

Attainment Report 4251-01

Title:

Methods are needed for sustaining biodiversity on fragmented forest landscapes of the west.

Progress Report:

ACTIVITIES:

We assessed the effects of introduced trout on the native aquatic community and ecosystem subsidy transfer to the adjacent terrestrial community in the Trinity Alps Wilderness. We developed a model to predict the occurrence of American martens in the Greater southern Cascades region of California. Our unit is integrating census and demographic metrics by monitoring bird populations at multiple temporal and spatial scales. We have completed development of a process for obtaining, archiving, documenting and formatting any source of data from constant-effort mist-netting stations and various census techniques into a single format database, the Bird Monitoring Data Exchange. Helped develop, with PSW colleagues, synthesize the science related to the effects of fuels treatments in the Sierra Nevada on ecosystem integrity and the effects on wildlife habitat. Predicted the seasonal and meteorological conditions under which bats were active at wind energy facility in southern California and quantified the survey effort necessary to characterize bat activity there. We examined the influence of fluvial and geomorphic processes on herpetofauna distribution in a northwest California watershed. Assessed faunal responses to environmental gradients in headwater tributaries of a northwest California watershed. Examined the use of stream amphibians as metrics of riparian restoration and responded to an article that questioned their use for measuring ecosystem stress. Facilitated the interagency Coastal Martes Working Group meetings Created a retrospective assessment, over the last 30 years, of the effects of vegetation management and timber harvest on the distribution of American martens at the Sagehen Creek Experimental Forest (SCEF); demonstrated a substantial decline in marten distribution over the period that will need to be considered by forest managers and PSW as they develop plans to manage the forests of the SCEF.

SERVICES

Counseled biologists, researchers, as well as managers on various National Forests and National Wildlife Refuges in effective use of inventory and monitoring tools for birds and bats, including sensitive and listed species.

PRODUCTS

We developed software tools for biologists, managers, and scientists in visualizing and analyzing data in the Bird Monitoring Data Exchange. The new tools will soon be published on the Web with access to the compiled database.

Impact:

As a result of our research California Department of Fish and Game now maintains selected fish-free lakes in the Trinity Alps Wilderness, CA to promote native biodiversity. Results of our study are being incorporated into a programmatic EIR on fish stocking practices in the state.

Our research on bat activity patterns at wind energy facilities helps to avoid negative impacts on bat populations and to inform mitigation measures to reduce bat fatalities.

Our new approach to forest ecosystem management for the Sierra Nevada is helping national forests develop plans for treating fuel accumulations without compromising ecosystem processes, ecosystem function, or the habitat for late-seral associated species. These plans are more likely to address concerns that the public have about forestry in the Sierra Nevada than the plans that preceded the development of our approach.

A new understanding of the ability of capture data to inform the condition and status, in addition to the response of birds on the landscape level to habitat stressors and alterations has been developed with our many partners.

Our American marten habitat model will help the affected national forests address concerns about the effects of their management activities on the distribution and connectivity of habitat for martens.

The Coastal Marten Working Group meetings bring together regional biologists and land managers to exchange information of new findings, research activities, and develop collaborative efforts to improve the management and conservation of American martens and fishers in coastal Northwestern California. These meetings have sped the dissemination and use of new PSW research.

Our retrospective analysis of the effects of timber harvest on martens and their habitat at Sagehen Creek Experimental Forest will help planners, managers and policy makers consider the effects of future fuel treatment strategies on the remaining marten habitat, and the small population of martens that may remain.

Our research has provided valuable baseline data on the distribution of amphibian assemblages in a commercially logged redwood forest. Results of our work provide information for land managers to track trends and evaluate the effectiveness of measures to restore forests to late-seral conditions.

Publications:

- North, Malcolm; Stine, Peter; O'Hara, Kevin; Zielinski, William; Stephens, Scott 2009. An ecosystem management strategy for Sierran mixed-conifer forests. Gen. Tech. Rep. PSW-GTR-220. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 49 p
- Kirk, T.A.; Zielinski, W.J. (2009) Developing and testing a landscape habitat suitability model for the American marten (*Martes americana*) in the Cascades mountains of California. *Landscape Ecol* 24:(6)759-773.
- Herrera, P. A. 2008. Eddy Gulch Late-Successional Reserve Northern Spotted Owl, Northern Goshawk and Landbird Survey Report 2008. U.S. Forest Service, Redwood Sciences Laboratory, Arcata, California. 20 pp.
- Herrera, P. A.; C. J. Ralph; Hollinger, K. 2009. Avian Monitoring of the Masterson and Plaskett Meadows Campgrounds. U.S. Forest Service, Redwood Sciences Laboratory, Arcata, California. 9 pp.
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- Pope, K. L.; Piovia-Scott, J.; Lawler, S.P. 2009. Changes in aquatic insect emergence in response to whole-lake experimental manipulations of introduced trout. *Freshwater Biology* 54: 982-993.
- Garwood, J. M.; Pope, K. L.; Bourque, R. M.; Larson M. D. 2009. High-mountain lakes provide a seasonal niche for migrant American dippers. *The Wilson Journal of Ornithology* 121: 600-609.
- McCarthy, S. G.; Duda, J. J.; Emlen, J. M.; Hodgson, G. R.; Beauchamp, D. A. 2009. Linking habitat quality with trophic performance of steelhead along forest gradients in the South Fork Trinity River watershed, California. *Transactions of the American Fisheries Society* 138:506-521.
- Moriarty, K. M. 2009. American Marten Distributions over a 28 Year Period: Relationships with Landscape Change in Sagehen Creek Experimental Forest, California, USA. Masters thesis, Oregon State University, Corvallis, Oregon, USA.
- Rich, T. D.; Dale, B.; Long, L.; Ralph, C. J.; Rosenberg, K.; Santana, E.; Sutton, A.; Vega, X. 2008. Partners in Flight bird conservation needs assessment: Results of the 4th International Partners in Flight Conference. Partners in Flight. McAllen, Texas. USA.

Attainment Report 4251-02

Title:

Developing quantitative methods for biodiversity assessment at the population level.

Progress Report:

Developed new knowledge about the genetic variation in the Point Arena mountain beaver, a federally listed endangered species, necessary to develop field methods to estimate population size from non-invasively collected field samples. For the first time we have a population estimate, across 3 years, from the two historical strongholds of the federally endangered Point Arena mountain beaver within their small range in Mendocino, County California. We also have estimates of annual survival. Population sizes are very small and survival, at least in one population, very low suggesting that these populations are vulnerable to loss from random environmental events. We assessed the synergistic effects of disease, climate change, and environmental contamination to at-risk montane amphibians such as the Cascades frog. Initiated a project to extensively monitor existing Cascades frog populations in the Lassen region of California. Developed understanding about regional genetic variation within several subspecies of the American marten in coastal California and Oregon, including the Humboldt marten a subspecies with special status in California. Evaluated the effects of forest thinning on ensatina populations and their habitat. Results from analyses of our long-term data from our Costa Rican monitoring stations suggests that declining populations of migratory birds are subjected to unpredictable food resources during the likely warming climatic trends. We play a principal role in the establishment of the “Red de Anilladores de Aves de Costa Rica.” (Network of bird banders of Costa Rica), a cooperative network of bird monitoring station in Costa Rica. This is an integral part of the Western Hemisphere Bird Banding Network (Red de Anillamiento de Aves del Hemisferio Occidental (RAAHO), and will facilitate the collection of avian habitat, demographic, and population data. Completed a new quantitative analysis of standard survey protocols for the fisher, a species recently found warranted but precluded from listing by the U.S. Fish and Wildlife Service in the Pacific States. Responded to a paper that questioned our examination of the relationship between seral stage and demographic composition and body condition of two species of plethodontid salamander. Examined the effects of time and flow management on western pond turtle demography and monitored the response of western pond turtle and foothill yellow-legged frog populations to manipulated flow regimes and salmonid-focused habitat restoration modifications in the Trinity River system of northern California. Investigated the population level response time of a plethodontid salamander to fire, high level ground disturbance and canopy removal. We designed and tested monitoring protocols for assessing and predicting avian diversity and population status for riparian and riverine species associated with a multidisciplinary salmonid and wildlife restoration program on the critically stressed Trinity and Klamath river systems where the program has involved removing and relocating the riparian habitat with potential negative effects on desired bird species. We are in the final process of implementing a cooperative agreement between the National Institute of Biodiversity of Costa Rica Instituto Nacional de Biodiversidad (INBio) and the U.S. Forest Service that will formalize mutual support for the Network of bird banders of Costa Rica programs. Developed a multidisciplinary, Integrated Assessment Plan for evaluating progress toward goals of a fish and wildlife restoration program on the Trinity River, in northern California. Developed web-based tools for visualizations and analysis of integrate banding data in a

national landbird monitoring database with Cornell University, the Bird Monitoring Data Exchange.

Impact:

Identifying potential limiting factors preventing population-level recovery of birds in Costa Rica will inform management decisions throughout the Hemisphere. The new information about the small size of the Point Arena mountain beaver populations has informed the state park system and the US Fish and Wildlife Service so that they can propose actions to protect these populations and to mitigate future habitat loss. Already this has resulted in treatment of invasive plants that have, over the course of many years, eliminated mountain beaver habitat within Manchester State Park. Our understanding of the genetic background of martens that currently occur within the described range of the Humboldt marten suggests that they are similar to the originally described subspecies, but that martens over a much larger area (including portions of coastal Oregon) are genetically similar to martens within the original range of the Humboldt marten. This allows the USFWS to make more informed decisions about the risk to unique subspecies in California. This first quantitative assessment of survey protocols for fishers provides new insight into problems with existing survey protocols and gives specific recommendations for how more effective surveys can be conducted in the future. Guidance is also provided on how to include quantitative analysis of future survey efforts such that survey confidence levels can be reported. The Trinity River Integrated Assessment Plan is used for short-term assessments to inform adaptive management decisions, particularly for design of habitat restoration sites. Longer-term assessments we are undertaking will evaluate cumulative effects and achievement of restoration goals. A new understanding of the methods of using bird capture data has been obtained. We have led private organizations, and state and federal agencies to use the valuable data contained in these data.

Publications:

- Welsh, H. H., Jr.; Pope, K. L.; Wheeler, C. A. 2009. How reliable are amphibian population metrics? A response to Kroll et al. *Biological Conservation* 142:2797-2801.
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- Falxa, G.; Baldwin, J.; Lynch, D.; Nelson, S. K.; Miller, S. L.; Pearson, S. F.; Ralph, C. J.; Raphael, M. G.; Strong, C.; Bloxton, T.; Galleher, B.; Hogoboom, B.; Lance, M.; Young, R.; Huff, M. H. 2008. Marbled Murrelet Effectiveness Monitoring, Northwest Forest Plan: 2004-2007 summary report. 25 pp.
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- Slauson, K. M.; Zielinski, W. J.; Stone, K. D. 2009. Characterizing the molecular variation among American marten (*Martes americana*) subspecies from Oregon and California. *Conservation Genetics*. DOI 10.1007/s10592-008-9626-x (online only)

- Slauson, K.M.; Baldwin, J.; Zielinski, W. J.; Schwartz, M. K. 2009. Estimating detection probabilities for fishers using non-invasive methods and implications for survey protocols. Pacific Southwest Research Station, Redwood Sciences Laboratory, Arcata, CA. 68 p.
- Zielinski, W. J; Schlexer, F. V.; George, T. L.; Pilgrim, K. L.; Schwartz, M. K. 2009. Point Arena mountain beaver population monitoring program and range-wide genetic structure. Progress Report to the U.S. Fish and Wildlife Service under Interagency Agreement #8122741H200 and endangered species permit TE-080774.

Attainment Report 4251-03

Title:

Understanding the natural history (autecology) of species of conservation concern.

Progress Report:

We have monitored the murrelet population offshore of the three state area adjacent to the Northwest Forest Plan area of Washington, Oregon, and northern California since 2000. Following the 2008 monitoring season, we found a statistically significant decline in the population. We produced and updated an interactive, georeferenced database of all our bird observations from multiple protocols. The database of approximately 500,000 records will be integrated with data from other disciplines and used for management planning and program evaluation. We provided a new view of the capability of California forests to host individuals and, perhaps, populations of the wolverine. This resulted in renewed optimism about the health of California forests and their role in maintaining populations of native carnivores. Examined spatial ecology patterns of a population of aquatic garter snake in northwestern California. Investigated the migratory and overwintering strategies of bats in redwood forests of Northern California. Determined the habitat relationships and distribution of the bullfrog, an invasive species, along the Trinity River. Examined the spatial dynamics and reproductive ecology of the Cascades frog. We documented molt patterns, and demography of little studied resident Costa Rican birds. Examined the spatial ecology and effects of temperature regimes on the basking behavior of the western pond turtle in the Trinity River. Improved understanding of the special habitat features that are selected by American martens as resting sites. Examined the reproductive cycle of the Del Norte salamander. Assembled information required to develop a conservation strategy for the western pond turtle. Examined the temporal and spatial dynamics of the Shasta salamander.

Events: We worked with Klamath Bird Observatory to put on a North American Banding Council Bird Banding Evaluation session at Humboldt Bay Bird Observatory, Arcata, California. A total of 18 participants attended, 15 certificates were awarded.

Impact:

The confirmation of a wolverine in California, after 80 years without such evidence, provides a new perspective on the necessity of considering habitat for this species in forest plans on public lands and harvest plans on private lands. Our continued monitoring of Marbled Murrelet population and its nesting habitat will assist in assessing the effectiveness of the Plan's old-growth forest reserve management strategy. An understanding of the autecology of these sensitive and threatened species is critical to species conservation. Results have improved our understanding of the natural history of these species, knowledge that is required in order to predict the effects of natural resource management. Results from various studies will be incorporated into state conservation assessments for several species. Use of knowledge of marten resting habitat to guide the management of public and private forest lands within the range of the Humboldt subspecies of the American marten. Understanding of the natural history and breeding phenology of Costa Rican birds will provide important knowledge for their management and conservation.

Publications:

- Moriarty, Katie M.; Zielinski, William J.; Gonzales, Armand G; Dawson, Todd E.; Boatner, Kristie M.; Wilson, Craig A; Schlexer, Frederick V.; Pilgrim, Kristine L.; Copeland, Jeffrey P.; Schwartz, Michael K. 2009. Wolverine Confirmation in California after Nearly a Century: Native or Long-Distance Immigrant?. *Northwest Science* 83(2): p. 154-162
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- Wolfe, J.D. 2009. Diet of some spring migrant landbirds on the Caribbean coast of Costa Rica. *Journal of Caribbean Ornithology* 22:37-40.
- Wolfe, J. D.; Ralph, C. J. 2008. Catorce Años de Anillamiento de Aves en Costa Rica: Una Visión General del Proyecto Integral de Monitoreo de Aves de Tortuguero. *Mesoamericana* 12(3):171.
- Wolfe, J. D.; Pyle, P.; Ralph, C. J. 2009. Breeding Seasons, Molt Patterns, and Gender and Age Criteria for Selected Northeastern Costa Rican Resident Landbirds. *The Wilson Journal of Ornithology* 121(3):556–567.