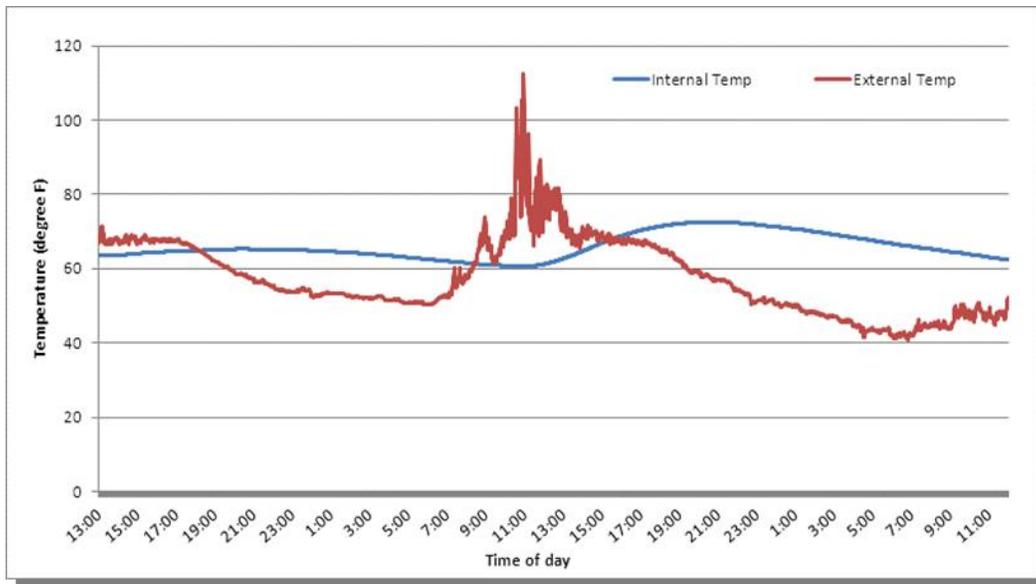


Figure 1. Graph of the internal and external temperatures associated with a historic fisher den cavity during an experimental spring prescribed burn.



Photo 6. Anticoagulant rodenticide liberally scattered at the base of marijuana plants found on public land.

Impacts of rodenticide poisoning on fishers in the southern Sierra: In collaboration with the Integral Ecology Research Center, UC Davis, and UC Berkeley, we contributed to a 2012 research article highlighting the exposure of fishers to anticoagulant rodenticides (Gabriel et al. 2012). Recently, in collaboration with the USFS Western Wildland Environmental Threat Assessment Center, USFS law enforcement, and the High Sierra Volunteer Trail Crew, we submitted a research article looking at the links between fisher survival, pesticide exposure, and illegal marijuana cultivation on the Sierra NF. Results suggest that exposure to rodenticides and pesticides found at

these sites increases the chance that a fisher will die of other causes such as disease or predation.

Identification and protection of fisher denning habitat: Beyond freely providing land managers information on the locations of fisher dens within project areas and assisting with the development of den buffers, we have worked extensively with forest silviculturists and marking crews to train them on identifying and protecting suitable structures outside of the KRFP study area. At the request of the the Sierra NF, our staff produced a photo-based field guide designed to help marking crews identify potential denning structures.

Development of a fisher denning habitat model: In collaboration with the Conservation Biology Institute and the Sierra Nevada Adaptive Management Project (SNAMP), we assisted with the development of a southern Sierra fisher denning habitat model. The model identified differences between overall fisher habitat selection and critical denning habitat, and will assist land managers with the identification and conservation of critical habitat.

Involvement in the Dinkey Collaborative Effort: We remain actively involved with the Sierra NF Dinkey Collaborative Forest Landscape Restoration Project, a 10-year, multi-stakeholder effort to design, implement, and monitor fuel reduction projects across the Kings River landscape. During 2012, our staff gave numerous presentations and webinars on topics such as identifying fisher habitat, the effects of fire and fuel reduction on cavity-dependent species, and the importance of snags in forest ecosystems.



Photo 7. Female fisher looking out of a black oak cavity used as a maternal rest site. Maternal rest sites are structures used by female fishers with dependent but mobile kits, often used for only 1-2 nights.

2013 Plans

Three large-scale fuel reduction projects, Dinkey North, Dinkey South, and the Kings River Experimental Watershed were completed in 2011 and 2012. A fourth project, the Soaproot project, is scheduled to be implemented in 2013. In addition to the annual population-level monitoring, research efforts will emphasize documenting fisher response to these management actions through radio telemetry and scat detector dog surveys. Results will be presented to the Dinkey Collaborative to assist with the design of future projects.

We have also identified predation, primarily by bobcats and mountain lions, as a significant source of fisher mortality. In particular, predation on adult females during the spring may limit the population. In collaboration with the non-profit organizations Integral Ecology Research Center and Panthera, we have a multi-species carnivore monitoring proposal currently under consideration by the California Department of Fish and Wildlife. If approved, we will overlap bobcat, lion, and fisher monitoring efforts in 2013 to better understand how these species interact and how habitat and vegetation management influences predation rates.

In 2013, KRFP-related documents, updates, and reports will be made available at a PSW-supported website: http://www.fs.fed.us/psw/topics/wildlife/mammals/fisher_krfp/.

2012 Publications

Thompson, C.M., R.A. Green, J. Sauder, K.L. Purcell, R.A. Sweitzer, and J.M. Arnemo. 2012. The use of radio telemetry in research on *Martes* species: techniques and technologies. *In* Biology and conservation of martens, sables, and fishers: a new synthesis. K.B. Aubry, W.J. Zielinski, M.G. Raphael, G. Proulx, and S.W. Buskirk, editors. Cornell University Press, Ithaca, New York, USA.

Gabriel, M.W., L.W. Woods, R. Poppenga, R.A. Sweitzer, C. Thompson, S.M. Matthews, J.M. Higley, S.M. Keller, K. Purcell, R.H. Barrett, G.M. Wengert, B.J. Sacks, and D.L. Clifford. 2012. Anticoagulant rodenticides on our public and community lands: spatial distribution of exposure and poisoning of a rare forest carnivore. *PLoS ONE* 7(7): e40163. doi: 10.1371/journal.pone.0040163.

Purcell, K.L., C.M. Thompson, and W.J. Zielinski. 2012. Fishers and American martens. Chapter 4 *in* Sierra Nevada mixed-conifer forests. M.P. North, editor. USDA Forest Service General Technical Report PSW-GTR-237, Albany, CA. <http://treesearch.fs.fed.us/pubs/41083>

Thompson, C.M., J.A. Royle, and J.D. Garner. 2012. A framework for inference about carnivore density from unstructured spatial sampling of scat using detector dogs. *Journal of Wildlife Management* 76:863-871.

Keller, S.M., M. Gabriel, K.A. Terio, E.J. Dubovi, E. VanWormer, R. Sweitzer, R. Barrett, C. Thompson, K. Purcell, and L. Munson. 2012. Canine distemper in isolated population of fishers (*Martes pennanti*) from California. *Journal of Wildlife Diseases* 48:1035-1041.

Fisher and Marten Status and Trend Monitoring

This regional monitoring project, led by Jody Tucker, conducts annual, systematic surveys across the national forests of the Sierra Nevada to track the status and trend of carnivore populations, specifically Pacific fisher (*Martes pennanti*) and American marten (*Martes americana*). Marten are a Management Indicator Species (MIS) for all Sierra Nevada forests, except the Plumas NF. Data are also routinely collected using the same survey techniques for a suite of other co-occurring carnivores, including gray fox (*Urocyon cinereoargenteus*), bobcat (*Felis rufus*), ringtail (*Bassariscus astutus*), spotted skunk (*Spilogale gracilis*), striped skunk (*Mephitis mephitis*), black bear (*Ursus americanus*), and weasels (long-tailed and ermine; *Mustela spp.*).

Sampling is focused on the southern Sierra Nevada as the existing native fisher population is limited to this area. Each sample unit in the monitoring program is located on a modified version of the Forest Inventory and Analysis (FIA) sampling grid for the Sierra Nevada. This grid was developed by offsetting the FIA points from their true location by 100 m in a random direction. During 2002-2009, intensive population monitoring was conducted during what is now referred

to as Phase I. This was the second year of full scale implementation of Phase II, which is a change from the intensive monitoring conducted during Phase I to a less intensive annual resample of the same sites. The design was discussed more fully in the [2011 SNFPA annual report](#).

Accomplishments

The carnivore monitoring program completed 98 sample units in the southern Sierra fisher zone. Fishers were detected at 24 of these 89 units for a naive occupancy rate of 0.25. An additional 22 units were completed in the northern Sierra Nevada to monitor marten populations, for a total of 120 units completed in 2012. Marten were detected at 35 of these 120 units. We collected hair samples from 20 of the units with fisher detections and marten hair samples from 24 of the units with marten detections. There was sufficient quantity and quality DNA in 44 fisher and 77 marten samples to genotype individuals. The genotypes detected represented 27 individual fishers (12 male, 13 female, and 2 undetermined sex) and 48 individual marten (29 male and 19 female). Since hair sample collection for fisher began in 2006 we have genotyped 185 individuals from the southern Sierra Nevada fisher population.



Photos 8 & 9. Photos of a fisher (left) and marten (right) at remote sensor camera stations taken during the 2012 field season. In the center of the photo is a piece of wire that holds chicken, which is used to bait the camera station. Surrounding the bait to the bottom and sides are wire gun brushes that are used as hair snaring devices to collect genetic samples. The sample unit number and station are posted above the bait.

In 2012, two papers were completed and subsequently published in peer-reviewed, open-access journals. The paper by Zielinski et al. (2013) summarized results of the first phase (2002-2009) of this monitoring effort. The following is excerpted from the abstract:

Carnivores are important elements of biodiversity, not only because of their role in transferring energy and nutrients, but also because they influence the structure of the communities where they occur. The fisher *Martes pennanti* is a mammalian carnivore that is associated with late-successional mixed forests in the Sierra Nevada in California, and is vulnerable to the effects of forest management. As a candidate for endangered species status, it is important to monitor its population to determine whether actions to conserve it are successful. We implemented a monitoring program to estimate change in occupancy of fishers ... in the southern Sierra Nevada.... We report here the results of 8 y (2002–2009) of sampling.... We model the combined effects of probability of detection and occupancy to estimate occupancy, persistence rates, and trend in occupancy.... The best-fitting model assumed constant probability of occupancy, constant persistence, and two detection groups ... [and] fit the data best for the entire study area as well as two of the three distinct geographic zones therein. The one zone with a trend parameter found no significant difference from zero for that parameter. This suggests that, over the 8-y period, ... there was no trend or statistically significant variations in occupancy. The overall probability of occupancy, adjusted to account for uncertain detection, was 0.367 (SE = 0.033) and estimates were lowest in the southeastern zone (0.261) and highest in the southwestern zone (0.583). Constant and positive persistence values suggested that sample units rarely changed status from occupied to unoccupied or vice versa. The small population of fishers in the southern Sierra (probably <250 individuals) does not appear to be decreasing. However, given the habitat degradation that has occurred in forests of the region, we favor continued monitoring to determine whether fisher occupancy increases as land managers implement measures to restore conditions favorable to fishers.

Another paper by Tucker et al. (2012) reported results of genetic analysis of samples from this and other monitoring (2006-2009) as well as historic museum specimens. Again, the following is excerpted from the abstract:

Establishing if species contractions were the result of natural phenomena or human induced landscape changes is essential for managing natural populations. Fishers (*Martes pennanti*) in California occur in two geographically and genetically isolated populations in the northwestern mountains and southern Sierra Nevada. Their isolation is hypothesized to have resulted from a decline in abundance and distribution associated with European settlement in the 1800s. However, there is little evidence to establish that fisher occupied the area between the two extant populations at that time. We analyzed 10 microsatellite loci from 275 contemporary and 21 historical fisher samples (1880–1920) to evaluate the demographic history of fisher in California. We did not find any evidence of a recent (post-European) bottleneck in the northwestern [California] population. In the southern Sierra Nevada, genetic subdivision within the population strongly influenced bottleneck tests. After accounting for genetic

subdivision, we found a bottleneck signal only in the northern and central portions of the southern Sierra Nevada, indicating that the southernmost tip of these mountains may have acted as a refugium for fisher during the anthropogenic changes of the late 19th and early 20th centuries. ... [W]e detected a 90% decline in effective population size and dated the time of decline to over a thousand years ago. We hypothesize that fisher distribution in California contracted to the two current population areas pre-European settlement, and that portions of the southern Sierra Nevada subsequently experienced another more recent bottleneck post-European settlement.

Publications

Tucker, J.M., M.K. Schwartz, R.L. Truex, K.L. Pilgrim, and F.W. Allendorf. 2012. Historical and contemporary DNA indicate fisher decline and isolation occurred prior to the European Settlement of California. PLoS ONE 7(12): e52803. doi:10.1371/journal.pone.0052803 <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0052803> or <http://treesearch.fs.fed.us/pubs/42715>

Zielinski, W.J., J.A. Baldwin, R.L. Truex, J.M. Tucker, and P.A. Flebbe. 2013. Estimating trend in occupancy for the southern Sierra fisher *Martes pennanti* population. Journal of Fish and Wildlife Management. doi: <http://dx.doi.org/10.3996/012012-JFWM-002> or <http://treesearch.fs.fed.us/pubs/42545>

Amphibian Status and Trend Monitoring

In 2012, the amphibian monitoring program again focused on analysis and reporting of data. This long-term bioregional program (2002-2009) monitored population status and trend for the mountain yellow-legged frog, Yosemite toad, and Sierran treefrog (=Pacific chorus frog), which is a Management Indicator Species (MIS) for wet meadows on all SNFPA forests. In 2012, we prepared a draft technical report and continued work on several manuscripts that report results. Peer reviews of the technical report were initiated. Monitoring of the MIS Sierran treefrog resumed in 2012. One paper was published:

Brown, C., K. Kiehl, and L. Wilkinson. 2012. Advantages of long-term, multi-scale monitoring: assessing the current status of the Yosemite toad (*Anaxyrus [Bufo] canorus*) in the Sierra Nevada, California, USA. Herpetological Conservation and Biology 7(2):115-131. http://herpconbio.org/Volume_7/Issue_2/Brown_etal_2012.pdf

Plans for 2013

The program of work for 2013 includes completion of the technical report. Field surveys for the MIS, the Sierran treefrog, will continue under a modified design, in conjunction with the long-term range (meadow) monitoring program.

California Spotted Owl -- Eldorado Study Area

Long-term monitoring of California spotted owls (*Strix occidentalis occidentalis*) on the Eldorado NF in the central Sierra Nevada is conducted by Drs. M. Zachariah Peery and R.J. Gutiérrez. This monitoring project is the longest such project on California spotted owls, and our methods are consistent with all other spotted owl population studies ([Blakesley et al. 2010](#)). Our monitoring provides essential information about the status of the owl population in this region and facilitates forest management by providing locations and reproductive status of owls on the Eldorado NF. We continued to participate in the [Sierra Nevada Adaptive Management Project](#) (SNAMP), which is assessing the ecological and social impacts of “strategically placed area treatments” (SPLATs) for fuel treatment in the Sierra Nevada.



Photo 10. Adult male California spotted owl (photo by S. Whitmore).

2012 Monitoring Results

During the 2012 field season we conducted four sets of complete nighttime surveys across our study areas. Thirty-nine of 84 territories were occupied. We resighted or captured 69 adults or sub-adults. We assessed reproduction at 36 territories and found 18 nests (including five failed nests). We captured 11 of the 13 fledglings observed. Thus, we continued to observe low territory occupancy and average reproduction.



Photo 11. Research technician about to release a newly banded California spotted owl.

Management Applications

By agreement with the [SNAMP](#) Science Team and Memorandum of Understanding partners, we are bound by a neutrality agreement, which precludes us from providing specific advice on management of forest areas that would be treated within the SNAMP time frame.

Our [past studies](#) on habitat conditions associated with spotted owls have provided

information that can guide silvicultural prescriptions. In addition, our analysis of monitoring data in 2012 provided further evidence for a long-term decline in reproduction and population rate of change (Tempel and Gutiérrez, *in press*). These findings suggest prudent management when considering potential impacts to owls. Our work on the next meta-analysis, tentatively planned for late 2013 or early 2014, should provide more insight on the factors correlated with these declines.

We have constructed a habitat map for our study area that incorporates 20 years of annual change in vegetation conditions primarily due to timber harvests, but also due to fires and regeneration (growth). We will use this map for a retrospective analysis of the study area to evaluate the relation between fuel treatments, habitat change, and owl occupancy, survival and reproduction. This map will supplement a vegetation map being developed by the USFS Pacific Southwest Region Remote Sensing Laboratory for the upcoming meta-analysis that will attempt to assess how habitat change is related to changes in spotted owl population parameters such as reproduction, survival, and territory occupancy. These efforts will build upon our past analysis that examined the impact of habitat change on spotted owl territory occupancy (Seamans and Gutiérrez 2007).

In a recent paper, we used long-term nest and roost site locations to examine the efficacy of the Protected Activity Center (PAC) as an owl management strategy (Berigan et al. 2012). This analysis demonstrated that PACs have effectively protected core areas of owl use over long time periods (see Figure 2 for an example), and thus, we recommend their continued use for California spotted owl management.

We also published a paper on the use of Before-After Control-Impact (BACI) studies to detect changes in occupancy when an experimental treatment is applied (Propescu et al. 2012). Using simulations, we found that the statistical power to detect changes in occupancy during an 8-year study was low for all scenarios unless the treatment effects were large (at least a 50% decrease in territory “survival”).

We have a paper that has been tentatively accepted by Conservation Biology and is currently under revision by the editors. In this paper, we compared trends in territory occupancy and population size (estimated from mark-recapture data) and found that trends in occupancy on the Eldorado Density Study Area were closely correlated with population trends (see Figure 3). This finding validated our proposed use of occupancy as a metric for

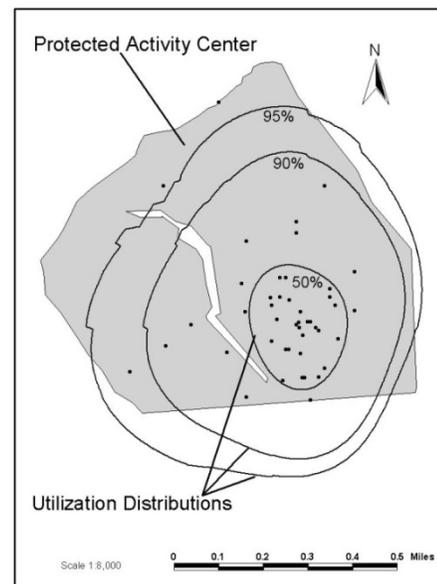


Figure 2. An example of the overlap between a spotted owl core area of use (50, 90, and 95% concentric lines) and its corresponding Protected Activity Center (PAC). The dots are owl nest and roost locations from long-term monitoring data. The shaded area is the PAC.

assessing the effects of habitat alteration on spotted owls; but more importantly, suggests that occupancy monitoring is a viable technique for large scale assessments of owl population trends.

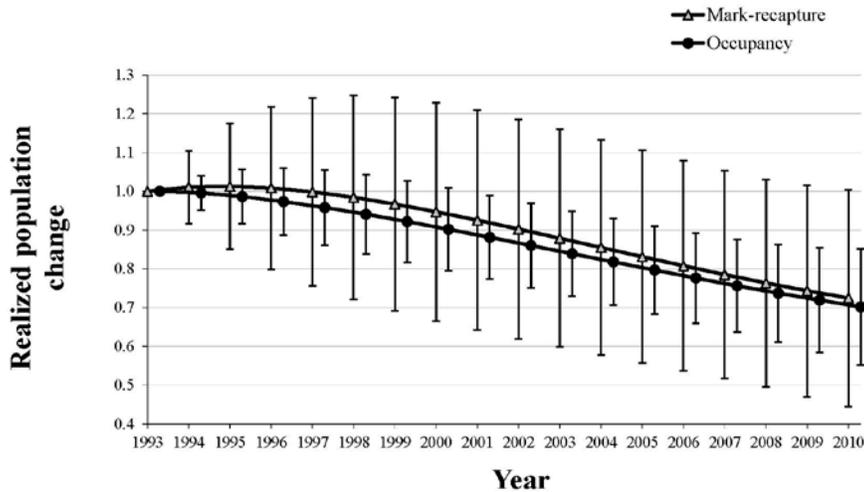


Figure 3. Realized population change (95% CI) from both occupancy and mark-recapture models for California spotted owls on the Eldorado Density Study Area, 1993-2010.

Technology Transfer

Our 2012 technology transfer activities included a public workshop, a public meeting, a [SNAMP](#) scientific meeting, and four field trips. These were attended by members of the public, public agency employees, and stakeholders (e.g. private timber companies and environmental groups). We presented our recent findings, answered questions from the audience, and discussed our recent publications and our future plans.

We participated in four field trips on the USFS Georgetown Ranger District, Eldorado NF, during which we visited foraging areas of two owls radio-marked during a previous study and also visited units for the proposed Blacksmith Flat fuel reduction project and the current Big Grizzly fuel reduction project. We participated in these trips specifically to advise the USFS on the nature of forests used by owls for foraging.

We shared our 2012 owl survey data (territory occupancy, detection and nest locations, and reproductive status) with the USFS Georgetown district biologists and provided summary reports to the USFS, California Department of Fish and Wildlife, and US Fish and Wildlife Service Bird Banding Laboratory. We continue to maintain the spotted owl research websites of Drs. Gutiérrez and Peery, which contain links to many of the papers we have published over our 30 years of owl work.

Plans for 2013

We will continue monitoring owls on the Eldorado NF study area for reproduction, survival, and territory occupancy from April-August 2013. We will assess the accuracy of our habitat map by comparing the results from our randomly sampled field locations to the mapped classifications. We will participate in the meta-analysis that is tentatively planned for late 2013 or early 2014 and in [SNAMP](#) events.

Literature Cited

Berigan, W.J., R.J. Gutiérrez, and D.J. Tempel. 2012. Evaluating the efficacy of protected habitat areas for the California spotted owl using long-term monitoring data. *Journal of Forestry* 110:299-303.

Blakesley, J.A., M.E. Seamans, M.M. Conner, A.B. Franklin, G.C. White, R.J. Gutiérrez, J.E. Hines, J.D. Nichols, T.E. Munton, D.W.H. Shaw, J.J. Keane, G.N. Steger, and T.L. McDonald. 2010. Population dynamics of spotted owls in the Sierra Nevada, California. *Wildlife Monographs* 174.

Propescu, de Valpine, D.J. Tempel, and M.Z. Peery. 2012. Estimating population impacts via dynamic occupancy analysis of Before-After Control-Impact studies. *Ecological Applications* 22:1389-1404.

Seamans, M.E., and R.J. Gutiérrez. 2007. Habitat selection in a changing environment: the relationship between habitat alteration and spotted owl territory occupancy and breeding dispersal. *The Condor* 109:566-576.

Tempel, D.J., and R.J. Gutiérrez. Relation between occupancy and abundance for a territorial species, the California spotted owl. *Conservation Biology*: In Press.

Sierra Nevada Adaptive Management Project

The [Sierra Nevada Adaptive Management Project \(SNAMP\)](#) was initiated in 2007 and is a joint effort by the University of California, University of Wisconsin, state and federal agencies, and the public to study management of forest lands in the Sierra Nevada. The intended result is a multi-resource assessment of effects of Forest Service fuel treatments on water, wildlife, fire, forest health, and public participation on a fireshed scale using an adaptive management framework, innovative research, and stakeholder participation. The project maintains a [website](#) that is frequently updated with results of the monitoring they do.

Management Indicator Species

A report on monitoring of aquatic Management Indicator Species (MIS) in the Sierra Nevada (2009-2012) was completed in 2012. The following is excerpted from the executive summary of the report, available at

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5415765.pdf

...Aquatic macroinvertebrates have been designated as the aquatic MIS for both lotic (stream and river) and lentic (lake) habitats of the Sierra Nevada region because they are known to be sensitive to natural disturbances and land management activities that may impact water quality.

Samples of stream and lake aquatic macroinvertebrates were collected from randomly selected sites throughout the Sierra Nevada Province national forests.... At least 290 distinct macroinvertebrate species have been identified from flowing water samples and 114 from lake samples....

Stream MIS biological data were available from 21 sites collected ... 2009-2010 and evaluated using two models: RIVPACS Observed-to-Expected ratio and western Sierra hydropower Index of Biotic Integrity (IBI). An additional aquatic macroinvertebrate data set was available from the State's Perennial Stream Assessment (PSA) program, which allowed for a more robust analysis with a larger sample size. Both programs have used the same probabilistic sampling design, which allowed for a pooling of the data

For the combined MIS-PSA data set of 74 samples, 78 percent of the perennial stream miles in the Sierra Nevada forests scored in the excellent-to-good category, meaning they were in reference condition, comparable to the least disturbed streams in the region. A majority of 54 percent of all perennial stream miles assessed were considered to be in excellent condition.

In addition, monitoring results for the annual monitoring of MIS birds, including results from the 2012 field season, are available on-line:

<http://data.prbo.org/partners/usfs/snmis/> Bioregional monitoring (fox sparrow, hairy woodpecker, mountain quail, and yellow warbler)

http://www.birdpop.org/Sierra/bbwo_results.htm (black-backed woodpecker)

Forest Monitoring Summary

October 1, 2011 to September 30, 2012 (FY 2012)

This summary is based on reports from the nine California national forests and the Lake Tahoe Basin Management Unit (LTBMU). Nearly all Sierra Nevada NFs in California have completed FACTS (Forest Activity Tracking System) data base entry for projects through FY12.

The forests generally conduct landscape-level assessments in designing fuel treatments that are reported as accomplished.

Fuel treatments in California spotted owl (CSO) and northern goshawk Protected Activity Centers (PACs) and in the wildland urban interface (WUI) during FY12 are summarized in Table 1. Treated acres represent less than 0.1% of CSO PACs and less than 0.4% of goshawk PACs. Total acres of fuel treatments have been declining over the past several years, and forests can avoid treatments in PACs because their boundaries are now well-established and stable.

Table 1. Summary of fuel treatments in California Spotted Owl and Northern Goshawk PACs and WUI for 2012.

Forest	Treatment Acres in California Spotted Owl PAC*	Treatment Acres in Goshawk PAC *	Acres treated in WUI	Percent of total treated in WUI
Eldorado	58	13	1,156	16%
Inyo	0	21	3,945	72%
Lake Tahoe Basin	0	76	6,707	96%
Lassen	26	0	2,824	20%
Modoc	0	21	1,027	25%
Plumas	112	37	1,047	71%
Sequoia	13	0	1,233	100%
Sierra	114	0	8,455	61%
Stanislaus	55	0	1,484	17%
Tahoe	2	209	2,689	47%
TOTAL	381	377	30,565	44%

* Data pulled from FACTS June, 2013

In 2012, fuel treatments were conducted on 69,274 acres on the Region 5 Sierra Nevada national forests. Of those acres, 44% were located in the wildland-urban interface (WUI). The regional goal was to have 50% of all initial fuel treatments in the WUI (SNFPA ROD, page 5), and we have now completed many of those treatments.

Treatments within California spotted owl PACs have occurred on eight of the national forests in the Sierra Nevada bioregion since 2004:

- 2,127 acres on the Eldorado NF,
- 944 acres on the Lake Tahoe Basin Management Unit,
- 166 acres on the Lassen NF,
- 703 acres on the Plumas NF,
- 1,606 acres on the Sequoia NF,
- 4,034 acres on the Sierra NF,
- 2,768 acres on the Stanislaus NF, and

- 525 acres on the Tahoe NF.

The total of 12,874 acres treated within CSO PACs since 2004 is about 3% of the 421,780 acres of CSO PACs designated within the Sierra Nevada. The ROD for SNFPA limits vegetation treatments to no more than 5% of the acres in CSO PACs per year and 10% per decade (page 61).

A number of treatments have been conducted in Northern goshawk PACs since 2004:

- 691 acres on the Eldorado NF,
- 200 acres on the Humboldt-Toiyabe NF (but reporting is incomplete),
- 24 acres on the Inyo NF,
- 262 acres on Lake Tahoe Basin Management Unit,
- 917 acres on the Lassen NF,
- 1,705 acres on the Modoc NF,
- 350 acres on the Plumas NF,
- 215 acres on the Sequoia NF,
- 749 acres on the Sierra NF,
- 764 acres on the Stanislaus NF, and
- 755 acres on the Tahoe NF.

The total of 6,634 acres treated in goshawk PACs since 2004 is about 6% of the approximately 108,158 acres in goshawk PACs. The ROD for SNFPA limits vegetation treatments to no more than 5% of the acres in goshawk PACs per year and 10% per decade (page 61).

These cumulative estimates of treatment acres in CSO and goshawk PACs probably represent an overestimate of actual acres treated because some treatments are implemented over more than one year. In recent years, data have been extracted from FACTS, our corporate database, and we have been able to eliminate duplication within a single year.

The ROD requires evaluation of CSO PACs after potentially stand replacing fires to determine whether PACs or PAC acres that may have become unsuitable should be replaced (SNFPA ROD, page 37). For FY 2011 (allowing a 1-year delay to assess effects):

- On the Plumas NF, 40 acres in one CSO PAC were affected by stand-replacing fires; replacement acres have not been found because PAC is surrounded by private lands.
- On the Sequoia NF, an unknown number of acres in three CSO PACs were affected by stand-replacing fires; replacement acres have not been found.

The Sierra Nevada national forests identified fuels treatments in great grey owl PACs and fisher den site buffers; none in marten den site buffers:

- Sierra NF treated 97 acres in great grey owl PACs at Forked Meadow.
- Sierra NF also treated 80, 40, and 131 acres in three 700-acre fisher den buffers.
- Stanislaus NF treated 3.5 acres in one great grey owl PAC.

The ROD allows some vegetation treatments in these areas (SNFPA ROD, pages 61-62).

Forests used the flexibility in S&G #71 to change CSO and goshawk PAC boundaries to implement projects during 2012:

- Lake Tahoe Basin Management Unit modified CSO PACs are described in table 2. These PACs were modified for the South Shore Fuels Reduction and Healthy Forest Restoration Project.

Table 2. Modifications to CSO and goshawk PACs on the Lake Tahoe Basin Management Unit. Acres Contracted in FY12 will be completed in FY13, and remainder of treatments will occur in subsequent years.

PAC	Acres modified	Acres contracted in FY12
Tahoe Mountain (goshawk)	129	0
Seneca Pond (goshawk)	23	42
Hellhole (goshawk)	68	0
Tahoe Mountain (spotted owl)	67	0
Echo Lake (spotted owl)	25	0
Hawley Grade (spotted owl)	9	0
Hellhole (spotted owl)	128	0

- Stanislaus NF modified PAC boundaries in TU0032 (Reynolds Creek) to correct a private boundary and replace acres for a fuels treatment; PAC changed from 302 to 324 acres.

Implementation monitoring was conducted on projects during 2011 as follows:

- Eldorado NF reports conducting Best Management Practices (BMP) monitoring on 30% of projects.
- Inyo NF reports that some level of implementation monitoring was conducted for about 75% of projects in 2012.
- Lassen NF conducted pre-treatment monitoring on 17% of HFQLG projects because it continues to operate under the Herger-Feinstein Quincy Library Group (HFQLG) Act. Monitoring for HFQLG is reported at <http://www.fs.fed.us/r5/hfqlg/monitoring/>.
- Lake Tahoe Basin Management Unit monitored 100% of projects.
- Modoc NF reports monitoring on 98% of vegetation and fuels projects.
- Plumas NF conducts monitoring on 100% of contracted projects and 50% of in-house projects; like the Lassen NF, the Plumas continues to operate under the HFQLG Act. Monitoring for HFQL is reported at <http://www.fs.fed.us/r5/hfqlg/monitoring/>.
- Sequoia NF reported monitoring on 5% of projects.
- Sierra NF conducted monitoring on all projects.

- Stanislaus NF reports monitoring for 10% of projects.
- Tahoe NF conducted BMP monitoring on 100% of projects with silvicultural waivers and additional BMP monitoring on a portion of activities to meet assigned BMPEP monitoring targets. Implementation monitoring was conducted for four vegetation and fuels management projects (Biggie, Last Chance, and Deadwood Projects and Sagehen Test Plots) and one aspen restoration project (Outback Restoration Project).

Forest Relations with Tribes

Sierra Nevada national forests maintain Government-to-Government relationships with the tribes in the region. They consult and cooperate with tribes on culturally important vegetation, prescribed burning and fuel reduction, and other forest management activities. Forests protect and provide access to sacred and ceremonial sites and tribal traditional use areas. Some specific new instances where the forests worked with tribes on projects in 2012 include:

Eldorado NF

The Amador-Calaveras Consensus Group (ACCG) Cornerstone Project, a Collaborative Forest Landscape Restoration Program, includes Tribal representation. This project is a highlight for both Forest collaborative efforts as well as collaboration with Tribal Governments and Rancherias.

Inyo NF

The Inyo NF is working with Ft. Independence tribe on a watershed restoration project. They are also working with Bishop and Big Pine Tribes on identifying watershed restoration needs in Bishop and Big Pine Creek watersheds.

The Forest employed a tribal intern to assist with the Heritage program.

Lake Tahoe Basin Management Unit

The LTBMU entered into a cooperative agreement with the Washoe Tribe of Nevada and California to produce a National Register of Historic Places Nomination for the Cave Rock Traditional Cultural Property.

The Washoe Tending Garden at the Tallac Historic site was implemented in cooperation with the Washoe Tribe of Nevada and California.

The Forest implemented a pass-through grant for Hazardous Fuel Mitigation on non-federal lands.

Lassen NF

The Lassen NF is working in partnership with four tribes (Susanville Indian Rancheria, Greenville Rancheria, Pit River Tribe, Mechoopda Tribe) to maintain and reconstruct miles of trail throughout the forest.

Heritage Resource personnel and other forest staff and line officers maintain continuous relationships with local Tribes (Pit River Tribe and Susanville Rancheria), including quarterly meetings to coordinate planning efforts. This year, the Forest also entered into ongoing consultation with the Redding Rancheria.

The Forest continues to maintain access and facilitates tribal use of sacred and ceremonial sites and works with the tribes, law enforcement, and other personnel to protect areas of Tribal concern. We continue to provide free special use permits for the Honey Lake Maidu to hold their annual Bear Dance Ceremony at Roxie Peconom Campground.

Modoc NF

The Modoc NF worked closely and collaboratively with the Pit River Tribe, the Shasta-Trinity NF, and the Lassen NF to revise the protocol MOU to make it more meaningful to the Tribe and the three forests.

The Modoc NF created a new Master Participating Agreement with the Pit River Tribe. Prior to this agreement there was only a Master Participating Agreement with the Tribe at the District level.

Plumas NF

The Plumas NF initiated and has facilitated a collaborative effort with Mountain Maidu Tribal Community, Maidu Tribes and Washoe Tribe of California and Nevada to replace derogatory place names on the Plumas NF visitor map. This collaboration has resulted in successful research of historic and tribal place names and cooperation among tribes to determine the most appropriate replacement names. The tribes will submit their recommendations to USGS for place name changes on their maps.

The Plumas NF hired a Mountain Maidu Student Employee to assist the Forest Tribal Relations Program Manager during the 2012 Fire Season. The student's cultural knowledge and connections in the tribal community were instrumental during the Chips Fire (75,000 acres). The student also worked with tribes on renaming derogatory place names on the Plumas NF visitor map.

Through consultation and collaboration with the Concow Maidu Tribe of Mooretown Rancheria, the Plumas NF was able to work with the tribe to locate small diameter logs for cultural use. We authorized the tribe to collect the logs under the 2008 Farm Bill. The tribe is using these logs as poles for bark houses to create an interpretive village.

Through the Plumas NF - Greenville Rancheria Fire Memorandum of Understanding (MOU), the Plumas NF utilized the Greenville Rancheria Type 3 Engine Crew during the 2012 Fire Season when they were dispatched to the Chips Fire. In addition to being a firefighting resource, the Tribal Engine Crew was also a source of immediate knowledge of cultural resources in areas within and near the Fire.

Sequoia NF

The Sequoia National Forest Tribal Relations Program (TRP) continues to conduct quarterly Tribal Forums with federally and non-federally recognized Tribes, Tribal groups, organizations and interested individuals. Forums are used as a way to share information, make introductions among USFS and Tribal leaders and staff, increase networks across Indian country, cross-market and promote events and activities, and update contact lists.

Tribal Forest Protection Act: Under the Tule River Reservation Protection Project (TRRPP) the Sequoia NF works with the Tule River Indian Reservation (TRIR) to manage Forest Service lands abutting tribal lands. The Sequoia-Western Divide Ranger District Interdisciplinary Team (IDT); Regional TRP Manager, Doug McKay; and the Forest TRP Manager met with members of the TRIR and Washington Office staff to tour the area, which was of concern to the tribe and Forest Service. Retired R5 TRP Manager, Sonia Tamez, provided technical expertise to help facilitate the field visit and coordinate the next steps in the process.

The TRP manager participated in several NAGPRA related events. Several collections from UC Santa Barbara and UCLA were retrieved and the process for repatriation and reburial was started. There is an ongoing coordination effort between the Sequoia NF Heritage Resources program and TRP to account for all NAGPRA collections.

The TRP manager sent notification and attended at three public meetings held in April by the US Army Corps of Engineers regarding the Lake Isabella DEIS. The event was attended by members of the public, Tribal groups, and Forest Service. The project is discussed at each Tribal Forum and US Army Corps of Engineers have been in attendance to provide insight and technical expertise.

Sierra NF

The Dinky Landscape Restoration Project (DLRP), Whiskey Ridge Ecosystem Restoration Project, and Sustainable Forest Community Collaborative (SFCC) projects Team Leaders attend each quarterly tribal forum. Collaborative projects engage the tribal community in project

activities and events and ensure Tribal traditional cultural knowledge is incorporated in the core values and beliefs of each collaboration effort. Tribal representatives emphasize the Sacred Sites - Sacred Places aspect of the area to the group. Tribal leadership officials and staff attend project meetings and subsequent field trips, which are extremely valuable, and contribute tribal perspectives into each of the planned activities.

Sierra NF works with the Tribal communities through the Crane Valley Hydroelectric Project - Cultural Resource Committee on the Crane Valley Dam (Bass Lake) seismic retrofit process and planning. The committee consists of Forest and District staff; Pacific Gas and Electric (PG&E) representatives and their Native American liaison; external subject matter experts; Tribal representatives from the North Fork Rancheria of Mono Indians, Picayune Rancheria of Chukchansi Indians, North Fork Mono Tribe, Big Sandy Rancheria of Mono Indians, Cold Springs Rancheria of Mono Indians, the Mono Nation, and Sierra Mono Museum; and local traditional cultural practitioners and interested individuals. The meetings have helped tribal members understand the FERC relicensing process and the on-going Crane Valley Dam seismic retrofit.

Tribal Relations Program made a presentation at the Cultural Resource Monitor Training sponsored by the North Fork Rancheria of Mono Indians to share information on the tribes in the area and their traditional cultural territory. We also discussed the importance of maintaining close and respectful relationships throughout the Forest.

Non-Discrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the bases of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, or all or part of an individual's income is derived from any public assistance program, or protected genetic information in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases will apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (PDF) within 45 days of the date of the alleged discriminatory act, event, or in the case of a personnel action. Additional information can be found online at www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form (PDF), found online at www.ascr.usda.gov/complaint_filing_cust.html, or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter to us by mail at U.S. Department of Agriculture, Director, Office of Adjudication, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, by fax (202) 690-7442 or email at program.intake@usda.gov.

Persons with Disabilities

Individuals who are deaf, hard of hearing or have speech disabilities and you wish to file either an EEO or program complaint please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

Persons with disabilities who wish to file a program complaint, please see information above on how to contact us by mail directly or by email. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.) please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).



Scan with your mobile device to visit
www.fs.usda.gov/goto/r5/SNFPFA