Klamath Basin Food System Assessment
Karuk Tribe Data

A survey about access to food for tribal people in the Klamath Basin

The Karuk Tribe and the University of California at Berkeley
March 15, 2019

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Acknowledgements and Disclaimer

The data provided in this internal report represent a portion of the survey results gleaned through a larger food security assessment study conducted as part of a five-year USDA-NIFA-AFRI food security project titled *Enhancing Tribal Health and Food Security in the Klamath Basin by Building a Sustainable Regional Food System*.

The data in this report reflects a preliminary compilation and summary of the survey data. Further analysis and interpretation of the results is presented in a final report and in articles and publications, available on the following website: https://nature.berkeley.edu/karuk-collaborative/

The views and opinions expressed in this report do not necessarily reflect the official policy or position of any agency of the U.S. government, but that of the authors. The survey was co-designed by members of the Karuk Tribe's Department of Natural Resources Lisa Hillman, Leaf Hillman, and Bill Tripp, in consultation with the Karuk Resources Advisory Board, together with UC Berkeley Cooperative Extension Specialist Jennifer Sowerwine, and research assistant Sara Reid. Data analysis was conducted by Megan Mucioki, post-doctoral researcher at UC Berkeley. Special thanks go to other members of the Klamath Basin Food Security team especially Daniel Sarna-Wojcicki, Frank Lake, and Edith Friedman, and to all the survey respondents who contributed their knowledge and experiences to this report.

It is important to acknowledge the assumptions and limitations of this survey in representing all facets of the tribal community. While we made our best effort to make the survey accessible to all tribal members and descendants, we may not have been able to reach everyone as not all descendants' mailing addresses are registered with the Karuk Tribe. We also may not have been able to reach those experiencing the greatest poverty and food insecurity. This includes those who may not have received the survey as they were no longer at the mailing address, are homeless, or are elderly and may not have had the means to respond to the survey. In addition, because the focus of our survey was at the household level, i.e. we requested one response per household, we may not have captured *all* tribal members as the survey respondent may have represented another tribe. Households often consist of tribal members and descendants of different or multiple tribal affiliations, as well as non-tribal members of the household. Survey responses were categorized based on the primary tribal affiliation of the person who filled out the survey.

When referencing this report, please use the following citation:

Karuk Tribe Department of Natural Resources, Megan Mucioki, and Jennifer Sowerwine. 2016. *Klamath Basin Food System Assessment: Karuk Tribe Data.* Orleans, California and Berkeley, California: Karuk Tribe and University of California at Berkeley.

Executive summary

Karuk Tribe employees and University of California at Berkeley researchers conducted the Klamath Basin Food System Assessment, documenting the current food system in Klamath River Basin's tribal communities, as well as eliciting possible solutions to food-related challenges faced by tribal people in this region. While the survey covered all four tribes (Karuk Tribe, Yurok Tribe, Hoopa Tribe, and the Klamath Tribes) in the Klamath River Basin, this report summarizes survey results for the Karuk Tribe stratified by geographic region (Coastal, Scott Valley, Orleans, Yreka, Happy Camp, Southern Oregon, Mount Shasta, and other towns). This report also highlights comparisons among Karuk respondents that live in the Karuk Tribe's three service areas (Orleans, Yreka, and Happy Camp) served by the Karuk Tribe's food security program.

The Klamath Basin Food System Assessment is a 60-question survey focused on household food shopping and consumption, food assistance programs, home grown and home raised foods, Native foods, community resources and food education. A total of 1323 surveys were distributed to tribal members and descendants residing within the service area of the Karuk Tribe through the mail (1183 surveys) and at select tribal events (140 surveys) from March 2015 to February 2016. From the Karuk Tribe, 286 tribal households returned completed surveys, representing 843 Karuk people.

Summary of results[1]

Household characteristics

- 34.15% of all households fell below the federal poverty level, earning $20,000 or less for a family of three as compared to 14% nationwide.
- Incidence of high blood pressure and type II diabetes were about twice the national rates reported by the Centers for Disease Control.

Access to food, water, and other resources

- 20.77% of respondents rarely or never had access to healthy food they desired throughout the year.
- 72.44% of respondents rarely or never had the access they desired to Native foods throughout the year.
- 76.19% of respondents always had access to drinkable tap water; however, 16.70% of all Yreka and Orleans respondents never had access.

Community food resources

- 44.91% of respondents said they got a portion of their food from hunting, gathering, or fishing.
- 47.72% of respondents said they got a portion of their food from a home garden or orchard.

[1] The recall period for all results was one year.

- Collectively respondents prioritized local grocery stores, fishing and eeling in local rivers, and a tribal farm or orchard as sources of food they wanted more of in their community.
- About 26% more households in Orleans fish, hunt, and gather food than in Happy Camp and Yreka.
- SNAP was ranked as a more important source of food for Yreka and Happy Camp respondents than for households in Orleans.

Grocery shopping behavior

- Collectively, 59.09% of respondents said fresh fruits were too expensive, 53.15% said fresh vegetables were too expensive, 61.54% said red meat was too expensive, 41.26% said poultry was too expensive, 55.59% said fish was too expensive, and 57.34% said organic foods were too expensive at the grocery store closest to their home.
- Over half of respondents in each region, except Orleans, went to the grocery store one to three times a week.
- Households in Orleans more commonly visited the grocery store once or twice a month, with distance being a prominent barrier to shopping.

Food security

- 45% of households are experiencing very low food security with households in Happy Camp and Yreka having the most households with low or very low food security.
- Collectively, 35.87% of surveyed households worried about running out of food or ran out of food in the past year.
- 5.42% of households ran out of money for food at least once a week, 22.02% at least once a month, and 15.52% a few times a year.
- When facing food insecurity, households in Orleans were more reliant on home garden produce, home canned foods, and locally gathered Native foods compared to those in Yreka and Happy Camp.

Food assistance

- 53.99% of respondents used some form of food assistance.
- 16.25% of respondents said they used food assistance because Native foods were not available.

Home raised foods

- 43.86% of respondents grew or raised their own food at home.

Native foods

- 80.92% of respondents ate Native foods at least once a year.
- In general, households in Orleans consumed the greatest diversity of Native foods – and more often in the past year.
- Respondents prioritized fish, berries, and mushrooms as the Native foods they wanted more of the most.

- The strongest barriers to respondents accessing Native foods were rules, limited availability, and that the area where the Native food used to be found is now heavily degraded.
- Prioritized from the top three, respondents felt that the following would help them consume more Native foods: 1) removal of legal barriers related to hunting, fishing, and gathering, 2) classes on gathering, preparing, and preserving, 3) classes on hunting, and 4) butchering, and canning, and classes on fishing, smoking, and canning.
- Most respondents learn about Native foods from their family (91.88%) but 42.77% indicated they are self-taught, and 27.67% reported learning from an unrelated person.

Household and survey respondent characteristics

Key trends:

- *Compared to 14.5% nationwide, 34.15% of respondents fell below the federal poverty level with reported annual household income of $20,000 or less for a family of three.*
- *8.24% of respondents and 16.58% of respondents' mothers did not graduate from high school. Additionally, about 59.17% of respondents have completed some college or higher, compared with approximately 22.84% of their mothers doing the same.*
- *The reported rates of high blood pressure (53.28%) and type II diabetes (17.95%)s are exceptionally high when compared to national rates of high blood pressure (29%) and type II diabetes (9.3%) reported by the Centers for Disease Control.*

In all, 286 Karuk tribal members or descendants responded to our survey. These respondents covered many different towns and regions. The data has been separated into the following locations/regions:

Coastal region- Carlotta, Fortuna, Loleta, Rio Dell, Scotia, Eureka, Blue Lake, Hydesville, and McKinleyville (53 households).

Scott Valley region - Fort Jones, Etna, Callahan, Greenview, Sawyers Bar, Forks of Salmon (29 households).

Orleans region- Orleans and Somes Bar (28 households).

Yreka region- Yreka and Montague (72 households).

Happy Camp region- Happy Camp and Seiad Valley (53 households).

Southern Oregon- Grants Pass, Ashland and Medford (22 households).
Mount Shasta region- Weed, Shasta Lake, Dunsmuir, McCloud, Grenada, Gazelle, Edgewood (14 households).

Other towns- Hoopa, Alderpoint, Azalea, Blocksburg, Dorris, Gold Hill, Shady Cove, Wolf Creek, Tulelake and Weott (15 households).

For this report, we analyzed the data collectively (using all Karuk respondents), comparatively among the defined regions above, and comparatively among the Karuk Tribe service areas: Orleans, Happy Camp, and Yreka. Throughout the report we strive to highlight key differences among all locations and these three service area locations.

Basic demographics: The average respondent was 54.24 years old, and the survey captured respondents 12 to 93 years old. The average household size was 2.98 people, with a range of one to nine people. There were 57.95% female, 41.34% male, and 0.71% gender non-conforming respondents. 94.72% of respondents were Native Americans.

Income: There was not a significant[2] difference among locations when comparing for income or for education. Respondents were asked to share their annual individual income as well as the household annual income. Figure 1 shows the annual, individual income reported by survey respondents. Precisely 25.69% of respondents earned less than $10,000 per year, and 44.26% of respondents earned between $10,000- $30,000 a year (Figure 1). The results for annual *household income* followed a pattern similar to respondent annual income (Figure 2). However, there were a greater proportion of households that earned $30,000-$39,999 and $40,000-$49,999 and fewer households that earned less than $10,000.

[2] We use the term *significant* or *statistically significant difference* to indicate relationships among household location/service areas and other variables that are not random or by chance. In other words, if our sample size is large enough and diverse enough, statistics inform us of relationships that are true for the population being surveyed every time and not just occurring by chance or randomly one time. The specific statistical tests we used to evaluate relationships in this report are the chi-square test and Fischer's exact test. We have used the probability of error level .05 which means that 5% of the time an identified relationship based on statistical analysis is wrong or not inherent to the population. For more reading about these tests and statistical significance please see: http://www.stat.yale.edu/Courses/1997-98/101/chisq.htm and https://web.csulb.edu/~msaintg/ppa696/696stsig.htm

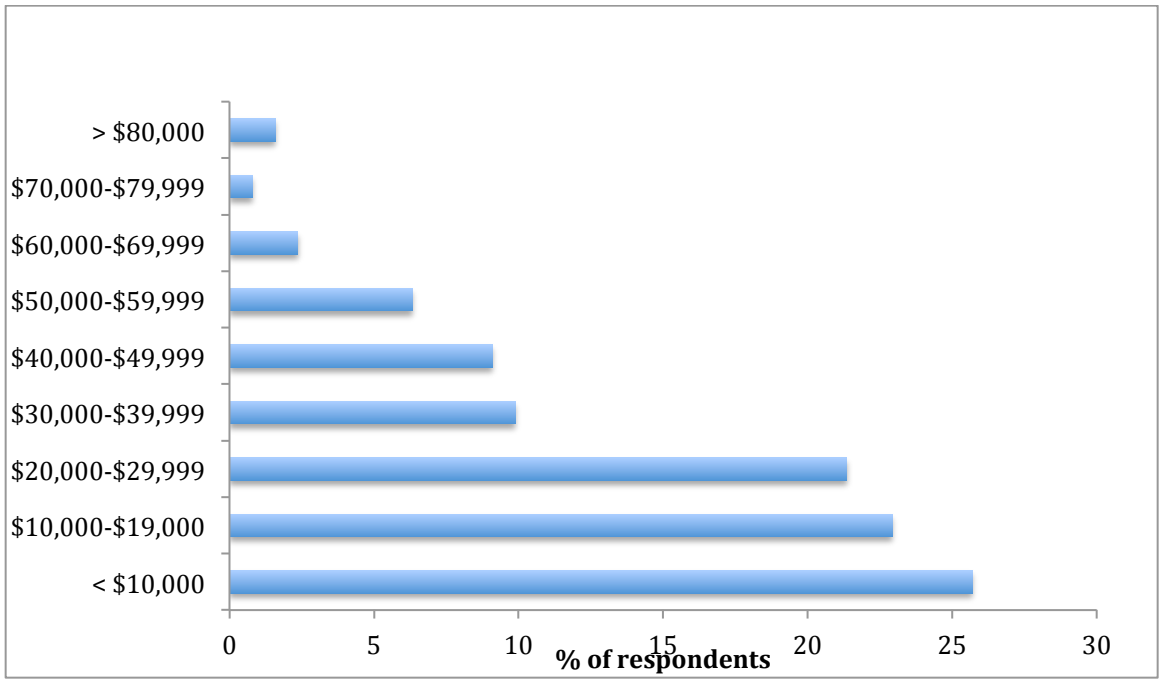

Figure 1. Individual annual income.

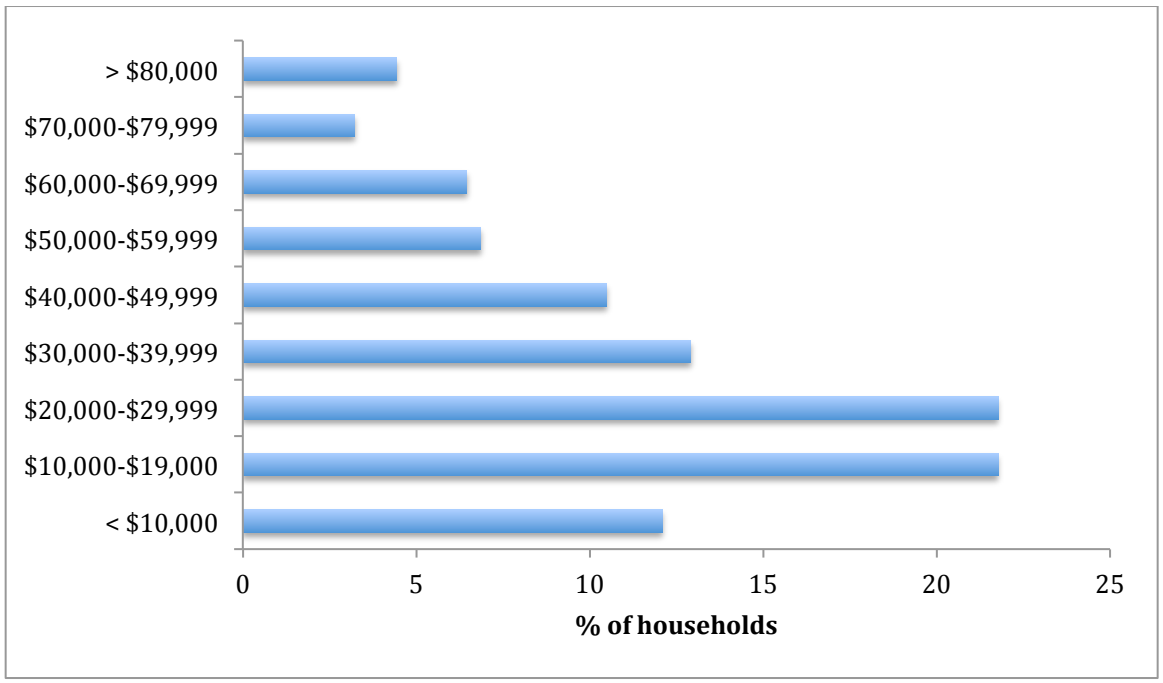

Figure 2. Household annual income.

Education: Survey respondents were asked to share the highest level of education they completed as well as the highest level of education their mother completed. Figure 3 illustrates the highest level of education completed by each survey respondent. Exactly 32.58% of respondents completed high school and 33.33% had completed some college. Some form of higher education was completed by 25.84% of respondents (Figure 3).

Comparatively, Figure 4 shows the highest level of education completed by respondents' mothers. Precisely 48.69% of mothers completed high school and 14.23% of mothers had completed some college. 8.61% of mothers had completed some form of higher education.

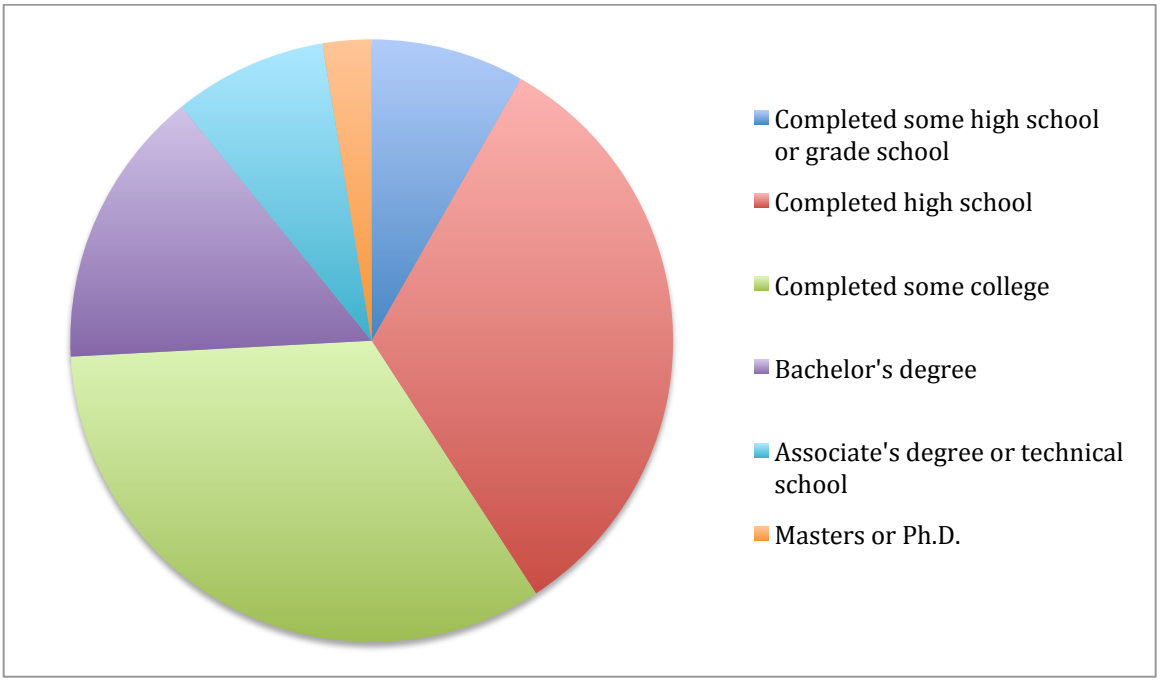

Figure 3. The highest level of education completed by each survey respondent.

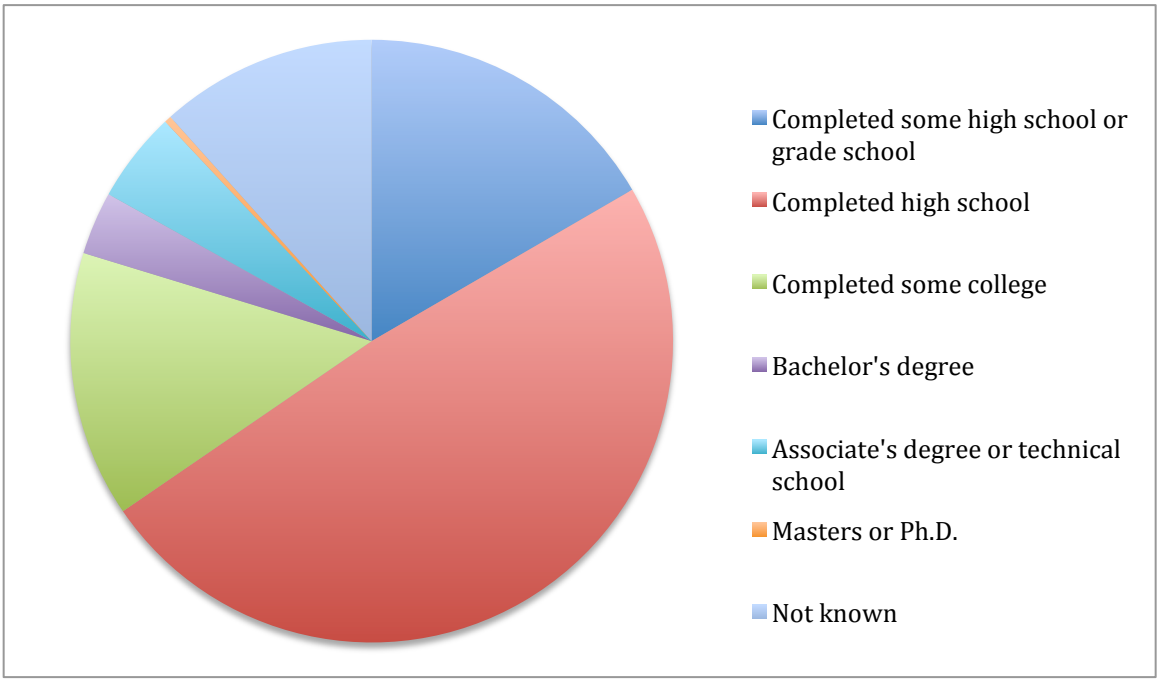

Figure 4. The highest level of education completed by respondents' mothers.

Health Issues: Lastly, survey respondents were asked if they themselves or anyone in their household suffered from a list of health conditions. Collectively, the percentages of households with at least one person suffering from a health-related issue were as follows: 53.28% high blood pressure, 14.23% hypertension, 16.06% heart condition, 17.95% type II diabetes, 43.80% obesity, 28.83% cavities, 15.38% food allergies, and 12.50% suffered from a condition "other" than those listed.

Access to food, water, and other resources

Key trends:

- *20.77% of respondents rarely or never had access to healthy food.*
- *72.44% of respondents rarely or never had access to all the Native foods they desired throughout the year.*
- *22.54% of Yreka respondents stated they never had access to Native foods they desired throughout the year.*
- *76.19% always had access to drinkable tap water, yet 16.70% of all respondents from Yreka and Orleans never had access.*

Respondents were asked to rank access to their desired healthy foods and Native foods in the past year. Access to healthy food was not significantly different among locations. Collectively, 25.00% of respondents said they *always* had access to healthy food, 54.23% said *usually*, 20.07% said *rarely*, and 0.70% said they *never* had access to healthy foods. Collectively, 5.65% of respondents said they *always* had access to the Native foods they desired, 21.91% *usually*, 51.24% *rarely*, and 21.20% *never*. While about 50% or more of households in each Karuk service area said they rarely had access to the Native foods they desired, more households in Orleans said they usually had access to Native foods than households in Yreka and Happy Camp (Figure 5).

Respondents were asked if they had access to drinkable tap water. Collectively, 76.19% responded that they *always* had access, 16.85% *usually* did but not always, 1.47% *sometimes*, 0.37% *rarely, and* 5.13% *never*. Comparing access to drinkable tap water among households in Orleans, Yreka, and Happy Camp alone, there was a significant difference among the locations (Figure 6), with Happy Camp respondents having the best access.

In an emergency event lasting up to three days, 78.37% reported having non-perishable food, 64.89% access to drinking water, 51.06% a propane stove, 47.52% a radio, and 32.98% a generator. Out of the three service areas, generators and propane stoves were more common in Orleans.

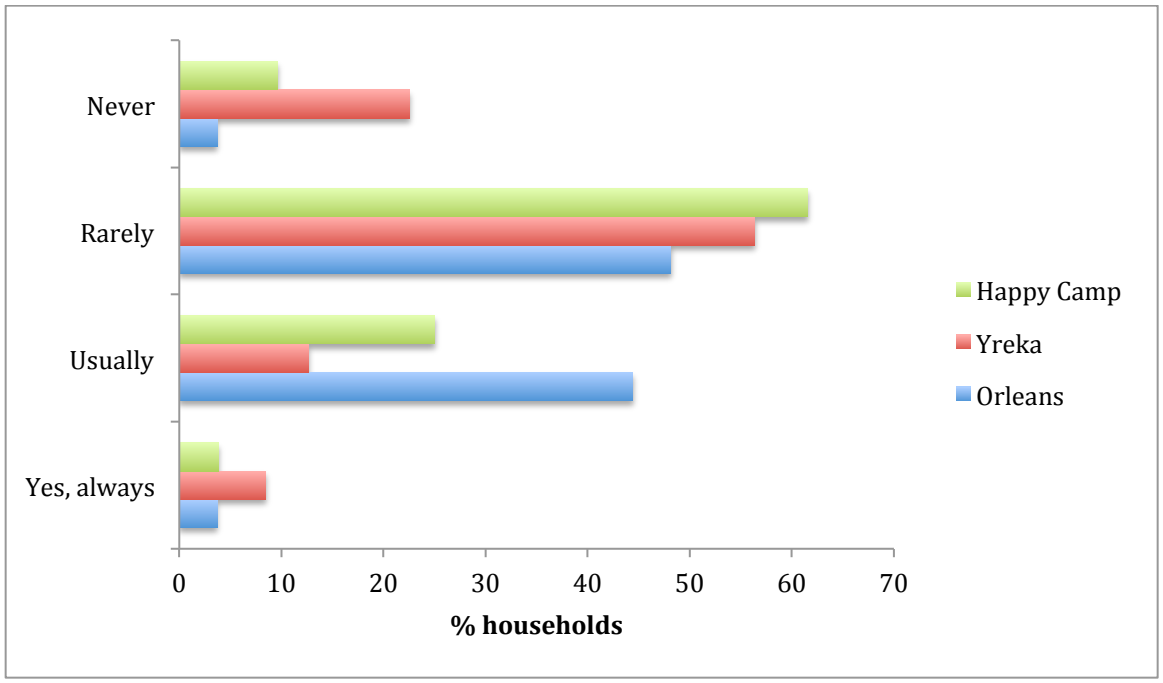

Figure 5. Access to Native foods in Happy Camp, Yreka, and Orleans.

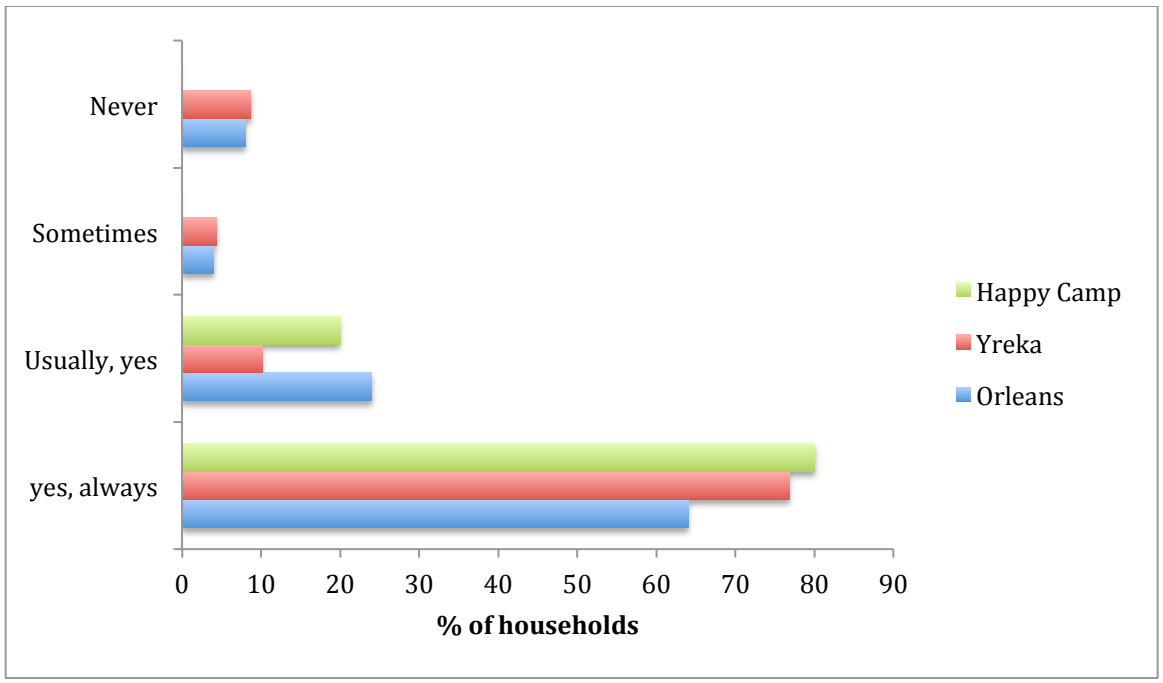

Figure 6. In Happy Camp, Yreka, and Orleans: household access to drinkable tap water.

Community food resources

Key trends:

- *44.91% of households said they got some portion of their food from hunting, gathering, or fishing.*
- *47.72% of households said they got some portion of their food from a home garden or orchard.*
- *26% more households in Orleans fish, hunt, and gather food than in Happy Camp and Yreka.*
- *45% more households in Orleans were dependent on neighbors, family, and friends for food than in Happy Camp and Yreka. This source of food was ranked by 50.00% of households in Orleans as very important.*
- *Food from gardens and orchards are most utilized in Orleans and Happy Camp.*
- *Fast food or food from restaurants were used by 35.71% more households in Yreka than those in Orleans.*
- *SNAP was a more important source of food to households in Yreka and Happy Camp than households in Orleans.*
- *Households prioritized local grocery store, fishing and eeling, and a tribal farm or orchard as sources of food they wanted more of in their community. Those households located in the Karuk Tribe service area placed a higher priority on gathering Native foods and farmers market than those outside the area.*

Where do you get most of your food?

Survey recipients were asked to indicate all the places where they got any portion of their food in the past year. As an aggregate, 98.25% of households got food from grocery stores, 44.91% hunted, gathered, or fished for food, 20.70% got food from convenience stores, 40.70% ate fast food or at restaurants, 47.72% got food from a garden or orchard, 22.11% got food from food distribution, and 32.98% relied on neighbors, family, or friends for food. Figure 7 shows the proportion of households in Orleans, Happy Camp, and Yreka that used each above-mentioned place to source food. In Orleans, about 26% more households fished, hunted, and gathered food than households in the other two service areas. Furthermore, about 45% more households in Orleans depended on neighbors, family, and friends for food than households in the other two service areas. Food from gardens and orchards were more utilized in Orleans and Happy Camp than Yreka. Fast food or food from a restaurant was used by 35.71% more households in Yreka than in Orleans. Next, survey recipients were asked to rank (one to four) the places where their households got the most food. Collectively, local grocery store was the first source of food, fast food or restaurant food was the second source, garden or orchard food was the third source, and hunting, fishing, and/or gathering was the last selection. Households only in Karuk Tribe service areas ranked food sources as follows (from first to last): local grocery store, fast food or restaurant food and garden or orchard food (tied for second), hunting, fishing, or gathering, and friends, family, or neighbors.

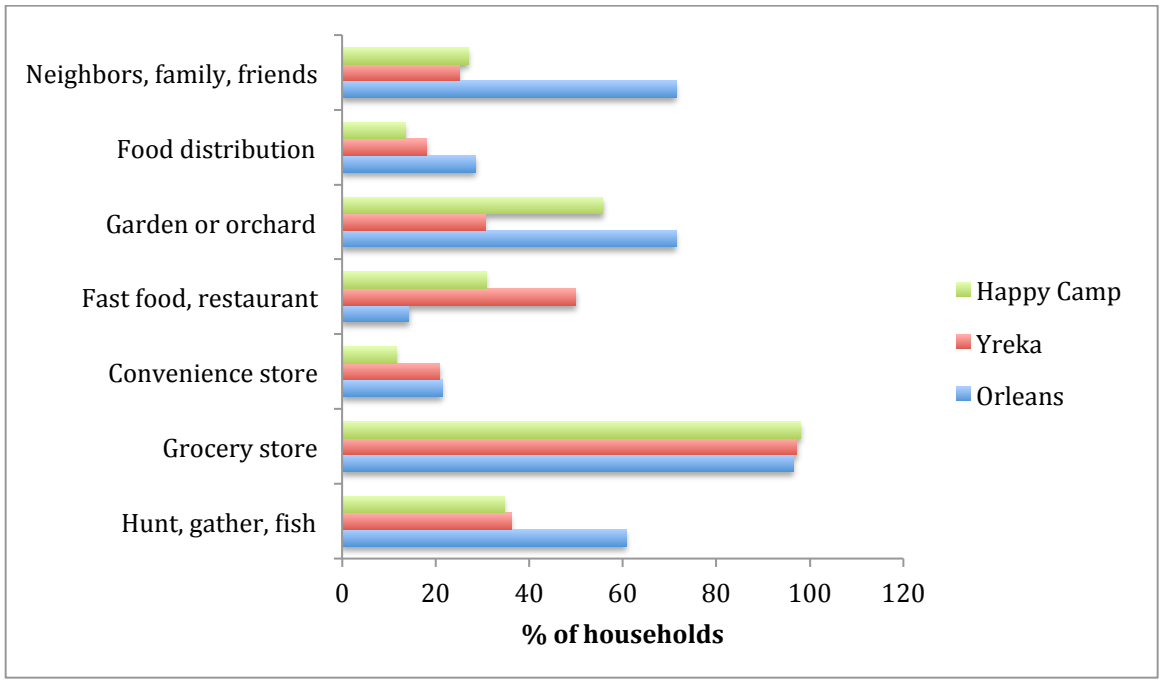

Figure 7. All the places where respondent households in Orleans, Yreka, and Happy Camp got their food.

How important are the following food resources?

Survey respondents were asked to rank how important different food resources were to their household. They could choose very important, somewhat important, not important, or does not exist in my community for each food resource. Table 1 reports the food sources that were ranked significantly differently among households in Orleans, Happy Camp, and Yreka. In Orleans, only 25.00% of respondents ranked the local grocery store as very important compared to 72.06% of respondents in Yreka and 73.08% of respondents in Happy Camp. Additionally, 25.00% of Orleans respondents said a local grocery store did not exist in their community. SNAP was ranked as a more important source of food to respondents in Yreka and Happy Camp as compared to Orleans – 36.36% of Orleans respondents said SNAP did not exist in their community. In Orleans, 50.00% ranked food from neighbors, family, and friends as very important for their households, and 33.33% ranked trade and barter as very important. Both of these sources of food were ranked as not important by a far greater proportion of respondents in Yreka and Happy Camp than those in Orleans. Fishing, eeling, and gathering Native plants are more important to households in Orleans than to households in Yreka and Happy Camp. Lastly, 83.33% of households in Orleans and 85.11% of households Happy Camp ranked home gardens and orchards as a very important or somewhat important source of food; in Yreka 62.06% of respondents did the same (Table 1).

Table 1. Household food sources that were ranked significantly different by importance in the Karuk Tribe service areas.

		Very important (%)	Somewhat important (%)	Not important (%)	Does not exist (%)
Local Grocery	Orleans	25.00	33.33	16.67	25.00
	Yreka	72.06	19.12	2.94	5.88
	Happy Camp	73.08	17.31	5.77	3.85
Superstore	Orleans	50.00	7.69	3.85	38.46
	Yreka	69.12	27.94	2.94	0.00
	Happy Camp	34.00	36.00	8.00	22.00
Convenience Store	Orleans	4.17	29.17	20.83	45.83
	Yreka	7.41	24.07	61.11	7.41
	Happy Camp	2.22	20.00	64.44	13.33
Farmer's Market	Orleans	8.70	47.83	17.39	26.09
	Yreka	25.40	47.62	26.98	0.00
	Happy Camp	19.57	26.09	17.39	36.96
Fast food or restaurant	Orleans	0.00	4.35	13.04	82.61
	Yreka	4.92	22.95	70.49	1.64
	Happy Camp	4.35	2.17	36.96	56.52
SNAP	Orleans	9.09	9.09	45.45	36.36
	Yreka	25.00	17.31	48.08	9.62
	Happy Camp	29.55	4.55	52.27	13.64
Neighbors, family, friends	Orleans	50.00	27.27	18.18	4.55
	Yreka	26.79	25.00	44.64	3.57
	Happy Camp	10.87	45.65	36.96	6.52
Trade or barter	Orleans	33.33	33.33	19.05	14.29
	Yreka	14.55	14.55	54.55	16.36
	Happy Camp	4.26	34.04	55.32	6.38
Fishing or eeling	Orleans	65.22	17.39	13.04	4.35
	Yreka	29.09	21.82	34.55	14.55
	Happy Camp	24.44	31.11	40.00	4.44
Gathering	Orleans	59.09	13.64	18.18	9.09
	Yreka	14.55	30.91	40.00	14.55
	Happy Camp	13.95	37.21	44.19	4.65
School or community garden	Orleans	34.78	39.13	17.39	8.70
	Yreka	14.55	12.73	54.55	18.18
	Happy Camp	21.74	10.87	58.70	8.70
Home garden or orchard	Orleans	62.50	20.83	4.17	12.50
	Yreka	31.03	31.03	27.59	10.34
	Happy Camp	40.43	44.68	8.51	6.38

Which sources of food would you like more of?

Respondents were asked to choose all the sources of food they would like more of in their community and then rank the top five sources they desire more of the most for their community. Collectively, they ranked local grocery store as the first source they would like more of in their community, followed by fishing and eeling (2nd and 3rd selection) and a tribal farm (4th and 5th selection). Respondents in Orleans, Happy Camp, and Yreka ordered their preferences very similarly. However, farmers market was prioritized as second and gathering and fishing and eeling were tied for third.

Grocery Shopping Behavior

Key trends:

- *Over half of respondents in each region, except Orleans, went to the grocery store one to three times a week. Households in Orleans more commonly visited the grocery once or twice a month.*
- *Collectively, 59.09% of respondents said fresh fruits were too expensive, 53.15% said fresh vegetables were too expensive, 61.54% said red meat was too expensive, 41.26% said poultry was too expensive, 55.59% said fish was too expensive, and 57.34% said organic foods were too expensive at the grocery store closest to their home.*
- *40.58% of respondents said buying local was very important.*

How often do you get to the grocery store?

Respondents were asked how often someone in their household went grocery shopping. Frequency of grocery shopping was significantly different by household location. Over half of households in each region, except Orleans, went to the grocery store one to three times a week. Households in Orleans more commonly visited the grocery once or twice a month (Figure 8).

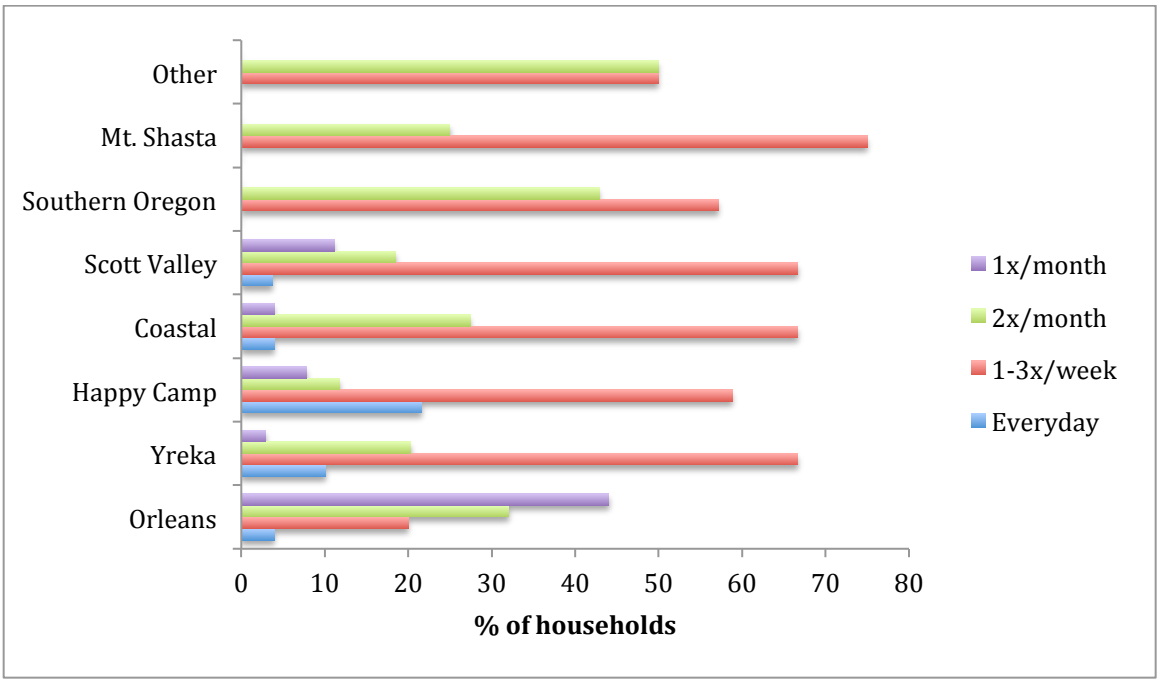

Figure 8. The frequency of grocery shopping by households in each defined location.

How long does it take to travel one-way to the grocery store?

Respondents were asked to select how long a one-way drive to the grocery store took from their household. The time differed significantly among regions. Figure 9 shows that households in Orleans experienced the greatest time commitment to travel to the grocery store followed by households in the "other" region. Household response in Happy Camp was stratified between traveling 20 minutes or less, and traveling more than one hour to the grocery store (Figure 9). Overall, 93.59% reported that they had access to a vehicle in their household.

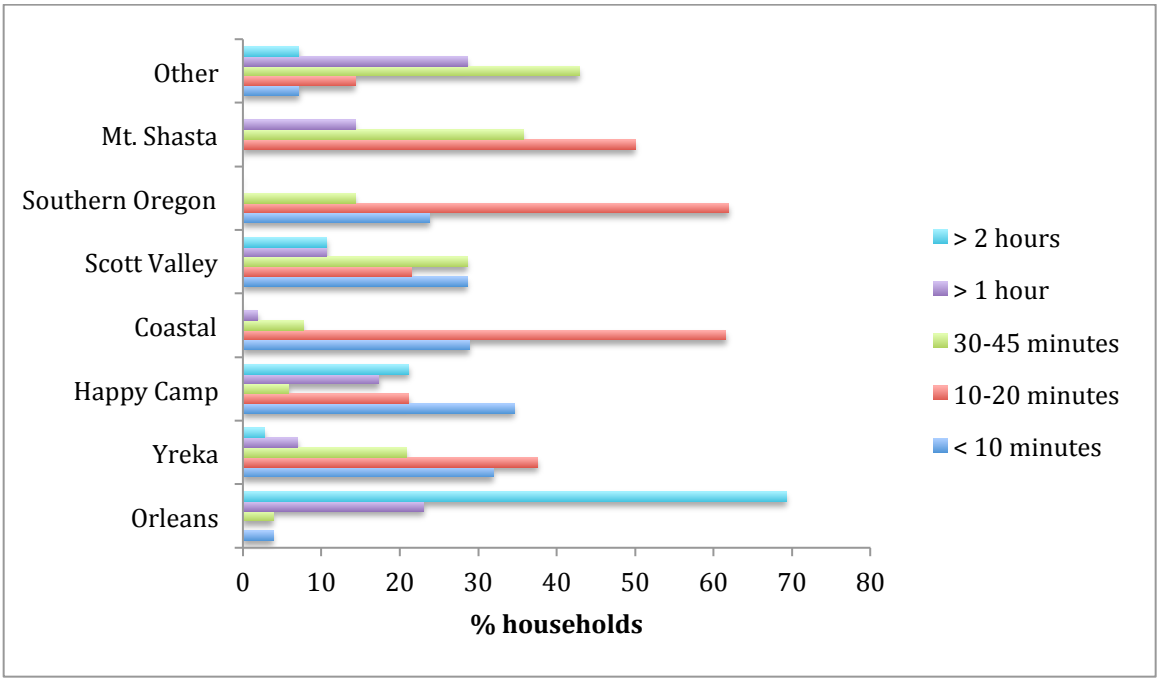

Figure 9. The time it took households, in each location, to travel one-way to the grocery store.

What are the biggest barriers you face getting to the grocery store?

Respondents were asked to select the greatest barrier their household faced when traveling to the grocery store. Among household locations, barriers differed significantly. About 70% in Mt. Shasta, Southern Oregon, and Coastal regions experienced no barriers when traveling to the grocery store (Figure 10). Distance was a prominent challenge to those in Orleans. Interestingly, the choice of "other barriers" was chose by over 40% of respondents in Orleans and Happy Camp (Figure 10). The most common other reasons listed were lack of money for food, inability to afford food locally, poor health, and/or dissatisfaction with products sold at stores.

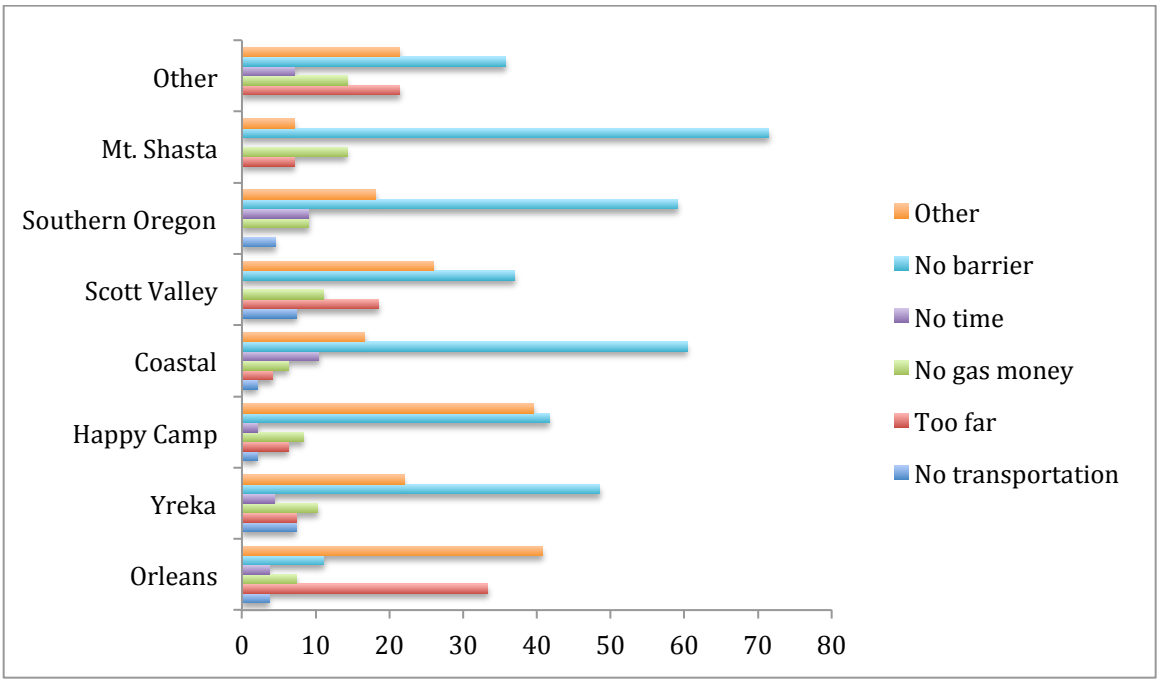

Figure 10. By location, barriers households had when traveling to the grocery store.

Opinion of the foods at the stores closest to you

Survey respondents were asked to qualify different food groups sold at the store closest to their home: whether each food group was affordable, of good quality, of good selection, too expensive, of poor quality, or of poor selection. They could also respond that they did not know or did not buy the food. There were many differences in opinion based on location, rendering a meaningful graphic representation problematic. Generally, among households in the Karuk Tribe service area, Orleans and Happy Camp households associated the most negative attributes with each food group. Notable aggregate responses included challenges with foods being too expensive. For example, 59.09% of respondents said fresh fruits were too expensive, 53.15% said fresh vegetables were too expensive, 61.54% said red meat was too expensive, 41.26% said poultry was too expensive, 55.59% said fish was too expensive, and 57.34% said organic foods were too expensive.

When asked how important it was to buy local foods, 40.58% of all households reported that it was very important, 33.33% moderately important, 15.58% somewhat important, and 10.51% not at all. By location, there was no significant difference in ranking.

Cooking

Key trends:

- *Over half of households faced no barriers to cooking, but 16.37% cited expense as a barrier.*

- *Isolation, physical disability, old age, and living alone were cited as "other" barriers to cooking by some households.*
- *In Orleans 46.43% of households identified lack of access to ingredients as a barrier to cooking.*

Respondents were asked if their households faced any barriers to cooking meals at home. Collectively, 52.31% faced no barriers to cooking meals. Of those who did face barriers, 11.83% had no time to cook, 5.34% did not know how to cook, 7.47% did not like to cook, 4.98% said their family would not eat what they cooked, 16.37% said it was too expensive to cook, 7.12% said they lacked essential kitchen equipment, 6.41% said they did not have kitchen space, 7.12% said they lacked water, 10.68% said they lacked ingredients to cook, and 16.08% said they experienced other barriers. Other barriers listed were physical disability or old age, expense of food or propane, and living alone. Access to ingredients needed for cooking significantly differed by household location, with ingredients being a barrier to 46.43% of households in Orleans.

Food Security

Key trends:

- *45% of households are experiencing very low food security with households in Happy Camp and Yreka having the most households with low or very low food security.*
- *Collectively, 35.87% of surveyed households worried about running out of food or ran out of food in the past year.*
- 5.42*% of respondents ran out of money for groceries at least once a week*, 22.02% *at least once a month,* and 15.52% *a few times a year*.
- *When facing food insecurity, households in Orleans were more reliant on home garden and home canned foods, as well as Native foods than those in Yreka and Happy Camp.*
- *More adults and children in Happy Camp skipped meals than households in Orleans and Yreka.*

In this section, survey respondents were asked three groups of questions about their households: 1) if they worried about running out of food or ran out of food in the last year; 2) if they ran out of money to buy food, how often they did, and; 3) what kinds of strategies they used to cope with not having enough money to buy food. Collectively, 35.87% of surveyed households worried about running out of food or ran out of food in the past year. When asked how often they ran out of grocery money, 23.47% said *never*, 33.57% said *rarely*, 5.42*% at least once a week*, 22.02% *at least once a month,* and 15.52% *a few times a year*. Figure 11 shows different strategies households in Happy Camp, Yreka, and Orleans used to deal with not having enough money to buy food. When facing food insecurity, households in Orleans were more reliant than those in Yreka and Happy Camp on home garden and home-canned foods, as well as Native foods. More adults and children in Happy Camp households skipped meals than those in Orleans and Yreka. On a fairly even scale, households in all three locations reduced the size of meals and bought less expensive foods.

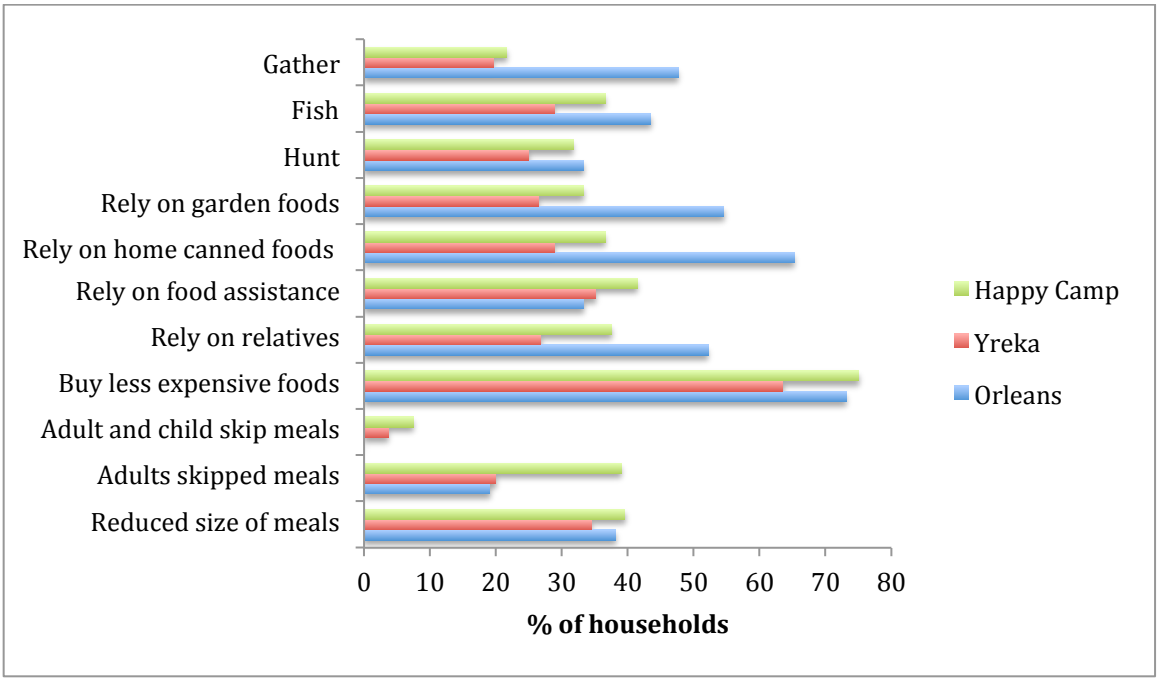

Figure 11. The proportion of households in Orleans, Yreka, and Happy Camp that used each listed strategy to deal with not having enough money to buy food.

In our assessment, we used conventional definitions and categorizations developed by the USDA to measure food security, examining household food intake, access to healthy foods, and food insecurity coping strategies reported above. Food security categories used in this study were adapted from the USDA Economic Research Service definition of food security[3] and are characterized as follows. Households with *high food security* report no indications of food access problems or limitations and are considered food secure. Households with *marginal food security* report some level of change in food sufficiency such as not always having access to healthy foods, sometimes running out of money for groceries, using food assistance and/or buying less expensive food. *Low food security* households are those that report greater reduction in quality but do not yet utilize extreme coping strategies found among very low food secure households. Low food security households may report that they rarely have access to healthy foods, run out of money for groceries several times a year, depend on food assistance and/or buy less expensive foods. Households with *very low food security* face severe challenges, reporting never having access to healthy foods, often running out of money for food, and reducing food intake (Table 2). Given the vulnerability of many Native American households, to be included in marginal, low, or very low food security categories, households must meet at least one of the criteria listed for that category and no unique criteria for a more severe category (see

[3] "[A]ccess by all people at all times to enough food for an active, healthy life" (Coleman-Jensen et al. 2017). Includes at a minimum: a) "the ready availability of nutritionally adequate and safe foods," and b) "the assured ability to acquire acceptable foods in socially acceptable ways" (e.g. "without resorting to emergency food supplies, scavenging, stealing, and other coping strategies") (USDA 2017b).

Table 2). For example, a household in the marginal category may usually have access to healthy foods, buy less expensive foods, but not use food assistance in the last 12 months. High food security households must meet all criteria for that category (Table 2). In categorizing households, we found that most food insecure households have more than one attribute of food insecurity with the average frequency of food insecurity attributes increasing with severity of food insecurity. We also found that very low food security households experienced not only more indicators but more severe indicators of food insecurity, as one might expect.

Table 2. Characteristics of food security categories used in this study. Households in the high food security category are characterized by no indication of food insecurity and thus must meet all the criteria in the "high food security" row of the table. Households in subsequent categories must meet at least one criteria in a given category and no unique criteria for a more severe category (underlined).

	Access to healthy foods	**Ran out of money for groceries**	**Coping strategies**	**Ran out or worried about running out of food**	**Used food assistance[a]**	**Qualified for food assistance but did not use**
High food security	Always	Never	None	No	No	No
Marginal food security	Usually	Rarely	Buy less expensive foods	Yes	Yes	No
Low food security	Rarely	A few times a year	Buy less expensive foods	Yes	Yes	No
Very low food security	Never	At least once a month or once a week	Buy less expensive foods Reduce size of meals Adults and children skip meals	Yes	Yes	Yes

[a]Excluding free school lunches and senior meals

Using this method to assess food security in Karuk households we found that 45.42% of households are experiencing very low food security, 12.32% low food security, 31.69% marginal food security, and 10.56% high food security (Figure 12).

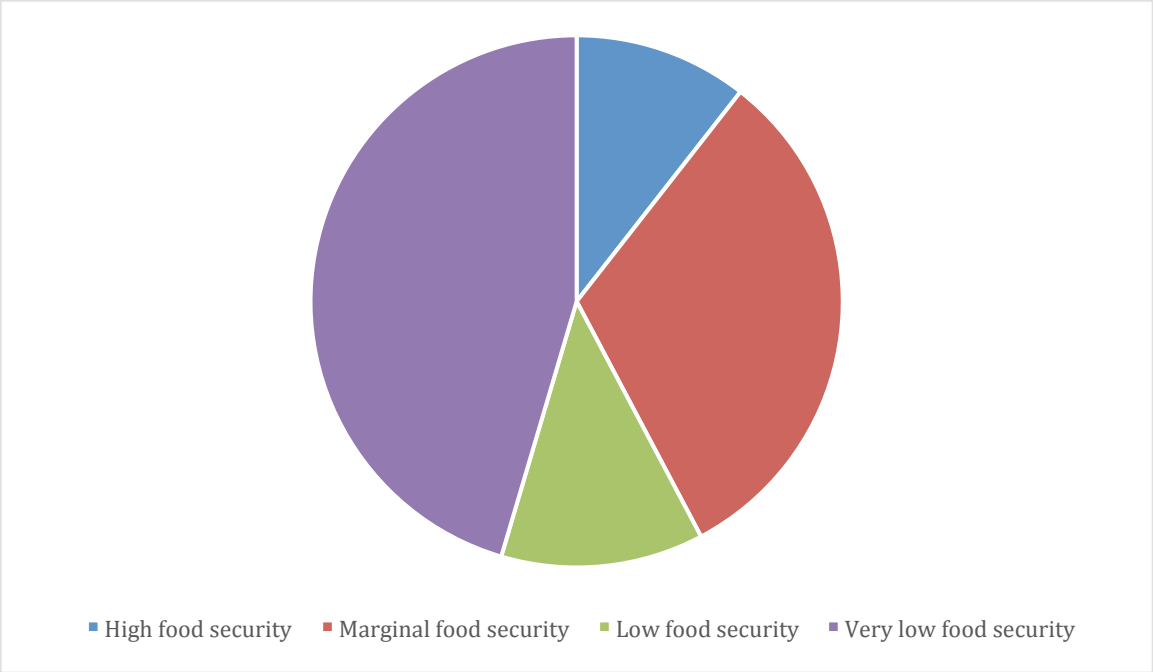

Figure 12. The proportion of Karuk households that are experiencing high, marginal, low, and very low food security.

The Happy Camp region had the greatest proportion of households experiencing very low or low food security (64.15%), followed by Yreka with 62.86% of households,Scott Valley 62.06%, Coastal 60.37%, Orleans 57.14%, Southern Oregon 45.46%, other 40%, and Mount Shasta 28.57% (Figure 13).

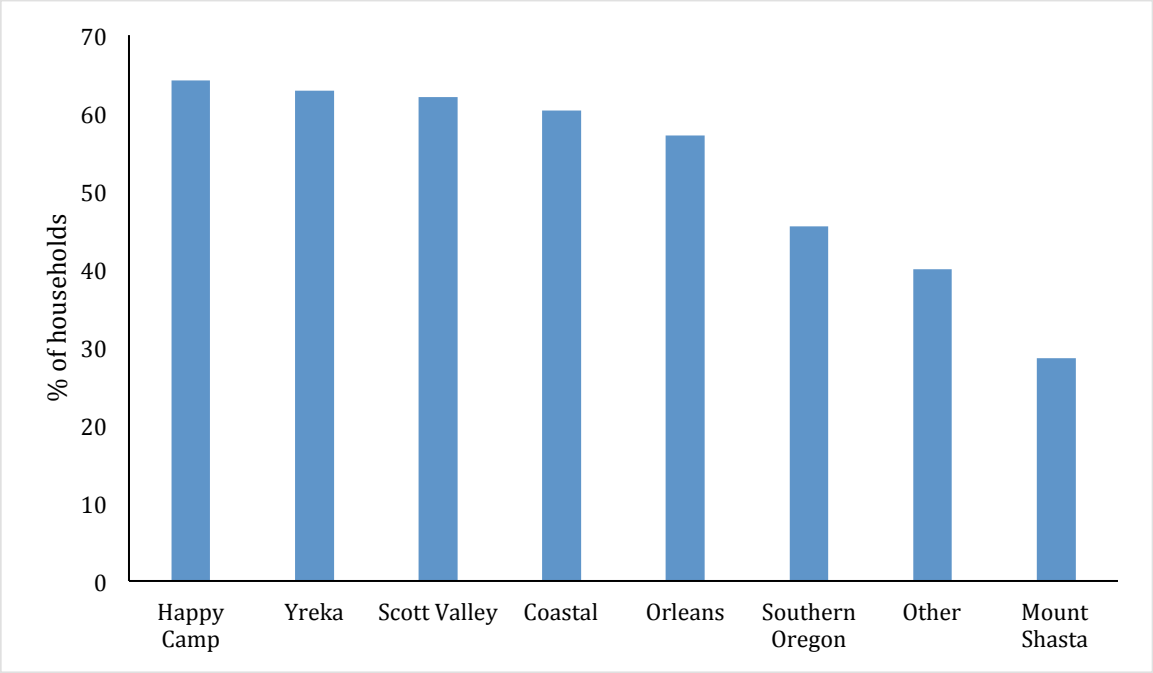

Figure 13. The proportion of Karuk households in each service area experiencing low or very low food security.

Native foods security

Additionally, we developed a novel indicator of food security, access to desired Native foods or *Native foods security,* to explore the contributions of Native foods to overall food security for Native American communities[4]. Through our analysis, we found that Native foods security is indeed an important indicator of overall food security for Native American households and should therefore be included in standardized food security assessments in Native American communities. Recognizing that *access* to Native foods is insufficient, we offer a definition of *Native foods security* that includes both access to all desired Native foods *and* the continuity of cultural, knowledge and stewardship practices that sustain them. *Native foods security is having physical, economic, social and legal access to all desired Native foods in the appropriate quality and quantity throughout the year, and the continuity of the cultural institutions that sustain them including traditional ecological knowledge, social support networks, and cultural resource stewardship* (Sowerwine and Mucioki et al. 2019). This definition is not intended to substitute for the USDA definition of food security but to enhance it; we intend it to serve as a supplement or addendum to the current definition of food security specifically for Native American communities. In other words, we argue that Native *foods* security contributes to *Native* food security.

Food Assistance Programs

Key trends:

- *53.99% of households used some form of food assistance.*
- *Orleans was the area with the highest rate of food assistance use (predominately summer lunch and senior meals) and Mount Shasta was the lowest.*
- *16.25% of respondents said they used food assistance because Native foods were not available.*

Survey recipients were asked if their households used food assistance programs. If the respondent replied with a "yes," they were asked which programs their household used in the past year, the reasons their household used food assistance, and foods they would like more of in food assistance programs. In the past year, 53.99% of households used some form of food assistance, while the participation rate varied by household location (Figure 14). Orleans households had the highest rate of food assistance use and Mount Shasta had the lowest (Figure 14). Collectively, 12.25% used WIC, 23.69% used free school lunch, 18.43% used food pantries, 3.66% used soup kitchens, and less than 1% used meals-on-wheels. Figure 15 shows the use of SNAP, tribal commodity food program, summer school lunch, and senior meals for each region by location. Senior meals and free lunch were the programs most used in Orleans while tribal commodity foods and SNAP were less used in

[4] By using the term "Native *foods* security," we draw attention to the state of having secure access to Native foods at all times in the desired quality and quantity, as distinguished from the state of Native American people being food secure more generally, which might be referred to as "Native *food* security."

Orleans; however, this may be due to program accessibility (Figure 15). In Happy Camp the most utilized programs were reported to be SNAP and tribal commodity foods, while in Yreka these were SNAP and summer lunch (Figure 15).

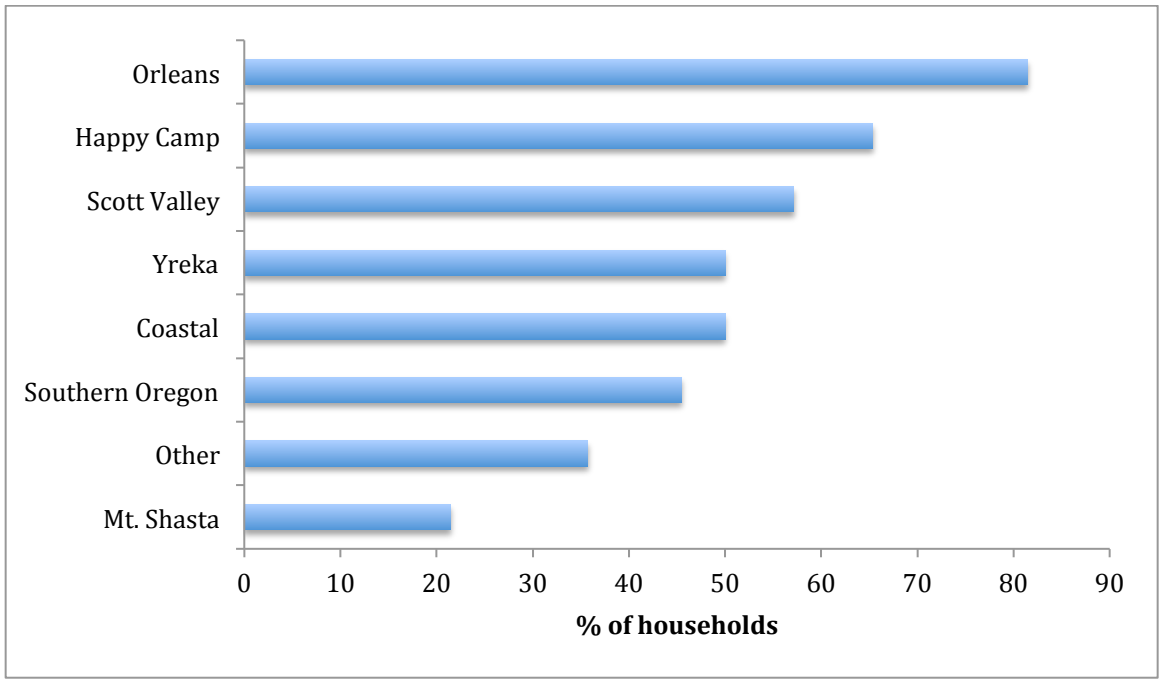

Figure 14. The use of food assistance programs by location.

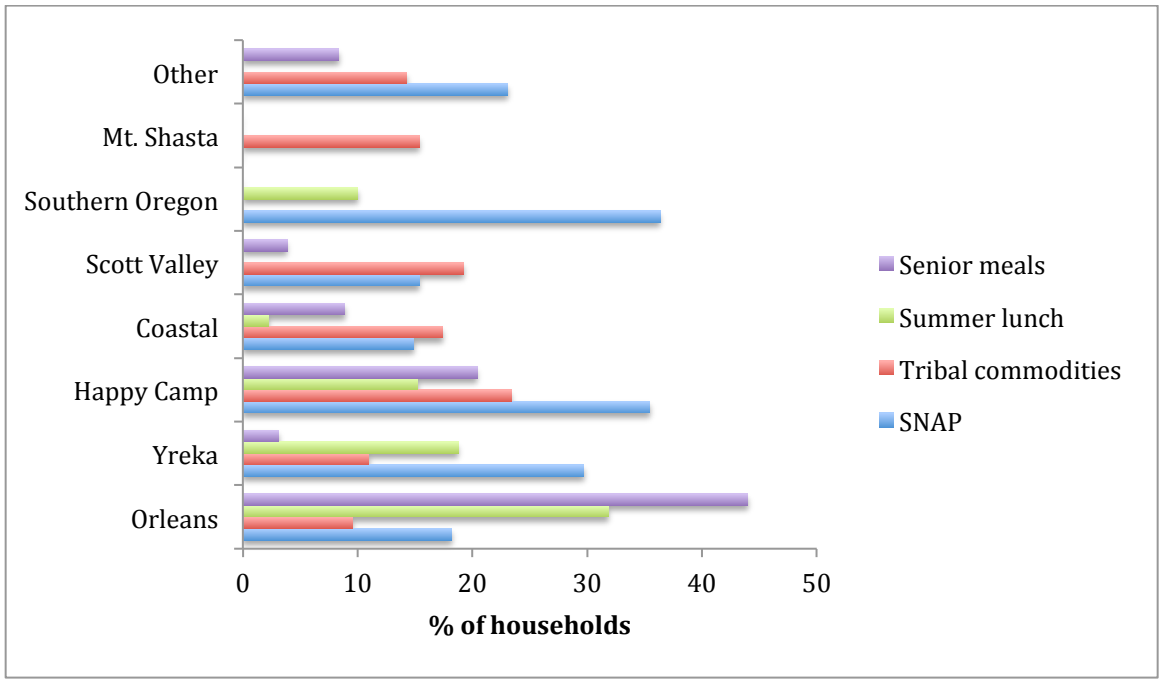

Figure 15. The use of specific food assistance programs by household location. The food assistance programs included varied significantly by location.

Respondents were then asked to share the reasons their household used food assistance. Collectively, respondents identified the following reasons: 17.33% had unusual expenses for the month, 8.66% used a different type of food assistance because they ran out of SNAP for the month, 3.97% had experienced a recent job loss, 7.22% experienced continuous unemployment, 2.17% were separated from their spouse, 0% had money or food stamps stolen, 16.25% said Native foods were not available, 11.91% said gardens were not available, and 21.82% said "other." Other reasons given were companionship for seniors at senior meals, availability of a given program for kids, having low income or stretching their budget, and stress related to other expenses. Happy Camp and Orleans experienced a higher proportion of other reasons for the use of food assistance than all other locations. Respondents in Happy Camp and Southern Oregon used other types of food assistance because their SNAP ran out more than other locations. Orleans, Happy Camp, and Scott Valley regions experienced continuous unemployment more than other locations.

Respondents were asked what type of foods they would like to see more of (or for the first time) in food assistance programs. Responses did not differ significantly by location. Collectively, 67.04% and 64.55% of respondents desired more fresh fruits and fresh vegetables. Exactly 44.03% wanted more red meat, 43.66% more poultry and 36.94% wanted more fish. Out of the Native food options: 47.01% desired more salmon, fish, or other seafood, 50.37% desired more deer and elk, 25.47% desired more acorns (however, in Orleans over half of respondents wanted more), 40.30% wanted more berries and nuts, and 33.21% wanted more mushrooms. Asked which foods they desired the most in food assistance programs, respondents prioritized fresh fruits, fresh vegetables, red meat, poultry, and dairy products.

Homegrown and home raised foods

Key trends:

- *Collectively, 43.86% of survey respondents grew or raised their own food at home.*
- *51.48% of respondents wanted to learn more about growing or raising their own food. Respondents were most interested in learning more about how to deal with pests and weeds (73.79%), preparation of soil and fertilizer (63.89%), crop planning and crop selection (59.31%), irrigation best practices (53.79%), greenhouse gardening (52.41%), and pruning (46.90%).*
- *13.83% of households participated in a community or school garden with Orleans and Happy Camp reporting the highest rates of participation.*
- *When asked if given the opportunity they would like to participate in a community or school garden, 47.37% of respondents said yes, with the greatest interest in Happy Camp.*

Collectively, 43.86% of survey respondents grew or raised their own food at home. Figure 16 shows what households did with the foods they grew and raised at home. Sharing with others, preserving the harvest, and family consumption were the most common

applications of homegrown or home raised food (Figure 16). Precisely 28.90% of respondents said they would like to start producing their own food or expand their current production, while 39.16% would like to do the same but experience challenges that prohibit them. The most common challenges listed by respondents were lack of space, lack of water or water restrictions, too expensive, restrictions set by tribal housing, pests, and physical disabilities. Households in Scott Valley, Orleans, and Southern Oregon were experiencing the most challenges related to growing their own food. Additionally, 51.48% of respondents wanted to learn more about growing or raising their own food. Respondents were most interested in learning more about how to deal with pests and weeds (73.79%), preparation of soil and fertilizer (63.89%), crop planning and crop selection (59.31%), irrigation best practices (53.79%), greenhouse gardening (52.41%), and pruning (46.90%). Furthermore, 13.83% of households participated in a community or school garden, with Orleans (33.33%) and Happy Camp (17.31%) reporting the highest rates of participation. When asked if given the opportunity they would like to participate, 47.37% of respondents said yes with the greatest interest in Happy Camp.

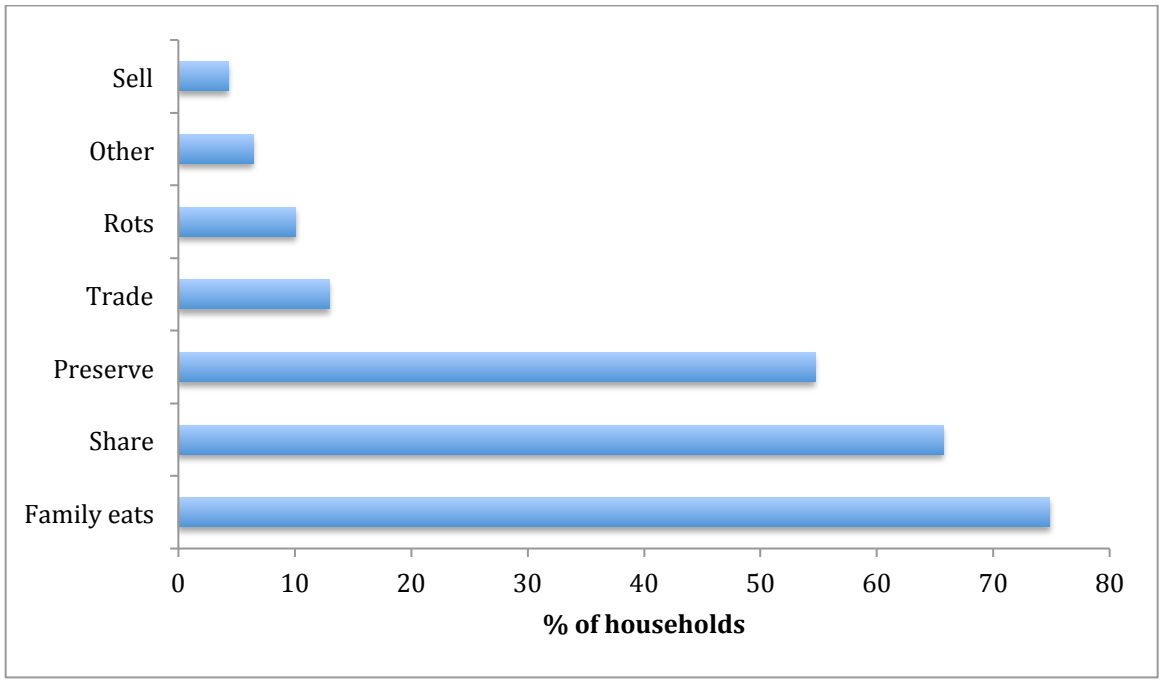

Figure 16. Household use of homegrown or home raised foods.

Native foods

Key trends:

- *Collectively, 80.92% of respondents ate Native foods at least once a year. However, this proportion varied significantly by location, ranging from 92.86% in Orleans to 68.18% in Southern Oregon.*

- *In general, households in Orleans consumed a more diverse range of Native food, more often than all other locations in the past year.*
- *Respondents prioritized other fish, salmon, berries, and mushrooms as the Native foods they wanted more of the most.*
- *The strongest barriers to respondents accessing Native foods were rules, limited availability, and degradation of the area where Native foods used to be found.*
- *Ranked most often as weaker barriers or not a barrier at all were the following: lacking space and needed equipment; lacking knowledge about preparation; not being familiar with Native foods; and time.*
- *Respondents listed the following as the things they thought would most help them consume more Native foods*: *removal of legal barriers related to hunting, fishing, and gathering (first choice), followed by classes on gathering, preparing, and preserving, classes on hunting, butchering, and canning, and classes on fishing, smoking, and canning.*
- *Most learn about Native foods from their family (91.88%) but 42.77% indicated they are self-taught, and 27.67% reported learning from an unrelated person.*

Collectively, 80.92% of respondents ate Native foods at least once a year. However, this proportion varied significantly by location, ranging from 92.86% in Orleans to 68.18% in Southern Oregon (Figure 17). Collectively, 80.32% of households received Native foods from other family members, 74.72% of households received Native foods from friends, 30.15% purchased Native foods, 39.46% traded Native foods, 64.47% acquired through hunting, 70.41% through fishing, 61.29% through gathering, 43.79% at tribal gatherings, and 9.84% through tribal food distribution. Native foods sourced through family, friends, trading with others, gathering on one's own, and tribal gatherings did significantly vary by location with the differences represented in Figure 18.

Next, respondents were asked what they did with Native foods they acquired. Collectively, 79.48% of respondents said their family ate the food, 60.53% said they preserved it, 50.00% said they shared it, 0.00% said they sold it, 8.33% said they traded it, 8.77% said they provided it for a tribal event, 4.82% said it went bad before consumption, and 1.33% said they did something other than what was listed. Sharing Native foods and trading Native foods significantly varied by household location. Trading was practiced most commonly in Orleans and sharing was practiced the most in other towns, Mount Shasta, Happy Camp, and Orleans (Figure 19).

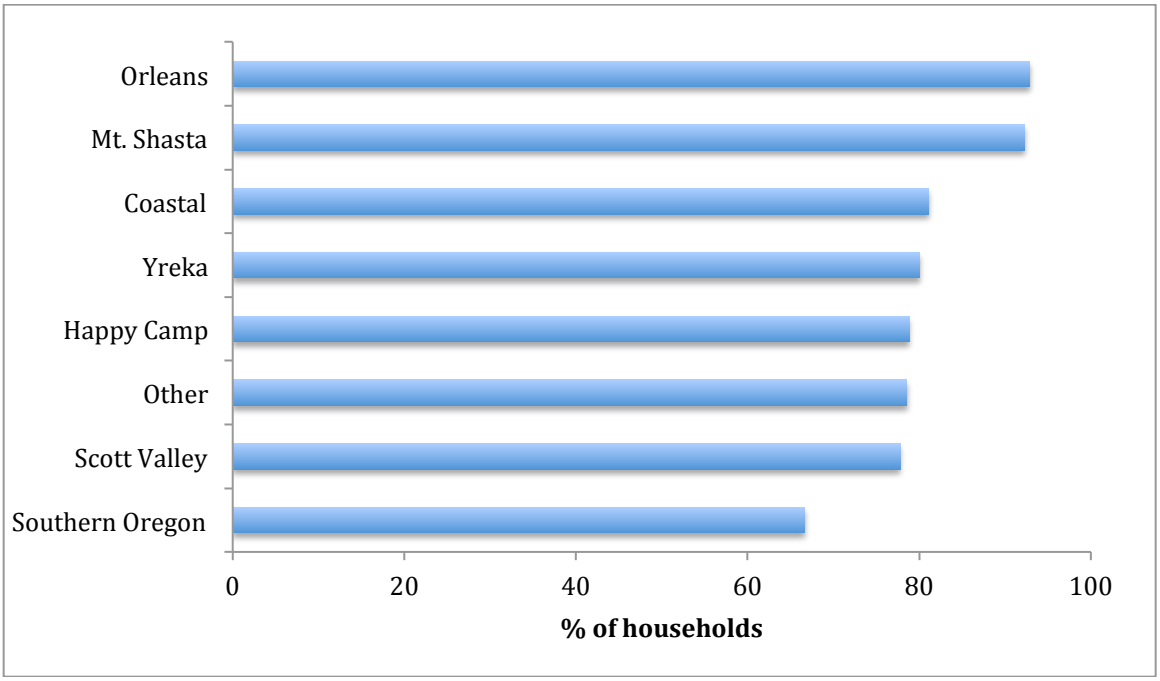

Figure 17. The proportion of households, by location, that consumed Native foods at least once a year.

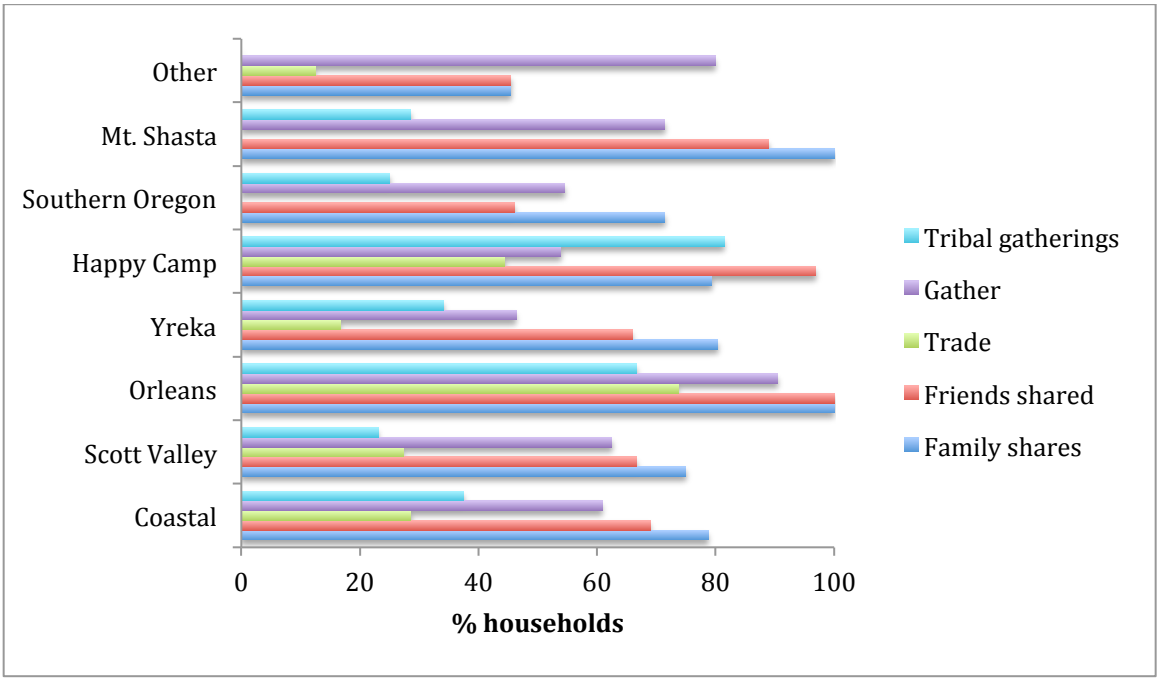

Figure 18. Sources of Native foods that varied significantly by location.

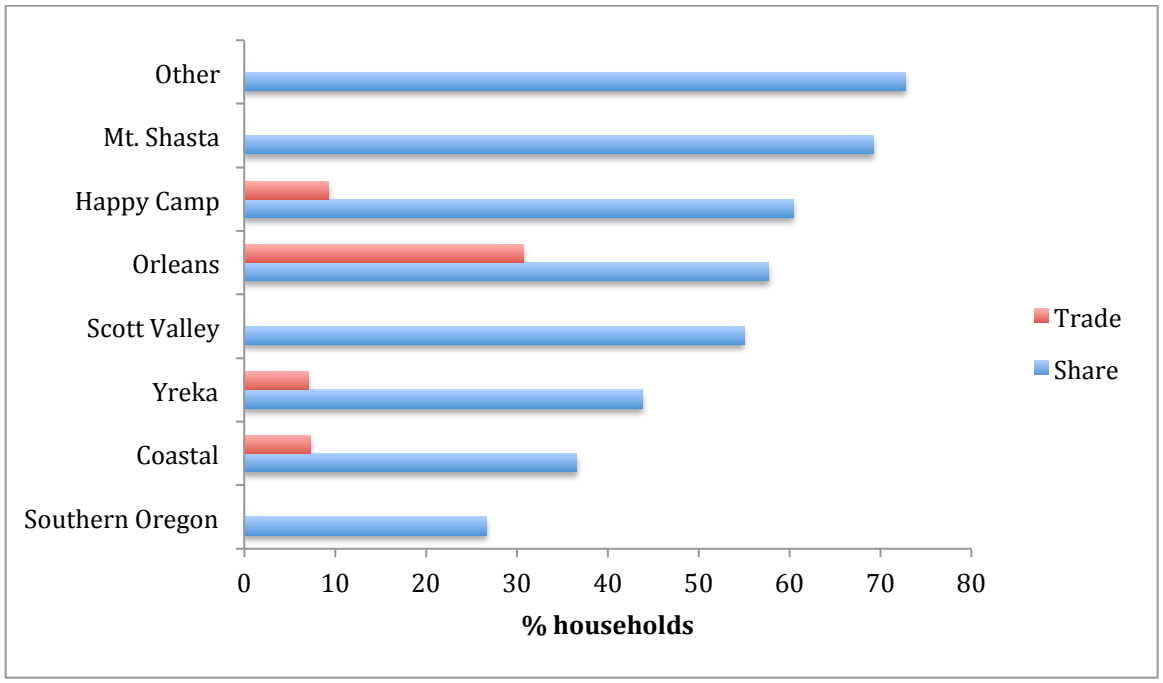

Figure 19. Households that shared and traded Native foods in each location.

Household consumption of Native foods

Households that consumed Native foods at least once a year were asked to select the specific Native foods that they consumed. Figure 20 shows the proportion of households that consumed a given Native food at least once a year. The three most commonly consumed Native foods were salmon, deer, and berries, while teas, seeds, and roots were the three least commonly consumed (Figure 20). Consumption, for most of the Native foods listed, varied significantly by household location. Figure 21 illustrates consumption of Native foods that varied significantly by household location. Berries were consumed the least in Yreka with fairly even consumption across the other locations. Tea was consumed the most in Orleans and the least in Happy Camp. Elk was consumed the most in Orleans, Southern Oregon, and Mount Shasta. The consumption of eel was highest by far in Orleans, as was the consumption of acorns (Figure 21). For each Native food consumed at least once a year, respondents were asked to estimate how many days out of the year they consumed the food. The average number of days of consumption, by respondents in Happy Camp, Orleans, and Yreka, for each Native food is reported in Table 3. In general, households in Orleans consumed each listed Native food more frequently than households in Happy Camp and Yreka. For example, households in Orleans, on average, consumed eel 10 days out of the past year, ten times the rate of consumption in Yreka and two times the rate of consumption in Happy Camp. Consumption of deer was more even among the three locations, as well as the consumption of roots (Table 3). Lastly, each respondent was asked to rank the top five Native foods they would like more of in their household. Respondents prioritized deer (1st and 2nd selection) other fish, salmon, berries, and mushrooms as the Native foods that they wanted more of the most.

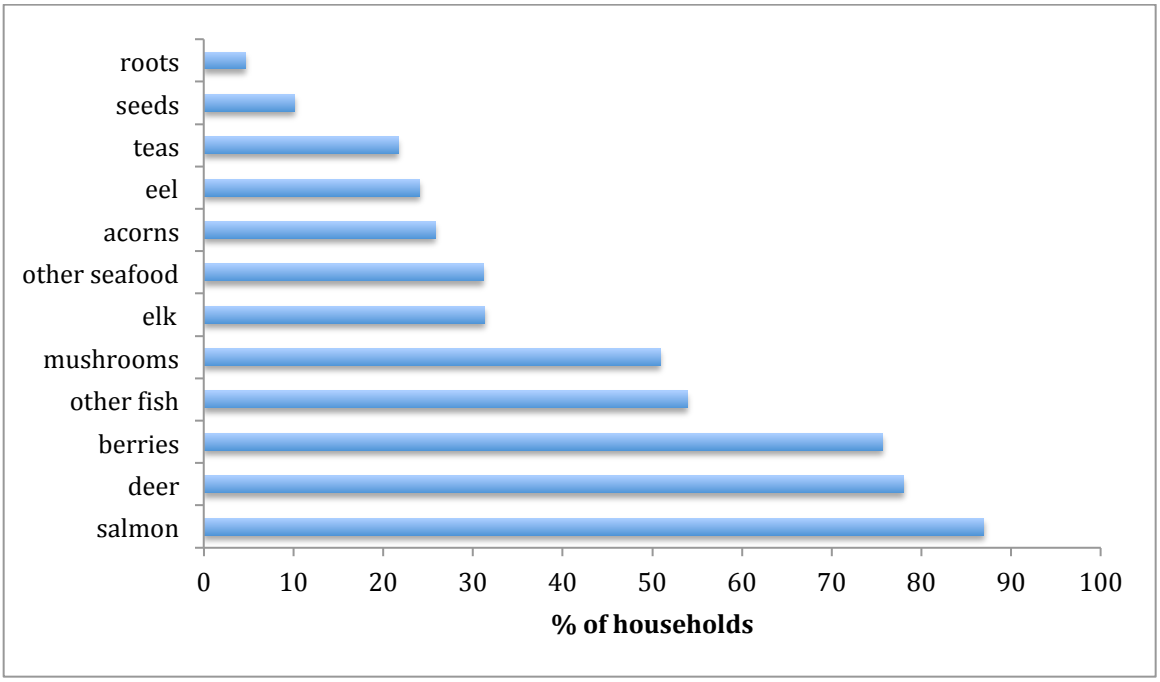

Figure 20. Households that consumed each Native food at least once a year.

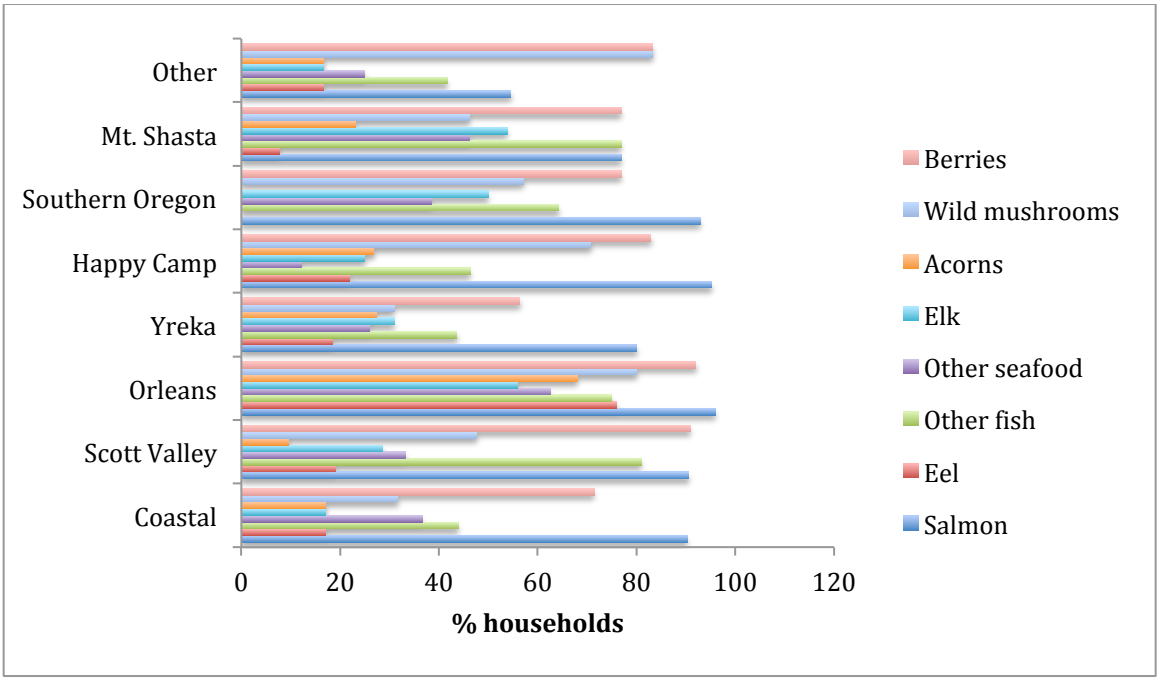

Figure 21. Households, by location, that consumed each Native food at least once a year. The consumption of Native foods listed varied significantly by household location.

Table 3. The average number of days respondents in Orleans, Yreka, and Happy Camp consumed a given Native food in the past year.

	Orleans	**Yreka**	**Happy Camp**
Salmon	39.05	9.20	15.39

Eel	10.06	1.05	5.27
Other fish	9.88	4.24	3.40
Other seafood	9.14	8.86	5.36
Deer	34.56	28.10	26.19
Elk	12.08	7.38	2.60
Acorns	13.38	1.10	3.78
Wild mushrooms	26.95	3.75	9.29
Roots	0.67	0.21	0.00
Berries	31.90	27.26	15.46
Tea	61.50	9.00	2.46
Seeds	30.00	3.20	1.09

Barriers to Native foods

Respondents identified barriers that made it challenging for their household to obtain all desired Native foods in the past year. They could rate each barrier as strong, medium, or weak or indicate if their household did not experience a given barrier. Figure 22 displays how respondents collectively rated each listed barrier. Rules related to hunting, gathering, and fishing were ranked as a strong barrier by the most respondents (56.11%). Lack of availability of Native foods was ranked as a strong and medium barrier by 60.91% of respondents. Heavy degradation to the area where Native foods used to be found and climate change were barriers (at some level) to about 68% of respondents. Not being familiar with Native foods, lacking space and essential equipment, lacking knowledge about preparation, and time were ranked most commonly as weak barriers or not barriers at all (Figure 22).

Table 4 shows how households only in the Karuk Tribe's service area ranked barriers to Native foods. Lack of knowledge was selected as a strong barrier by more households in Yreka (35.19%) than the other two locations. Lack of availability of a given Native food was a barrier to 85.71% of households in Orleans and poor quality was a barrier to about 50% of households across the three service areas. Rule and permits related to Native foods were a barrier to about 80% households in the three service areas and a strong barrier to over 50% of households in Happy Camp and Yreka and 35.00% of households in Orleans. Climate change was reported as a barrier by more households in Orleans (90.00%) than in Yreka and Happy Camp (54.17% and 61.90%). Transportation was challenging to about 50% of households across the three service areas and was the strongest barrier to households in Yreka. About 80% of households in all three service areas ranked not being familiar with Native foods as a weak barrier or not a barrier at all (Table 4).

Respondents were asked what would make it easier for their household to consume more Native foods, essentially minimizing some of the barriers identified in the previous question. Figure 23 depicts the things that would make it easier for households to consume more Native foods. Collectively, respondents most desired the removal of legal barriers; this was followed by classes on gathering and the integration of Native foods into tribal

food distribution programs (Figure 23). This same question garnered a range of responses by household location. The desire to improve management of Native foods was the strongest in Orleans (64.29%) and the weakest in Mount Shasta (23.08%). The desire to incorporate Native foods into tribal food distribution was the strongest in Scott Valley (58.62%) and in Orleans (57.14%) and the weakest in Mount Shasta (15.38%). The desire to incorporate Native foods into school lunches followed the same trend. Table 5 reports the solutions most desired by respondents in each of the three Karuk Tribe service areas. About 30% more respondents in Orleans desired improved management of Native foods than respondents in Yreka or Happy Camp. Classes on gathering, fishing, and hunting were most desired by respondents in Orleans and Happy Camp but there was also substantial interest in Yreka. The removal of legal barriers was desired by about 60% of respondents in all three locations (Table 5).

Respondents were then asked to rank the top four options that they would help them the most. The removal of legal barriers related to hunting, fishing, and gathering was the first choice, this was followed by classes on gathering, preparing, and preserving, classes on hunting, butchering, and canning, and classes on fishing, smoking, and canning.

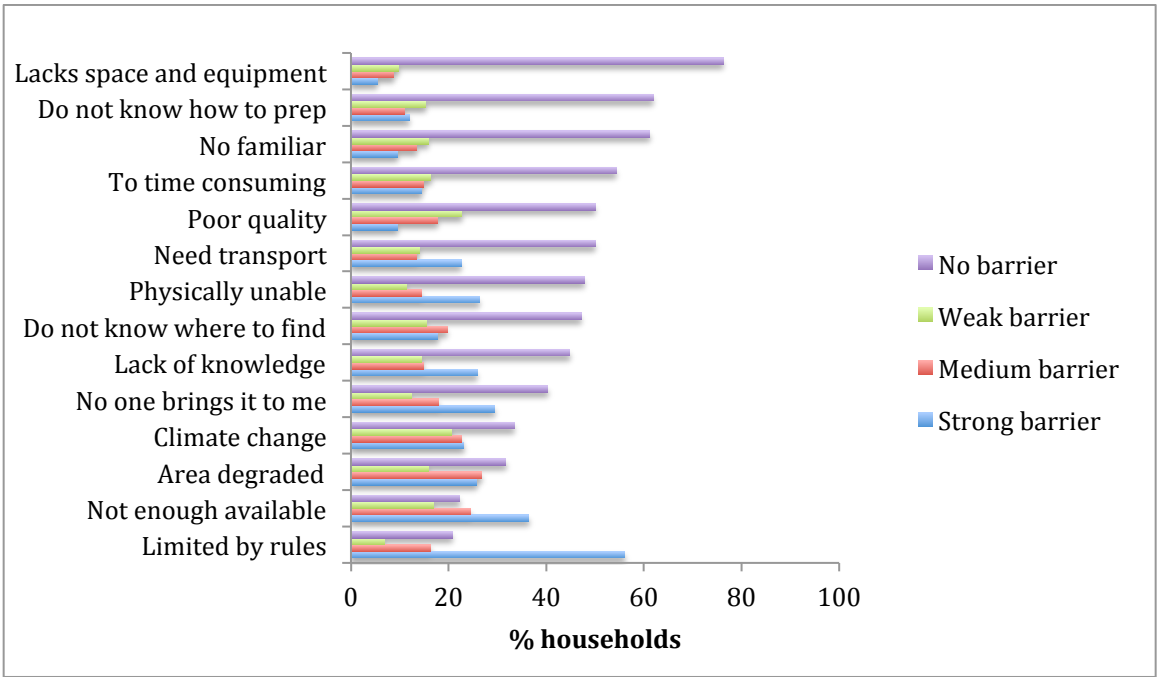

Figure 22. Barriers to Native foods.

Table 4. Barriers to Native foods in Orleans, Yreka, and Happy Camp.

		Orleans (%)	Yreka (%)	Happy Camp (%)
Lack of knowledge	Strong barrier	9.52	35.19	23.40
	Medium barrier	19.05	7.41	17.02
	Weak barrier	19.05	16.67	10.64
	No barrier	52.38	40.74	48.94
Not enough available	Strong barrier	33.33	40.38	30.32
	Medium barrier	23.81	11.54	18.60
	Weak barrier	28.57	9.62	20.93
	No barrier	14.29	38.46	30.23
Poor quality	Strong barrier	10.00	11.36	9.52
	Medium barrier	30.00	20.45	9.52
	Weak barrier	15.00	13.64	33.33
	No barrier	45.00	54.55	47.62
Environment heavily degraded	Strong barrier	27.27	17.39	17.05
	Medium barrier	27.27	30.43	22.50
	Weak barrier	13.64	10.87	22.50
	No barrier	31.82	41.30	37.50
No one brings to me	Strong barrier	15.00	23.08	25.58
	Medium barrier	25.00	21.15	30.23
	Weak barrier	15.00	9.62	11.63
	No barrier	45.00	45.15	32.56
Physically unable	Strong barrier	14.29	30.36	22.73
	Medium barrier	28.57	7.14	20.45
	Weak barrier	4.76	12.50	6.82
	No barrier	52.38	50.00	50.00
Rules and permits	Strong barrier	35.00	56.00	52.17
	Medium barrier	30.00	8.00	21.74
	Weak barrier	15.00	4.00	4.35
	No barrier	20.00	32.00	21.74
Climate change	Strong barrier	30.00	22.92	19.05
	Medium barrier	40.00	14.58	26.19
	Weak barrier	20.00	16.67	16.67
	No barrier	10.00	45.83	38.10
Do not know where to find	Strong barrier	10.00	14.29	17.39
	Medium barrier	25.00	22.45	13.04
	Weak barrier	15.00	10.20	19.57
	No barrier	50.00	53.06	50.00
Do not know how to	Strong barrier	10.00	16.00	9.30
	Medium barrier	5.00	10.00	9.30

prepare	Weak barrier	20.00	16.00	13.95
	No barrier	65.00	58.00	67.44
Too time consuming	Strong barrier	5.26	8.51	15.22
	Medium barrier	31.58	10.64	17.39
	Weak barrier	15.79	19.15	17.39
	No barrier	47.37	61.70	50.00
Lack transportation	Strong barrier	10.00	26.53	13.95
	Medium barrier	30.00	8.16	23.26
	Weak barrier	5.00	12.24	6.98
	No barrier	55.00	53.06	55.81
Not familiar with eating Native foods	Strong barrier	0.00	8.33	9.52
	Medium barrier	12.77	12.50	9.52
	Weak barrier	25.53	25.00	11.90
	No barrier	53.19	54.17	69.05
Lack space or equipment for processing	Strong barrier	10.00	6.52	6.82
	Medium barrier	20.00	2.17	6.82
	Weak barrier	5.00	4.35	15.91
	No barrier	65.00	86.96	70.45

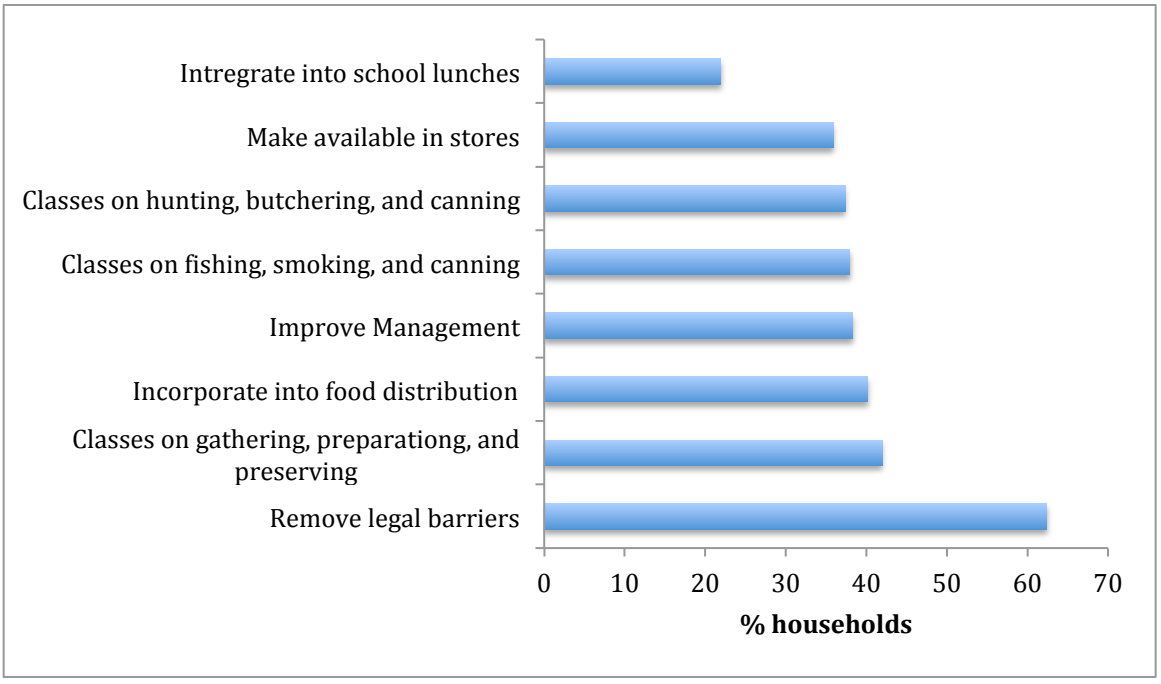

Figure 23. Changes or actions that respondents said would enable them to consume more Native foods.

Table 5. Changes or actions that respondents in Orleans, Yreka, or Happy Camp said would enable them to consume more Native foods.

	Orleans (%)	Yreka (%)	Happy Camp (%)
Improve management	64.29	35.82	32.00
Incorporate into tribal food distribution	57.14	37.31	36.00
Integrate into school lunch	46.43	11.94	26.00
Classes on gathering, preparing, preserving	46.43	37.31	42.00
Classes on hunting, butchering, canning	42.86	28.36	40.00
Classes on fishing, smoking, canning	39.29	29.85	36.00
Remove legal barriers	57.14	58.21	60.00
Make available in stores	28.57	29.85	42.86

Knowledge related to gathering, hunting, fishing, preparing, and managing Native foods

Over half of respondents (52.73%) had shared knowledge about gathering, fishing, hunting, preparing or managing Native foods or materials with other people. Rates of sharing knowledge varied significantly with household location (Figure 24). Respondents from Scott Valley, Orleans, and Mount Shasta most commonly shared knowledge related to Native foods with others, while respondents in Southern Oregon, the Coastal region, and Yreka shared knowledge with others the least (Figure 24). Figure 25 shows with whom or where respondents shared knowledge related to Native foods. Respondents most commonly shared knowledge with their children, other family members, and friends (Figure 25). Some notable locational differences include: The sharing of knowledge with nieces and nephews was greatest in other towns (70.00%) and the least on the Coast and Yreka (45.45%). Sharing of knowledge with other tribal members was the greatest in Orleans (63.16%) and the least in other towns (10.00%), while the sharing of knowledge with non-tribal members was the greatest in Southern Oregon (66.67%) and the least in Orleans (10.53%). Lastly, the sharing of knowledge at a ceremony was the greatest in Orleans (42.11%) and the least in Yreka (3.03%), Southern Oregon (0.00%), and Scott Valley (0.00%). Figure 26 shows where or from whom respondents acquired knowledge related to Native foods or materials. Most respondents learned from a family member

followed by being self-taught. The least popular modes of learning were non-tribal programs, school, and tribal programs (Figure 26).

Next, respondents were asked to rank the top four topics related to Native foods and materials that they most wanted to learn more about. Collectively, they prioritized learning where to gather, when to gather, how to preserve traditional foods, how to gather traditional foods, and how to prepare traditional medicines.

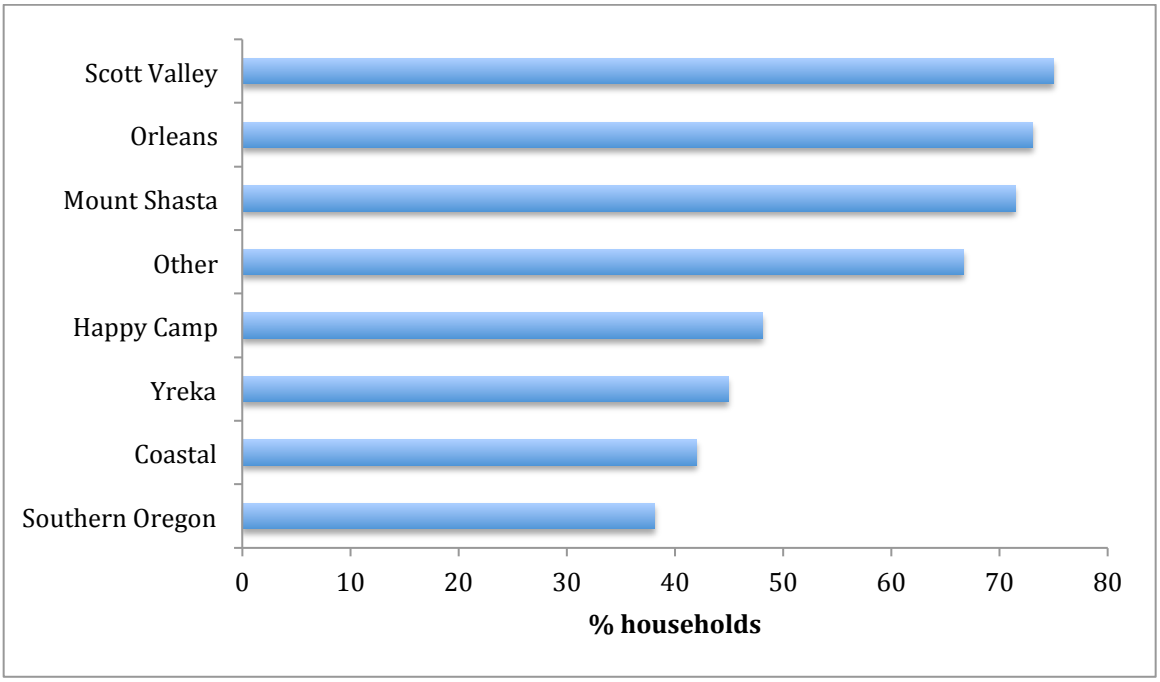

Figure 24. The proportion of respondents who shared knowledge with others about gathering, fishing, hunting, preparing, or managing Native foods or materials.

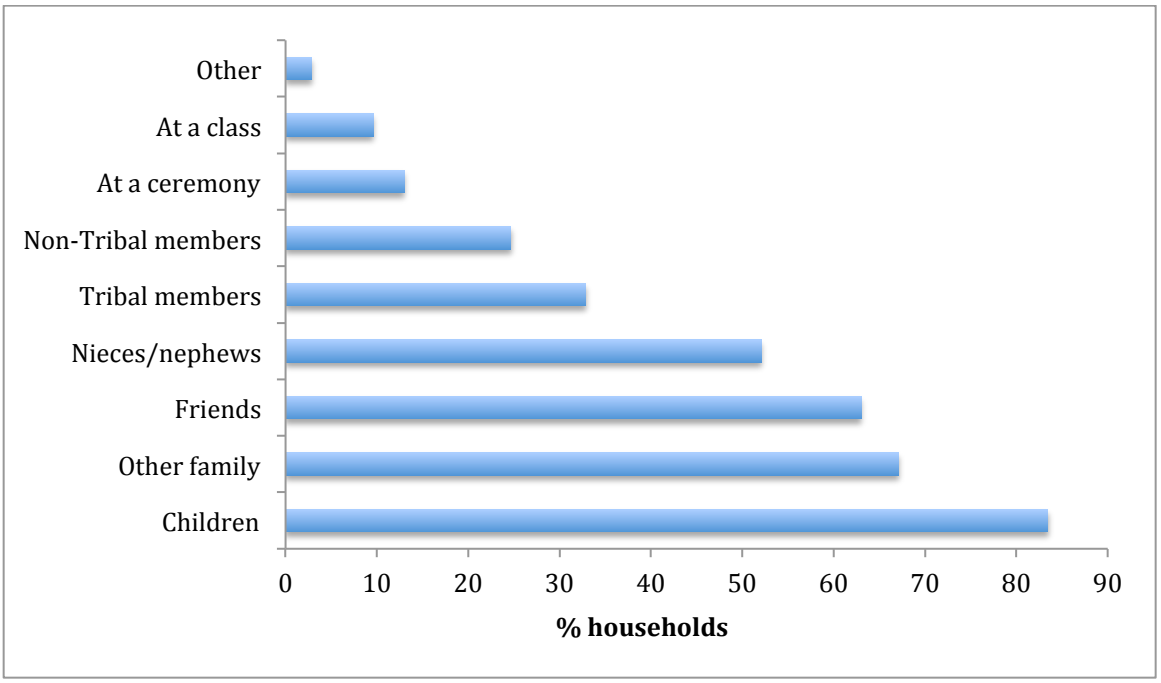

Figure 25. Where or with whom respondents shared knowledge about Native foods or materials.

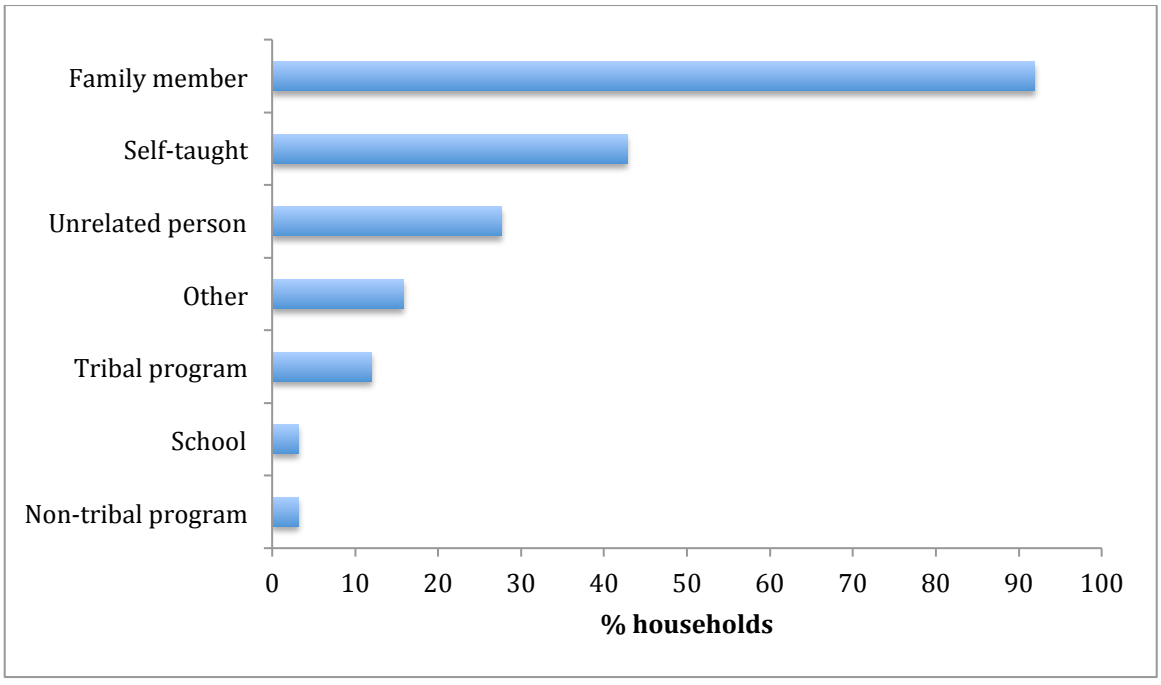

Figure 26. Where or from whom respondents acquired knowledge about Native foods or materials.

Community resources and food education

Key trends:

- *Respondents said they were most likely to use a farmers market, weekly vegetable box, or a smokehouse if they were available to the community.*
- *Respondents would most like to receive food-related information through their P.O. Box, email, local newspaper, or Facebook.*

Survey respondents were asked which community resources they would use if they were available in their community (Figure 27). A farmer's market, weekly vegetable box, and smokehouse were the resources that garnered the greatest interest. When asked how they would like to receive food-related information, respondents chose through their P.O. Box, email, local newspaper, or Facebook.

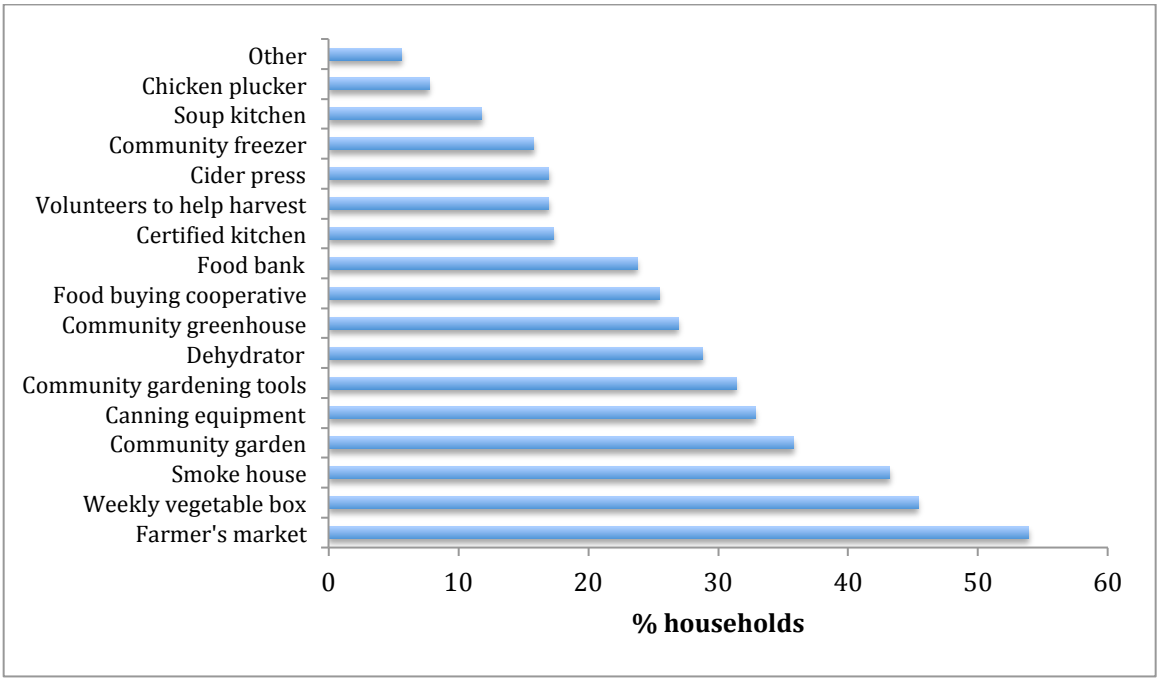

Figure 27. Respondent interest in utilizing different community resources.