

Community Forestry Research Fellowship 2005: Final Report January 10, 2006  
Frank K. Lake, P.O. Box 48, Orleans, Ca. 95556,  
Ph. D. Candidate, Environmental Sciences Program, Oregon State University

**Briefly summarize your research problem (include any hypotheses) and the goals of your research.**

The focus of my dissertation research was to broadly address the problem of how traditional ecological knowledge (TEK) of Native Americans and their cultural environmental management practices could be integrated with western science regarding the topics historical landscape change, fire ecology, fuels reduction, prescribe burning, ethnobotany and management of sandbar willows in Northwestern California. The goal was to integrate ethnographic data, oral history interviews, field experiments and additional information gained from working with local community members to support my graduate research. A scaled approach was taken to focus more distinct areas of interest. Oral history interviews were conducted with tribal elders and practitioners to gain their knowledge of historical landscape change, cultural uses of fire, and perspectives of fuels reduction and prescribe burning for fire management and restoration. The next part of my research addressed what are the effects of prescribed fire on the composition, structure, and fuel loads on sand bar willow (*Salix exigua*) communities and what is useable and preferred willow basket material by Indigenous basketweavers that was pruned and burnt. Experiments were conducted to study the effects of prescribe fire on sand bar willow community vegetation pre and post fire. Lastly, an ethnobotanical experiment was conducted to study the effects of pruning and burning on sand bar willow growth form and production to enhance basketry material for Native American basket weavers. The desired product was to demonstrate how local Native cultural environmental management practices (burning and pruning) have been adapted to emulate the disturbance regime of low to mid-elevation riparian areas in the absence of natural flooding or fire. My dissertation will offer a synthesis of Native American perspectives regarding historical landscape changes, cultural versus natural fire regimes, fire and cultural management practices on sand bar willow communities and regrowth. Each approach is summarized below:

**Oral history interviews-Problem and Hypothesis:**

The data collected from the oral histories of tribal elders is intended to support a broader understanding and appreciation of cultural uses of fire that is very often under represented or discounted by current fire research, management, and restoration efforts. The hypothesis of interest was: How does the traditional ecological knowledge of Native American elders and practitioners compare to western science regarding the causes of historical landscape change, ecological fire effects (seasonality, extent, frequency, etc.), anthropogenic vs. natural (lighting) fire ignition locations, the development of cultural versus natural fire regimes, and prioritization of fuels reduction and prescribe burning for contemporary forest and grassland restoration efforts in the Klamath-Siskiyou bioregion.

**Oral history interviews-Goals:**

The goals of the interviews were to ask each tribal elder participant a series of questions to address the topics of interest. Native American elders should be able to recall the selective and specific cultural uses of fire for various purposes, describe landscape changes about forest, shrub, and grassland habitats, the role and extent of Indian and/or lightning fires on forest, shrub, and

grassland habitat composition, structure, function, and productivity, and what areas have departed the most from the historical condition. Also, where and how would tribal elders prioritize fuels reduction and prescribe burning efforts to restore natural and cultural fire regimes, enhance wildlife habitat, and maintain critical ecological processes as hydrology, nutrient cycling, and succession. I wanted to compare what tribal elders said about these ecological conditions and processes to western science which very rarely considers Native American fire use as part of the historical condition affecting biodiversity and productivity.

### **Willow patch prescribe fire- Problem and Hypothesis:**

Sandbar willow riparian communities along the mid-lower Klamath River have not experienced sufficient intensity, magnitude and frequency of flooding because of flood control, dam, and irrigation operations in the Klamath Basin. In an effort to emulate flooding disturbance, Native American basket weavers desired to have sand bar willow riparian areas burnt to reduce insect pest infestations and rejuvenate shoot/stem production for basketry use. Three sand bar willow patches were selected for experimental prescribe burns to test the effects of fire on the composition and structure of vegetation, and fuel load. The hypothesis was that sand bar willow patches experiencing a prescribed burn will result in a reduction in fuel (live and dead biomass) and a shift in composition and the structure of vegetation compared to preburn conditions.

### **Willow patch prescribe fire- Goals:**

The goals of the research were to study the effects of fire and other cultural management practices on growth and ecological condition of sand bar willow communities. My research involved working with local native basket weavers, tribes, federal and state government agency biologists, resources managers, non-governmental organizations, and community groups. The research should demonstrate how prescribe burn treatments changed the composition, structure, and function of willow habitat for basket material use and wildlife habitat. On December 29-31, 2005 flooding influenced the structure, fuel load, and geomorphic condition of the willow patches which will have to be considered in the final analysis.

### **Individual Experimental Treatments-Problems and Hypothesis:**

Native American basket weavers have not been able to have large tracts of sand bar willows burnt for basketry material improvements. As a result of the lack of flooding of higher magnitude and intensity, and ability of conducting prescribe burns, basket weavers have to manually coppice or prune willows to stimulate regrowth for shoots to be used for weaving. Cutting willows generally does not reduce the level of insect pest infestations in the willow shoots. The shoot morphology may be good (long and skinny), but if infected then the shoot is functionally not useable and often breaks during weaving, reducing weaving efficiency. I designed an experiment to test the effects of pruning and burning on sand bar willow shoot production and usability to be compared between and before and one year after treatments. The hypothesis: Willow shrubs that experience fire and pruning are more likely to produce shoots useable by Native American basketweavers than those willow shrubs that did not experience fire or pruning (supported by the Good:Bad shoot and stem diameter:length ratios). Based on the traditional knowledge and experiences of Native basket weavers, I expected that fire would produce a greater proportion of useable shoots than pruning or the no treatment/control.

**Individuals Willow Treatments-Goals:**

The research should demonstrate which management treatments produce the greatest quantity and quality of willow shoots/stems for basket material. The goal was to compare the number of “good-useable” willow shoots to “bad-non useable” willow stems (Good:Bad ratio) resulting from each treatment after one year of growth. I will be able to characterize the annual growth, useable stem production, and other general characteristic as the presence of insect pest and stem condition which makes willows non-useable for basket weaving.

**Describe your field experience and data collection experience. Include a discussion of how your participatory research worked out.**

Overall my field experience and data collection experience went well. I was able for the most part complete the goals and objectives I set out to accomplish when I first started my research fellowship. I moved from Oregon State University, Corvallis Or. to Orleans, Ca. near my research area. After moving I was able to be in closer contact with my cultural community which resulted in me not only being able to be immersed into my field research but also be lured into other related issues and activities. Staying focused and on track with the specific tasks and not getting overly involved with related activities was a challenge. Working with a few main community partners versus diversifying and spending additional time with other community members posed its rewards and challenges. Trying to work as a “go-between” among community groups; federal agency, tribes, tribal and community organizations, individuals, and academic committee provided an enriched and yet complex fellowship experience.

I was done with my course work and focused on my field work and data collection in my research/cultural community. Field work caused a physical and mental detachment from academic campus life. I virtually lost touch with my graduate committee while I participated in an active closer bonding relationship with the research community and at my experimental field sites. I moved my personal library with me, and conducted more active participation in community issues related to my research. Each area of my field research and data collection has its own unique rewards and challenges which I will describe below:

Oral history reviews: Native American Uses of Fire for Land Management

Overall I enjoyed my oral history interviews with tribal elders and practitioners. I was able to collect traditional ecological knowledge about cultural burning practices and related subjects. I under estimated the time it was necessary to ask around the community for prospective elder candidates for my interviews, as well as, the time necessary to gain the trust or situational comfort to conduct an audio recorded interview with them. Calling elders without personal formal introduction from one of their family members or friends was at times an awkward moment on the phone. Making personal visits to their residence unannounced and without some intermediary (their family member or friend) seemed at times intrusive as well. At the end of an initial visit I was usually able to assess just how much traditional knowledge and experience with cultural burning an elder or practitioner would have for an audio recorded one hour interview.

The first visit I would make with an elder was usually the introduction of myself, where I lived, who my family was, personal background, what I was doing for work/school, and then the same general information from them. It usually was not until towards the end of my first in-person visit did I then ask them if they would consider taking part in my research interview. I would provide them a copy of the interview questions and the “informed consent” form, ask

them when would be a good time for me to stop in again, and if there was anything I could bring for them next time. The frustrating part of the oral history research was the amount of time it took to scout, form an initial relationship and trust, make a time for the formal audio recorded interview, then have myself or them be available at that later date to conduct the interview.

Generally with each first in-person meeting I was able to gauge how well I thought the elders would be in addressing the questions and topics of my research interest. When I told them what I was interested learning about, and if they had any knowledge on those subjects, the elders would usually give about 15-20 minutes of detailed information of the topics. Minutes I wished each time I could have recorded. I would leave thinking our next formal audio-recorded interview would be better with more time, that was not always true. It was hard to schedule formal interviews with elders. Many times they were ill or had other health issues, away with family, gone to town, did not have phones, and the drive time to visit them would be hit and miss of an in-person meeting.

Once at the meeting for the formal audio-recorded interview, I reviewed the Oregon State University's Institutional Review Board authorized informed consent form and interview questions with them, then started the interview. My microphone and recording set up (Sony Mini-disc) was non-intrusive. Most of the time, I would ask the questions and let the discussion flow in the direction the elder took it. If a particular topic of interest came up, then I would ask more specific details about that. The quality of interview content for my research use would vary. The first 15-20 minutes would be good and on topic, after that some elders would begin to get off topic and details of knowledge specific to my research interview questions decreased. At the conclusion of the interview I would thank them, pay them their honorarium and let them know a general time frame of when I would get back to them with the transcribed interview to review and edit.

At the conclusion of each interview I felt several feelings regarding project accomplishment. Sometimes I felt the amount of time I put into interview was sufficient for the information received, other times I was disappointed, feeling that my expectations for that individual were not met. When other field work or life issues arose it was a challenge to prioritize time for the oral history interview process if initial scouting and scheduling took a lot of time. Sometimes the interview content did not fully address my research topics. A few elders I wish I had more time for, they provided significant ecological knowledge related to my topics of interests. Personal benefits included times when they entrusted me with sacred and spiritual knowledge related to my research and cultural interest. Those moments are the times I felt most grateful that I had the opportunity to be with elders because it was work/school related.

In addition to the interview process, the path to incorporating the recorded data into my dissertation will take additional time, but will need to be completed by July 2006. Each interview requires duplication of the audio recording, transcription and returning to the participant elders to review the transcription, followed by indexing the transcriptions, final analysis and presentation of the results. For each hour of audio-recorded interview, I estimate the following time required to transform that into finished product data for my dissertation or publishable article. Five to seven hours of scouting, travel and meetings required up to the time of completing a formal interview. One to two hours of copying interview for backup copy. Four to five hours for first draft transcription of interview and text structure organization. Two-three hours for a follow-up visit to review interview transcription draft and then edit material. One-two hours for indexing and topic organization for each interview. One hour for final edits, formatting, and incorporation for use into another finished document. For every one hour of interview conducted, requires

about 14-20 hours of follow up work depending on the availability of the elder interviewee, quality of their speech and content of interview, transcription, editing, analysis, and incorporation into final document.

#### Sand bar willow prescribe fire/flood:

My field research of the effects prescribe fire on the vegetation and fuel load in sand bar willow riparian communities required very little participation from the community. The Karuk Tribe's Department of Natural Resources, US Forest Service Happy Camp Ranger Station on the Klamath National Forest, and the USFS Orleans Ranger Station on the Six Rivers National Forest, and members of the Karuk Indigenous Basketweavers were consulted for potential project locations. The USFS conducted the required National Environmental Policy Act (NEPA) scoping to the public and conducted the surveys for the projects areas to evaluate the likely effects to resources or environment, then implemented the prescribe burns. The surveys of the vegetation at the willow sites required proper plant identification and difficult field survey conditions in the summer heat in thickets of willow, blackberry and star thistle with ticks and other hazards. Skills and conditions many people in the community did not have or wanted to work/volunteer in. When the prescribe burns were implemented, only Wildland fire trained and certified personnel were able to be present and near the fire. The only people who participated in my experimental sand bar willow surveys and prescribe burns were paid workers, and/or US Forest Service personnel. Native American basket weavers would benefit more from the prescribe burns and my results which should support additional sand bar willow riparian sites being burnt.

My field experience consisted of surveys conducted at several times of the years. In the early summers of 2004 and 2005 I surveyed the composition, structure, and cover of vegetation in three different willow patches, Independence, Ullathorne, and Big Bar between Happy Camp, Orleans, and Weitchpec along the mid-lower Klamath River. Each site consisted of seven 25-30 meter long transects, depending on the shape of the willow patch. A one-meter belt transect was established along each transect where individual tree and shrub species, height class, and live or dead status was recorded. Then each transect had 5-6 quadrats in which forbs and grasses, and cover were measured. Then in September of 2004 and 2005 at each of the project sites the fuel load was surveyed before the prescribe burns. Along each transect the 1, 10, 100, and 1000 hours fuel classes were measured and recorded. Presence of fine fuels consisting of duff and litter and cover was collected at two places along each transect. Both survey methods required crawling through the willow patches along each transect in a manner that minimized disturbing the condition of the site that might affect the vegetation growth other than natural factors. Constant poking and scratches from blackberry thorns, insects, and weather conditions made surveys difficult and frustrating at times.

In the fall of 2004 after the fuels load surveys were completed the prescribe burns were not conducted due to US Forest Service fire crew availability, weather conditions, and a non-approved prescribe burn plan. The next year in June and September 2005 the surveys were conducted again, but in October 2005 the prescribe burns at all three sand bar willow sites were implemented by the US Forest Service fire crews. During the prescribe burns I took photos and notes regarding ignition pattern, fire behavior, wildlife observations, and fire effects. Post burn surveys were conducted in November 2005 to characterize the effects of fire. On December 30-31, 2005 flooding along the Klamath River began to inundate and change the structure, fuel load,

and geomorphic composition of the willow sites. After the flood waters receded, I conducted site visits to two of the three willow sites taking photographs and notes of flood effects.

In early January 2006 I took photos at the end points of each transect and of some quadrats to compare the pre and post burn condition to the post flood condition. Lesson learnt: *Flood trumps fire*. Ironically, fire studies conducted on sand bar willow communities to support the rejuvenation of basketry material for basket weavers in the absence of flooding were significantly changed by flooding. Flooding did the job it naturally should have.

#### Individual willow treatment experiment:

This project site was near Orleans Ca. next to the confluence of Camp Creek and the Karuk village of *Tishunick*. The site was selected after consulting the Karuk Tribe's Department of Natural Resources, Karuk Indigenous Basketweavers and local Karuk ceremonial leaders. The USFS Orleans Ranger District conducted the NEPA and implemented the prescribe burn treatment. This project involved community participation from individual Karuk Indigenous Basketweavers, Passport in Time-Follow the Smoke volunteers, and the US Forest Service fire crew at the Orleans Ranger District, Six Rivers National Forest. LaVerne Glaze, Bryan Colegrove, and Laura Sanders of the Karuk Indigenous Basketweavers participated in the study at different times. LaVerne was the "pruning" treatment, and has assisted with classification of useable willow stems for basketry. She has provided knowledge, time, and basketry management practices to facilitate the completion of this study. Bryan and Laura have assisted in the maintenance and care of the site by pruning and weeding around willows at the project site. The PIT-Follow the Smoke volunteers and other Karuk Indigenous Basketweavers have harvested, counted and measured willow shoots from the project site necessary for the research. Other Karuk Indigenous Basketweavers have provided ethnobotanical knowledge and allowed access to their basket material, specifically willow shoots, allowing me to measure them for my stem diameter: length ratio characterization.



My initial field work consisted of locating the site, consulting with the Karuk tribe, Karuk ceremonial leaders, Karuk Indigenous Basketweavers, US Forest Service, and a few members from local community. At the time I started the fellowship the site was selected and I had developed an experimental design. I placed numbered tags at selected individual willow shrubs and laid out the experiment across the site. I worked with the Karuk Indigenous Basketweavers to have some of the site to be used and managed as non-experimental treatment cultural uses. The "good useable" willow shoots from the site were and continue to be used in LaVerne's

basketry classes held at the Orleans elementary and community center. My wife, Luna Latimer Lake, as a representative of the Orleans Somes Bar Fire Safe council volunteered time to assist me with data collection and with willow management for the Karuk Indigenous Basketweavers. Before and one year after the treatments were applied I collected data on the height, number of stocks at ground level, and number of “good-potentially useable” to “bad-non useable” willow stems/shoots for each individual willow in the experiment.

My experimental design was a randomized block with three treatments. There were 23 blocks, each with an individual willow shrub receiving a control, prune, and burn treatment. In November of 2004 the USFS Orleans Fire Crew used propane burners to apply the “burn” treatment, LaVerne, as my community partner, was the “prune” treatment and pruned the selected willows according to basket weaver standards and cultural preferences. The willows in the experiment were allowed to grow for one year, during that time the other willows at the site were burnt, pruned, weeded, and harvested for basketry material. In November of 2005 the final survey of willow shrub height, number of stocks at ground level, and “good” sticks were harvested and bundled by their tag number. I conducted the post-treatment surveys and willow shoot harvest by myself. The number of “bad” stems, and notes on growth form, and insect damage was recorded. The “good” stems will be examined by LaVerne and the final tally of the “good:bad” ratio for each treatment will be analyzed. On December 29-31, 2005 flooding on the Klamath River washed over and through this site affecting access and potential use of the site.

**Discuss your preliminary findings and analysis. How do they relate to your original goals/hypotheses?**

Oral history interview: Native American Uses of Fire for Land Management

The preliminary results of my oral history interviews indicate that Native American elders have a diversity of traditional ecological knowledge pertaining to historical landscape change, cultural uses of fire, fire effects, the extent and frequency of cultural versus natural fire, and what should be the prioritization of fuels reduction and prescribe burning today. The most significant theme common to them all was the extent and specificity of cultural fire use from Native Americans compared to natural/lighting ignited fires that is not even hardly mentioned by western science fire research and studies. Other emergent issues that came from the interview material were the reasons why Native Americans stopped or limited cultural burning practices. Generally cultural burning stopped because it became illegal (arson) as a result of differing views, understanding and reliance on fire inducted landscape goods and services between American society and local Native Americans. Actions from American society against Native Americans which prevented, outlawed and limited cultural burning practices were: genocide, settlement and privatization of land, government policies and laws, persecution/imprisonment, boarding school experiences, forced western education and assimilation. All these factors affected directly how the elders I interviewed, ages 60-90, had direct experience with cultural burning, were taught or remember about cultural burning and how fire affected the environment and ecological processes.

Other aspects of the interview material demonstrated the detailed ecological knowledge of elder’s traditional ecological knowledge about sacred geography, wildlife habitat-fire relationships, and cultural practices that accompanied pre and post fire environmental interactions. The other surprising theme which came from the interviews was the recent cultural resurgence of cultural environmental management practices, and the attention to regaining and exchanging traditional ecological knowledge that should be integrated with forest, shrub, and

grassland restoration activities that involve fuels reduction and prescribe fire. In short, most all of the material gained from the interviews related to my original goals and hypotheses. It is contingent upon me to organize and integrate it with western science to present a Native American community-based fire and forest management perspective on behalf of the tribal community.

#### Sandbar willow prescribe fire/flood:

The irony of the situation is that I was going to study fires effects of willows because of the lack of flooding. Flooding historically scoured and redistributed willows causing young regrowth which the Native American basket weavers relied upon for basket material. Part of my original hypothesis was that in the time periods between flooding disturbance, the Karuk basket weavers burnt willows to induce resprouting for shoots. The timing of burns needed to be off-set or lag in frequency behind flooding events. The cultural risk management always involved the uncertainty of when the next flood of sufficient magnitude would occur. Burning the willows to reduce pest infestations and stimulate willow resprouting. Normally, if a flood coincided with the winter following a fall burn it was no problem because the disturbance created environmental effect would be similar. In the case of my prescribe fire research, flooding compounded the fire effects for the study.

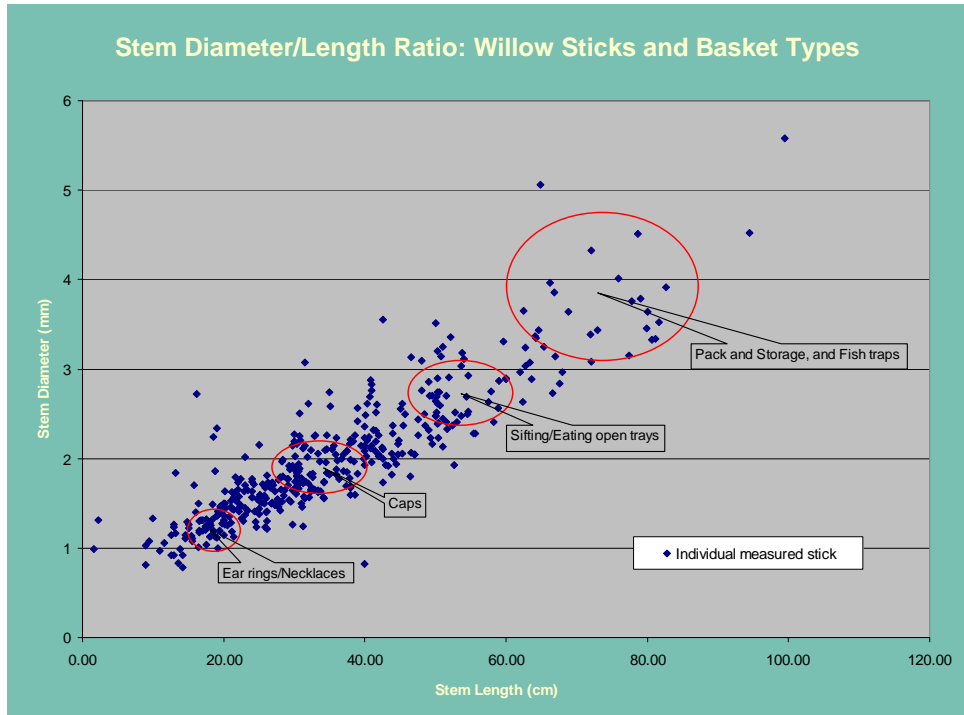
My preliminary findings of my prescribe fire are now affected by the recent flooding activity. The data that I have related to prescribe fire are photo points from each end of the transect showing the condition of the willow patch for the two years (2004 and 2005) of pre-fire vegetation composition, structure and cover, and the pre and post fire fuel load data. Prior to the December 31, 2005 flooding I would have anticipated the effects of prescribe fire to be close to what I expected for the potential the fire effects such as top killing older larger willows and other shrubs, removing dead material, duff and litter. I needed to conduct post-fire vegetation surveys in June 2006. Now with the flooding disturbance which has affected each willow project site, I will need to modify my goals and hypothesis to reflect the disturbance effects of fire and flood.

#### Individual willow treatment experiment:

My preliminary findings and analysis for the treatment effects of pruning, fire and no treatment closely match what the Native American basket weavers predicted and expected. The only emergent issue was learning about the scale of fire needed to reduce pest infections. Propane burning individual plants will top kill willows and stimulate regrowth. When older mature unburnt willows infested with insect pests are adjacent to burnt individuals, the regrowth of the formerly burnt willow can also be infected. The same general finding applies to pruned willows as well. As a result of the treatments and measuring the resultant one year growth of shoots suitable for basket weaving the following trend was revealed: fire  $\geq$  prune > control.



I counted the number of potentially useable willow shoots on each shrub before and after treatment (see photo above). I measured the stem diameter and length of a percentage of shoots on each willow to calculate the stem diameter/length ratio. Based upon instructions, observations and measurements of “good” shoots/sticks that Native American basket weavers were using for weaving, I developed my research criteria for assessing what makes a “good” desirable shoot. A “good” willow shoot is a single straight stick greater than 1 mm in diameter and greater than 10 cm in length, without lateral branches, kinks, or signs of insect damage such as boles or galls. This lower size limit and quality describe the smallest sized shoots used by basket weavers. In an effort



to better describe and characterize the quality of willow shoots needed by basket weavers, I measured the stem diameter and length of thousands of sand bar willow shoots from the collections of basketweavers. I developed and graphed the stem diameter/length ratio which indicates that the size and type of sandbar willow baskets depends on the characteristics and quality of the willow shoots (see above). I then used the stem diameter/length ratio as another line of evidence in determining how the treatments resulted in “good” (useable) versus “bad” (non-useable) shoots.

A common misconception Native American basketweavers encounter among land managers and the public is that every willow shrub can give them enough quality sticks for weaving. This experiment allowed me to show potentially how much of a riparian area of sand bar willows is needed to support the material needs of basket weavers as well as to describe how a single managed (burned or pruned) willow shrub can produce a variety of shoots for different types of baskets.

### Preliminary Block Results: Good and Bad Stems Before and After Treatment

Willow #	Before/After	Height	Stalks at ground level	Good stems	Bad stems	Ratio	Change in good stems	Change in bad stems
#12	<i>Before burning</i>	2.1 m	1	21	90	.23		
	<i>10 months after burn</i>	1.5 m	5	38	34	1.12	+13	-56
#11	<i>Before pruning</i>	1.9 m	4	16	83	.19		
	<i>10 months after pruning</i>	2.1 m	4	80	62	1.29	+64	-21
#10	<i>No treatment</i>	2 m	2	18	121	.15		
	<i>10 months later</i>	2.5 m	2	134	263	.51	+116	+142

As the data in the table indicate, the number of “good” stems and “bad” stems change as a product of annual growth and the type of treatment. An important component of the study is comparing the Good to Bad ratio (G/B: #) before and after treatment. The higher the ratio, the greater the improvement in the number of potentially useable stems for basket weaving. Comparing the change in good and bad stems is another way of assessing the effects of treatments on the number of potentially useable stems and shoots on each willow shrub. Although the control produced many more stems, my experience in the field as well as that of the basket weavers, demonstrates that the shoots are either too high to access, take more effort to search through for “good” stems, and generally have more insect infestations. Height, the annual change in growth after treatment, is indicative of productivity. For example, in the table above #12 Burn grew 1.5 meters, compared to #11 Prune and #10 Control which grew only 0.3 meters, and 0.5 meters respectively.

Although I did not measure the difference in height of the stems or how much of the tops of the pruned willows were cut off, I inferred their growth relative to the growth of the burned and control willows. The “burn” treatments grew from the ground up to the height at the time of post treatment measurement. The “control” grew from the tallest point at the time of pre-treatment measurement to the time of post treatment measurement. The growth of the pruned shrubs was somewhere in between these measurements. The numbers of stalks at ground level indicates response to each treatment. Burning generally increased the total number of stalks at ground level. In contrast, the number of stalks at ground level in the prune and control treatments remained relatively constant. Overall I feel the preliminary data supported my original hypothesis and goals of the project. I was able to expand the ethnobotanical knowledge of sand bar willow use for Native American basket weaving.

#### **What is the benefit of your research to the community?**

##### Oral history interview: Native American Uses of Fire for Land Management

I think the benefit to the community is that the elders I conduct formal audio-taped interviews of are compensated with an honorarium of \$100 US dollars, and their knowledge is recorded and documented for future use. An additional benefit will when I complete the transcription, copies of mini-disc to audio cassette, and have the final report of the indexed subject material that will be made available and/or given copies of back to the elder’s who

participated, a copy to the tribe or tribes if designated by the elder, and/or local organization. Any confidential or sensitive material will be edit out of the public copies as request by the tribal elder or practitioner. How ever the final material is used, be it in publications or presentation by myself or others in the future, there is the contribution of rare limited tribal elder traditional ecological knowledge about historical landscape change, cultural uses of fire, and Native American elder perspective regarding restoration of fire as an ecological process in the Klamath-Siskiyou bioregion. I know there is interest from the local US Forest Service, community fire safe councils, and tribes for having this information to be incorporated into their land management planning and restoration activities. Lastly, the elders I have conducted informal and formal interviews with have entrusted me with traditional ecological knowledge some of which is sacred and special regarding cultural practices and land use. I have a responsibility for the knowledge which was shared with me, and I am culturally obligated to pass on or use this knowledge to benefit the community. I intend to uphold this responsibility by teaching others and using it as it was intended when those elders learnt it from their elders and so on to benefit the cultural and biological community.

#### Sandbar willow prescribe fire/flood:

The benefit of my prescribe burn research on sand bar willows to the local community will be minor. This aspect of my research was targeted toward Native American basket weavers and scientifically increasing the knowledge of fire effects on sand bar willow dominated riparian communities. It will benefit those locally and maybe regionally who are interested in understanding fire and flood effects on riparian vegetation. My research findings have an application for cultural basketry management, which is an important issue locally and with increasing or modifying wildlife habitat. Elk have been reintroduced in the Marble Mountains along the eastern side of the mid-Klamath River between Happy Camp and Somes Bar. Elk use the sand bar willow/cotton wood riparian forest and river bars for winter range habitat. Increasing elk winter range habitat has been selected as a local restoration priority.

#### Individual willow treatment experiment:

The benefit of this part of my research to the local community is primarily the local Karuk Indigenous Basketweavers. The basket weavers have received willow shoots from this project site that have been used for local classes at the elementary school and community center. A few Native basket weavers have used some willow shoots harvested from the projects site for making baskets which were later sold commercially providing income to those weavers. Results of the study can be used to validate or support the ethnobotanical knowledge of Native American basket weavers regarding the effects of pruning, burning or naturally growing sand bar willows.

#### **Lessons learned. Include any suggestions you may have for improving the CFRF program.**

I learnt several lessons during the time of my fellowship experience that I feel would benefit others conducting community forestry research by learning what I could have been more effective in doing or improving upon. First, manage the fellowship funding diligently. The funding is a valuable opportunity to explore one's capacity in forming relationships with community individuals or organizations. Fellows should focus field research on data collection, improving or adapting methods and progressing dissertation work that includes writing and publishing as you go along! I moved to my research area and did not have work (employment for

income) for the first five months. Luckily, the fellowship provided funding support for living (rent) and travel (gas money) to conduct the main parts of my research.

Second, use time and money wisely. I was culturally involved with my research community before receiving the fellowship. When I moved back to northern California from Oregon where I was going to college, everything I did became formal and informal “community forestry research”. I diversified my experience and increased my knowledge about Native American community forestry issues, but at the expense of not focusing specifically on the timely transcription, indexing, and edits of my oral history interviews or advancing my potential progress on my willow research such as data entry, preliminary analysis and writing. I got the basics of my field research done, but I also went berry picking, mushrooming, fishing, hunting, worked on preparing ceremonial dance areas and attended tribal ceremonies, learning to basket weave, and spent more time expanding my overall community forestry experience (see photo with LaVerne). All these experiences provided me with opportunities in meeting elders, other tribal practitioners, and gaining traditional ecological knowledge that would be more of a benefit to me after my dissertation was completed than towards the end when I should be getting it into draft chapters and maintaining a closer relationship with my graduate committee.

I should have kept in contact with my graduate committee at least once a month, not very 6-9 months. I was and still am a motivated self directing individual, but guidance from your graduate committee is just as important as from your community partner(s). As I completed various aspects of my field work, (i.e. finished willow surveys or completed certain number of oral history interviews) I could have been better at notifying my graduate committee of my progress. Keeping in contact with my graduate committee would have also been keeping them involved or at least knowledgeable with my research challenges and successes.

After this fellowship, I do not plan to move back to Corvallis, Or. to be at Oregon State University. I will continue living in Orleans, Ca. working half time, and finishing my research and writing of my dissertation. Not every fellow will want or need to stay involved with their field research community after their fellowship or upon completing their graduate degree. For cultural and life style choices I will continue living in the Orleans area. All the traditional ecological knowledge that has been invested in me from the tribal community is expected to stay, and I am expected to produce goods or services that will benefit the community for the rest of my life. Recently in speaking with tribal elders and ceremonial leaders they expressed concerns reminding me of the commitment I have as a scientist and a care taker of traditional knowledge to the community. Following the fellowship research experience, students may not have a similar level of responsibility, or may not think they are expected to contribute back to the community, but be mindful that some commitment may be expected. Do not create expectations that you will not be able to fulfill, or promises you will not be able to keep.

If possible, fellows should use the time of their fellowship to make connections and secure work related to their academic interest. I have been fortunate to secure a paid student



Frank Lake and LaVerne Glaze:  
“Another day in the forest”

career educational experience (SCEP) biologist position with the US Forest Service to finish my graduate research and work with the Karuk Tribe on land management issues. I feel that my CFRF experience and funding provided me with leverage to secure employment opportunities related to my professional and academic interest.

In closing, I am privileged to have been selected as a CFRF recipient and to have the community forestry research experience. I feel that the CFRF program provided me with an opportunity to grow and expand my knowledge culturally, academically, and professionally. I think the CFRF program did a good job of requesting input from me and drawing upon my experience by requesting my participation with my community partners at the annual workshops, and by requesting a written contribution to the newsletter. Call me if or when you need anything to support your program.

Thank you, Frank K. Lake.