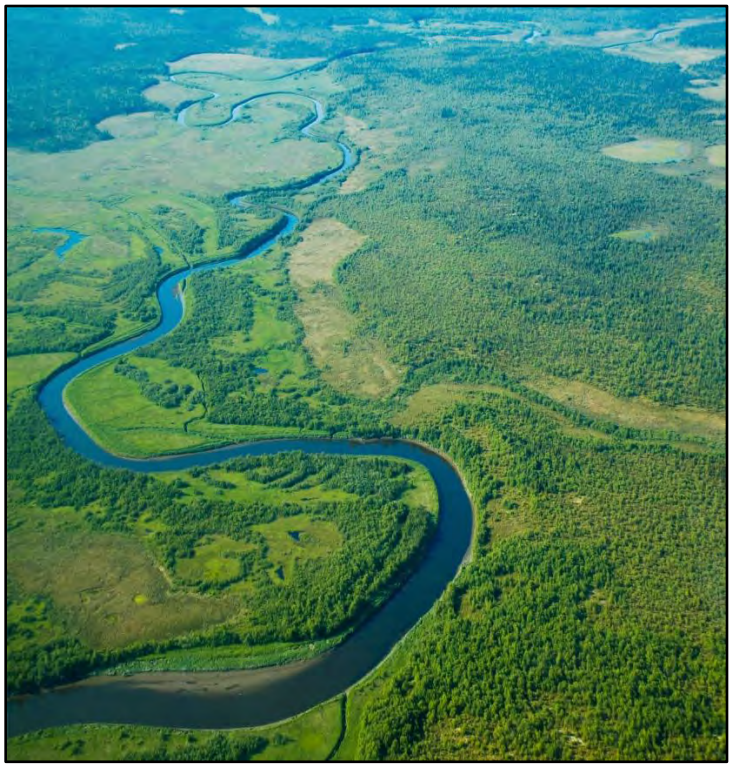
Bristol Bay Native Association

Home Heating, Steam Baths, Smoke Houses and Wood Harvest Practices: Current Conditions in Aleknagik and Dillingham

May 2013



PREPARED BY Bristol Bay Native Association
P.O. Box 310
Dillingham, Alaska 99576
907.842.5257
www.bbna.com

Acknowledgements

This project was made possible by a grant agreement between the U.S. Environmental Protection Agency and the Bristol Bay Native Association. It was completed with assistance from individuals representing various agencies, including the Alaska Native Tribal Health Consortium and Aleknagik Traditional Council.

A special thank you to the homeowners in Aleknagik and Dillingham who participated in this study.

Authors

Melody Nibeck, Energy Program Manager
Bristol Bay Native Association
P.O. Box 310
Dillingham, AK 99576

Susan Flensburg, Environmental Program Manager
Bristol Bay Native Association
P.O. Box 310
Dillingham, AK 99576

Christopher Strub, Forestry Program Manager
Bristol Bay Native Association
P.O. Box 310
Dillingham, AK 99576

Christopher Fish, REHS
Environmental Health Consultant
Alaska Native Tribal Health Consortium
Division of Environmental Health and Engineering
3900 Ambassador Drive, Suite 301
Anchorage, AK 99708

Table of Contents

Index of Figures

Index of Tables

Executive Summary

This study collected baseline information through interviews on residential heating systems and wood harvest practices in Aleknagik and Dillingham in southwest Alaska, as well as providing educational outreach to households that participated in the study. The survey questionnaire conducted with household occupants obtained data on basic home information, primary and secondary heating systems, steam baths, smoke houses, and wood harvest practices in relationship to current use and practices. Educational information shared with households included resources on home energy efficiency, air quality, wood burning appliances, and, best practices on burning, storing and seasoning firewood. A total of 405 homes were surveyed, representing about 46 percent of the owner-occupied housing units for both communities.

The project was led by the Bristol Bay Native Association in partnership with the Aleknagik Traditional Council and the Alaska Native Tribal Health Consortium, with funding from the U.S. Environmental Protection Agency. The Aleknagik Traditional Council is a federally-recognized tribe in the Bristol Bay region with environmental staff who has received training on indoor and ambient air quality. The Alaska Native Tribal Health Consortium, Division of Environmental Health & Engineering, agreed to provide expert technical assistance for this work. The project supports the core values of environmental and economic sustainability reflected in the Bristol Bay Regional Vision, a statement giving a unified voice to the people in the region and providing guidance to private and public entities at the local, state and federal levels engaged in the Bristol Bay region.

Study findings will be used to assess the feasibility of wood heating system exchange programs, tailor follow-up education and outreach programs, and assist with research needed to determine sustainable biomass harvest levels for Dillingham and Aleknagik. Collecting specific data through the study is an important initial step for both communities to identify appropriate wood smoke reduction measures.

The survey questionnaire conducted with households included six sections. Results are summarized below.

Section A: Home Information

The majority of homes in both communities were built more than 15 years ago. The size of homes varied, but the largest category selected was 1,001 to 1,500 square feet. The number of occupants in a home averages around three people. Most of the homes surveyed have not received an energy audit or participated in weatherization program upgrades.

Section B: Home Heating (Primary & Secondary)

Heating (stove) oil is the main primary home heating fuel source. A small percentage (less than 15 percent) of participating households identified firewood as their primary

heating source. Firewood is the main source used for secondary home heating. The most common brand names of primary heating systems in Aleknagik are Toyotomi (Toyostove) and Weil-McLain. In Dillingham the most common brand names of primary heating systems are Toyotomi (Toyostove), Weil-McLain, Monitor, and Energy Kinetic Systems 2000. The most common brand name of wood stove in Aleknagik is Country whereas the most common brand name of wood stove used by Dillingham households is Blaze King. The average age of heating systems are relatively old (15 plus years) or relatively new (1 to 5 years). Several homes surveyed in Dillingham are heated by hydronic heaters (outdoor wood boilers) and use of this technology is on the rise.

Section C: Home Heating with Firewood

The predominant type of firewood harvested is spruce with some respondents also reporting birch. Participants report traveling up to 10 miles to harvest mostly dead trees and burn about 5.5 cords a year on average. The overwhelming majority of participants are "not at all familiar" with EPA certified wood stoves even though a number of homes had EPA approved stoves. However, a high percentage of participants in Aleknagik report their primary and secondary stoves as being EPA certified.

Section D: Steam Bath

Firewood (mainly spruce) is the preferred fuel source for heating steam baths in both communities. Twenty percent of the Dillingham households surveyed use oil stoves instead of firewood. Some participants also report burning "other" materials such as, "pallets" and "scrap wood." Many participants light their steam bath a "few times a week." The vast majority of participants travel up to 10 miles to harvest firewood and burn about 2.7 cords a year on average in their steam baths.

Section E: Smoke House

Cottonwood is the preferred firewood for smoke houses. Dillingham households reported a higher use of other firewood such as driftwood. The vast majority of participants travel between 0 to 10 miles to harvest mostly dead trees, and burn about ¼ cord a year on average. Some Dillingham participants reported traveling between 11 to 21 miles to harvest firewood and/or buying wood from friends and family members.

Section F: Other (Informational Materials & Comments)

Most survey respondents wanted more information on home energy efficiency, wood stove efficiency, wood stove cleaning and maintenance, and air quality. Participants offered a range of comments and suggestions mostly relating to high prices and concerns regarding the sustainability of the wood resource. A few participants expressed concerns about emissions from wood stoves and hydronic heaters (outdoor wood boilers) in certain locations as well as air pollution from landfill burning practices.

Recommendations

Based on the results and findings of the survey questionnaire, the following recommendations were made by the three programs within BBNA – Tribal Energy Program, Environmental Program, and Tribal Forestry Program. The environmental health recommendations were developed in consultation with the Alaska Native Tribal Health Consortium.

Energy

- Assess the state of technology in our residential and non-residential building sectors.
- Create fact sheets to help educate homeowners on the various energy saving technologies and their associated cost savings and reduced emission potential.
- Develop an energy efficiency campaign outlining a clear path to private, state and federal resources with a relevant message and delivery system that resonates at the local, sub-regional and/or regional level.
- Explore public and private partnerships to help support technology change-out programs.
- Explore partnership with ENERGY STAR.

Environmental

- Wood smoke can impact both indoor and ambient air quality. Community education material can inform homeowners about the health risks associated with wood smoke and how to minimize exposure.
- The number of wood burning stoves identified in the survey was significant, with 51 percent of respondents using wood as a primary or secondary heating source. Currently, there are no measurements of the impact of wood burning on ambient air quality in Dillingham and Aleknagik. Future assessment of air quality could include ambient PM2.5 monitoring during the heating season to determine a baseline.
- Limited research on burning driftwood and dioxin has been conducted to date. The health risks of using driftwood and of the associated emissions are poorly defined in published literature and text. Measuring emissions and indoor air quality in proximity to burning driftwood is important in building regionally appropriate education material and air quality assessment tools.
- While most people burning indicated that the wood they used was harvested dry, wood moisture content was undetermined. Future assessment of wood moisture would be valuable with baseline PM2.5 assessment.
- Despite improved combustion technology, current regulations on emissions from wood burning stoves have not been updated for over a decade. Furthermore, the State of Alaska has no regulations on the specifications of wood burning appliances that may be sold in the state. We recommend updating these regulations to reduce emissions from stoves purchased for use in rural Alaska in

the future, especially in light of the increasing cost of heating oil and dependence upon wood as a heating source.

- Using wood as a heating source instead of fossil fuels has been described to have a net negative carbon footprint when forestry and wood harvesting practices are optimal. The reduction of greenhouse gas emissions is a very important topic among Alaskans who face more severe impacts of climate change in the historically arctic climate. Future research on the net carbon footprint of heating using wood as a source of fuel in Alaska is of great interest.
- While heating oil typically results in lower emissions than wood burning, homes may have higher indoor air pollution from volatile organic compounds when heating systems are not operated and maintained properly. Education materials on operation and maintenance of fuel oil heating systems would be appropriate for Dillingham and Aleknagik. Educational outreach would benefit from collaboration between public health workers and tribal environmental programs.

Forestry

- Inspect homes for leaks and overall efficiency and make upgrades as necessary.
- Select a woodstove made for the size of the home with a high level of efficiency.
- Practice proper wood drying techniques to ensure maximum efficiency from woodstoves.
- Use a moisture meter to monitor the levels in the wood before it is burned.
- Identify barriers to proper wood drying techniques.
- Explore resources and methods for dry wood programs (e.g. wood banking programs).

Introduction

This section provides background information and connection with the Bristol Bay Regional Visioning Project, describes the two communities -Aleknagik and Dillingham – involved in the study, and explains steam baths and smokehouses for those not familiar with their cultural significance.

Bristol Bay Native Association

The Bristol Bay Native Association is a tribal consortium serving 31 federally-recognized tribes in the Bristol Bay region of southwest Alaska. It functions as a service agency dedicated to the betterment of the Native people of the region. The association administers a wide range of federally and state funded programs, including the Environmental, Energy and Forestry programs dedicated to assisting and building capacity at the local level. BBNA is the recipient of the grant that was awarded to fund the Home Heating System, Steam Baths, Smoke Houses & and Wood Harvest Practices Study.

Figure 1. Bristol Bay Region

More information about BBNA can be found at www.bbna.com.

Bristol Bay Regional Vision

The Bristol Bay Partnership is a group of five regional organizations - Bristol Bay Native Corporation (BBNC), Bristol Bay Area Health Corporation (BBAHC), Bristol Bay Native Association (BBNA), Bristol Bay Housing Authority (BBHA), and the Bristol Bay Economic Development Corporation (BBEDC) - that entered into a Memorandum of Understanding in 2005 to meet quarterly and work together on areas of common interest, such as developing a unified vision to guide the future of the region.

The Bristol Bay Regional Vision is based on the opinions and concerns of nearly 1,400 participants from across the Bristol Bay region gathered during two rounds of meetings held in 26 communities between September 2010 and May 2010. The region-wide vision statement reflects the shared values of the region and is intended to provide guidance to private and public entities at the local, state and federal levels that are engaged in the

Bristol Bay region. The Home Heating, Steam Baths, Smoke Houses and Wood Harvest Practices: Current Conditions in Aleknagik and Dillingham Study is linked to and supports the core values of environmental and economic sustainability reflected in the region-wide vision statement articulated below.

Bristol Bay Regional Vision Statement

The foundation *of the Bristol Bay Region is committed families, connected to our land and waters.*

We believe *future generations can live healthy and productive lives here. Across our region, we share common values of community, culture and subsistence.*

We see *a future of educated, creative people who are well prepared for life. This requires:*

- *Excellent schools*
- *Safe and healthy families*
- *Local jobs*
- *Understanding our cultural values and traditions*

We assert *the importance of local voices in managing our natural resources to continue our way of life.*

We welcome *sustainable economic development that advances the value of Bristol Bay people. Our future includes diverse economic opportunities in business and industries based largely on renewable resources. Large development based on renewable and non-renewable resource must not threaten our land, our waters, or our way of life.*

We foster *cooperation among local and regional entities to coordinate infrastructure planning for stronger, more affordable communities. Investments in energy, housing and transportation promote sustainable communities and spur economic development.*

We recognize *the need to locate new sources of capital to implement this vision with a goal of generating self-sustaining regional economies.*

We are *unified to secure a prosperous future.*

All results and documents (e.g. community meetings) of the Bristol Bay Regional Vision Project can be viewed on the project web site at www.bristolbayvision.org.

Alaska Native Tribal Health Consortium

The Alaska Native Tribal Health Consortium (ANTHC) is part of the Alaska Tribal Health System (ATHS), a network of tribes and tribal organizations linked by common health-related goals and objectives. As the largest organization within the system, the consortium facilitates regional collaborations and shared interests of the statewide network; provides technical assistance for the development of health infrastructure; and coordinates training and educational opportunities. The Division of Environmental Health and Engineering (DEHE) is one of four major divisions. The division provides planning, design, construction and operations support for health care facilities, and for clean water

and sanitation projects throughout Alaska. DEHE Environmental Health Services staff work at the regional and village level, to address factors of the natural and built environment that may affect human health. Responsibilities include assessment and control of environmental factors to protect the health of Alaska Native people; to prevent disease spread; and to create healthy environments. More information about ANTHC can be found at www.anthc.org.

Community of Aleknagik [1]

Aleknagik is located at the head of Wood River on the southeast end of Lake Aleknagik, 16 miles northwest of Dillingham. The community lies at approximately 59.273060° North Latitude and -158.617780° West Longitude. (Sec. 31, T010S, R055W, Seward Meridian.) The area encompasses 11.6 sq. miles of land and 7.2 sq. miles of water. Aleknagik is in a transitional climate zone. The primary influence is maritime, although a continental climate does affect the weather here. Average summer temperatures range from 30 to 66 °F. Average winter temperatures range from 4 to 30 °F. Average annual precipitation is 20 to 35 inches, and average annual snowfall is 93 inches. Fog and low clouds are common during July and August and may preclude access. The lake and river are ice-free from June through mid-November.

Wood River and Aleknagik Lake have been used historically as summer fish camps. Aleknagik means "Wrong Way Home." Natives returning to their homes along the Nushagak River would sometimes become lost in the fog and find themselves swept up the river with the tide, inadvertently arriving at Aleknagik Lake. The 1929 U.S. Census found 55 people living in the "Wood River Village" area to the south (South Shore). In 1930, there were five families living on the shores of the lake year-round. A log cabin territorial school was built on the South Shore in 1933. Attracted by the school, other facilities, and plentiful fish, game, and timber, a number of families from Goodnews, Togiak, and Kulukak relocated to Aleknagik. A post office was established in 1937. A two-story framed school with a teacher apartment was constructed in 1938. By 1939, Aleknagik had 78 residents, over 30 buildings, and a small sawmill. In the late 1940s, a Seventh - Day Adventist mission and school was established on the North Shore.

During the 1950s, a Moravian Church and a Russian Orthodox Church were built and over 35 families lived along the lake. In 1959, the state constructed a 25-mile road connecting the South Shore to Dillingham. The road was passable only during the summer months, until the late 1980s, when it was upgraded and maintained year-round. The City of Aleknagik was incorporated in 1973. The Aleknagik Traditional Council is the governing body for the federally recognized tribe. Fishing and subsistence activities are still practiced today.

[1] Alaska Community Database Community Information Summaries, Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs

Community of Dillingham [2]

Dillingham is located at the extreme northern end of Nushagak Bay, at the confluence of the Wood and Nushagak Rivers. It lies 327 miles southwest of Anchorage and is a 6 hour flight from Seattle. The community lies at approximately 59.039720° North Latitude and -158.457500° West Longitude. (Sec. 21, T013S, R055W, Seward Meridian.). The area encompasses 33.6 sq. miles of land and 2.1 sq. miles of water. The primary climatic influence is maritime; however, the arctic climate of the Interior also affects the Bristol Bay coast. Average summer temperatures range from 37 to 66 °F. Average winter temperatures range from 4 to 30 °F. Annual precipitation averages 26 inches, and annual snowfall averages 65 inches. Heavy fog is common in July and August. Winds of up to 60-70 mph may occur between December and March. The Nushagak River is ice-free from June through November.

The area around Dillingham was inhabited by both Eskimo and Athabascan and became a trade center when Russians erected a post in 1818. Local Native groups and Natives from the Kuskokwim Region, the Alaska Peninsula, and Cook Inlet mixed together as they came to visit or live at the post. By 1837 the community was known as Nushagak, when a Russian Orthodox mission was established. In 1881 the U.S. Signal Corps established a meteorological station at Nushagak. In 1884 the first salmon cannery in the Bristol Bay region was constructed by Arctic Packing Company east of the site of modern-day Dillingham. Ten more salmon canneries were established within the next seventeen years. The post office at Snag Point was named after U.S. Senator Paul Dillingham in 1904, who had toured Alaska extensively with his Senate subcommittee during 1903. The 1918-19 influenza epidemics struck the region hard leaving no more than 500 survivors. A hospital and orphanage were established in Kanakanak after the epidemic, 6 miles from the present-day city center. The Dillingham town site was first surveyed in 1947. The city was incorporated in 1963. The Curyung Tribal Council is the governing body for the federally recognized tribe. Traditionally a Yup'ik Eskimo area with Russian influences, Dillingham is now a highly mixed population of non-Natives and Natives. The outstanding commercial fishing opportunities in the Bristol Bay area are the focus of the local culture.

Forest Resources

Most of the land on the road between Dillingham and Aleknagik, (approximately 80 percent) is made up of privately owned Native allotments. There is typically no wood cutting allowed on these privately owned parcels unless authorized by the landowner. While free use permits are available to harvest wood on these lands, they are not often used due to the permitting requirements. The land surrounding most of the local Dillingham area is owned by Choggiung Limited, a for profit corporation formed under the Alaska Native Claims Settlement Act. Choggiung Limited offers wood cutting permits at no cost to shareholders for harvesting a limited amount of

[2] Alaska Community Database Community Information Summaries, Alaska Department of Commerce, Community and Economic Development, Division of Community and Regional Affairs

dead wood on corporation lands. For amounts larger than the initial permit (more than 10 cords), permits must be purchased and the fee schedule based on the amount of wood to be harvested. Permits are also available to non-shareholders although there is a fee for any wood cutting. The State of Alaska has some land available approximately one mile to the west of the road between Dillingham and Aleknagik, although wood harvest is not a practice that has been included in the State of Alaska Department of Natural Resources Area Management Plan. To the west and southwest of Dillingham, the Togiak National Wildlife Refuge allows unlimited harvest of dead standing wood for heating purposes for personal subsistence or private use only. Wood cutting for commercial purposes is prohibited on refuge lands.

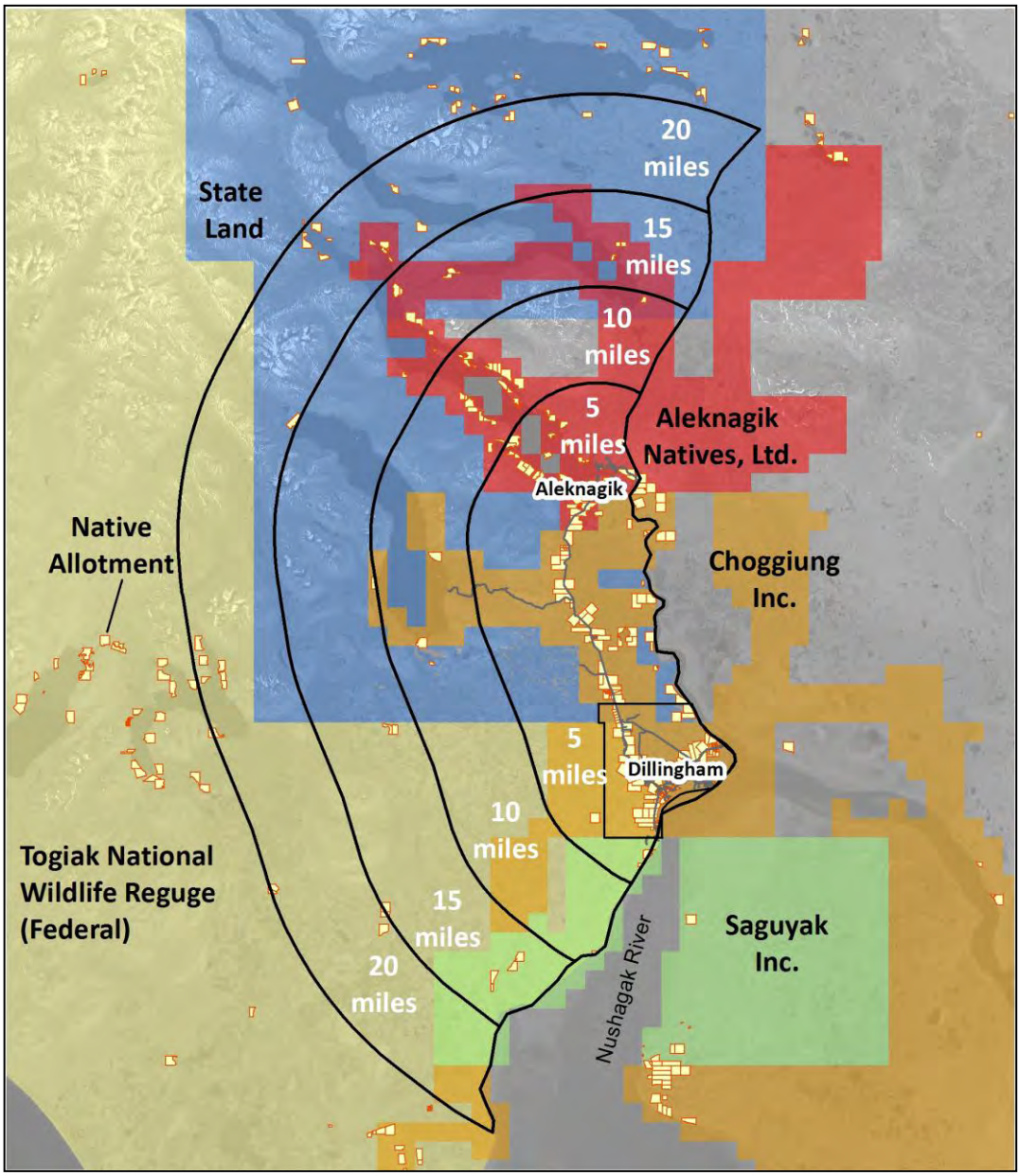


Figure 2. Land Status and Distance Traveled to Harvest Firewood

Steam Bath

The Steam Bath was introduced by the Russians in the 1700s, and still in use today by the Natives and non-Natives of Aleknagik and Dillingham. The Yupik word for Steam Bath is "maqiq". The Steam Bath is a place to sweat, bathe and socialize. It is usually a small building with two main rooms: a cold room and hot room. The hot room contains the stove, usually made from a 55 gallon barrel, stoked with firewood. On top of the stove are rocks. The firewood heats the rocks and bathers splash the rocks with water creating steam. Some Steam Bath owners have retrofitted their 55 gallon barrel to heat with oil.

Figure 3. Typical Wood Stoves used in Steam Bath

Figure 4. Hot Room and Firewood Storage in Steam Bath

Smoke House

Alaska Natives have depended on salmon as an important source of food to provide nourishment and sustenance for thousands of years. Many families in Aleknagik and Dillingham harvest salmon at a Fish Camp or beach where processing, brining and smoking take place. The salmon are cut into long strips and tied to a rope for hanging in the Smoke House. The preferred fuel for smoking the fish is cottonwood. Brining recipes and the length of time the fish are left in the Smoke House vary by family. This is a time-honored tradition and the entire family works together, even around the clock, when the first fish start hitting the nets.

Figure 5. Typical Smoke House Operations

Methodology

This section includes a description of the research objectives and methods and quality control measures to design and implement the study.

Research Objectives

As fuel prices continue to increase, more homeowners are supplementing their need for space heating with firewood, raising concerns about indoor and outdoor air quality and availability of forest resources to support increasing harvest levels. Responsible wood-burning techniques are not always used as evidenced by chimney stack smoke and odors. To date, no data has been systematically collected to determine the type and age of wood burning systems in homes and outdoor structures, and the type and amount of wood fuel being used.

The study had three major objectives:

1. Gather information on primary and secondary home heating sources in Aleknagik and Dillingham
2. Determine the type and age of residential wood combustion technology used in both communities
3. Gather information on wood sources harvested for residential homes, steam baths and smoke houses

Survey results and findings will be used to assess the feasibility of wood heating system exchange programs, tailor follow-up education and outreach programs, and assist with research needed to determine sustainable biomass harvest levels for Dillingham and Aleknagik.

Survey Questionnaire and Implementation

The project collected and shared information on home heating systems and practices through interviews and outreach. The survey questionnaire included 6 sections, 26 closed-ended questions, and six open-ended questions. The closed-ended questions were standardized answers organized in a set format and comprehensive. The open-ended questions allowed respondents to formulate their own answers. The sections and questions were organized to flow logically.

In some cases, the sections did not apply to the participant and the interviewer skipped to the next appropriate section. For all questions a possible response of “I don’t know/not sure” was provided. For some questions a “does not apply” or “other” answer was provided. Visual and verbal prompts were provided for questions relating to the volume of wood harvested or cords. For cultural purposes a cord is typically measured as a “sled full,” as firewood is typically harvested using a snow machine with a sled in tow during the winter months.

The draft survey questionnaire was revised twice based on input from project team members and changes suggested by the EPA Office of Air, Waste, and Toxics Tribal Air Program. The revised survey questionnaire was subsequently pre-tested with a small group and minor changes were made as a result to improve clarity. The survey was conducted with available households in Aleknagik and Dillingham from May to October 2012. A copy of the final survey questionnaire is provided in Appendix A.

A Quality Assurance Project Plan (QAPP) was prepared to ensure the data collected was valid and reliable for its intended purpose. In addition to data quality, the plan also addressed documentation, sampling methods, data validation and storage. A copy of the final QAPP approved by EPA Region 10 is provided in Appendix B.

A sub-recipient agreement with the Aleknagik Traditional Council was prepared to help administer the survey questionnaire through face-to-face interviews and input responses into the MS Excel database maintained at BBNA. Informational material that was made available to survey respondents is provided in Appendix C.

Figure 6. Sled Full of Harvested Firewood

Findings

This section includes a description of the findings and results. The quantitative information is displayed in tables and graphs along with an explanation. The results are presented in sections that correspond to the survey questionnaire.

Section A: Home Information

The survey questionnaire was conducted with a total of 405 homes, 44 in Aleknagik and 361 in Dillingham, representing around 46 percent of the owner-occupied housing units for both communities based on 2010 census data.[3] The average household size for both communities was just over 3 persons, compared to 2.81 for the statewide average[4]. Aleknagik participants reported slightly fewer occupants per household than Dillingham.

Table 1. Home Location, Number of Occupants, and Average Occupants per Home in Each Community

	Home Location Responses	Total Number of Occupants	Average Occupants Per Home
Aleknagik	44	119	2.7
Dillingham	361	1108.5	3.1
Total	405	1227.5	3.03

The size of homes varied, but the leading category selected by participants was 1,001 to 1,500 square feet for both communities. Dillingham participants also selected greater than 1,500 square feet and less than 1,000 square feet more often than Aleknagik participants. Generally speaking most homes in both communities are greater than 15 years old. This is especially true for Dillingham. Aleknagik participants also report a percentage (34 percent) of homes between 11 and 15 years of age.

Table 2. Size of House, Responses and Percentage of Total in Each Community

	Size of House	Responses	Percentage of Total
Aleknagik	<1,000 s.f.	9	20%
	1,001-1,500 s.f.	29	66%
	>1,501 s.f.	6	14%
	Not Sure	0	0%
	Total	44	100%
Dillingham	<1,000 s.f.	91	25%
	1,001-1,500 s.f.	136	38%
	>1,501 s.f.	114	31%
	Not Sure	21	6%
	Total	362	100%

[3] Total occupied housing units reported in the 2010 U.S. Census are 67 for Aleknagik and 814 for Dillingham.

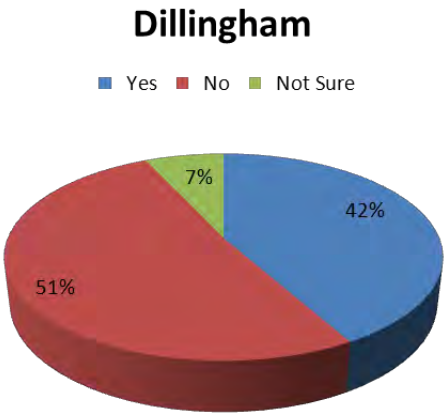
[4] Average household size of owner-occupied units reported in the 2010 U.S. Census is 2.81 for Alaska.

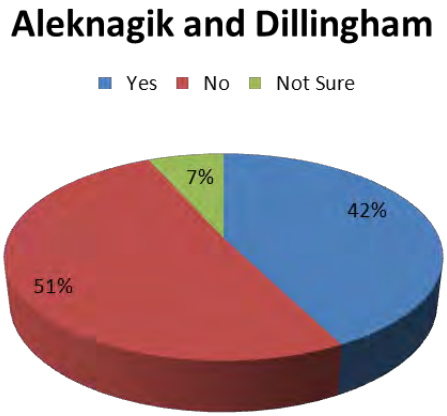
Table 3. Age of House, Responses and Percentage of Total in Each Community

	Age of House	Responses	Percentage of Total
Aleknagik	Less than 1 Year	2	5%
	1-5 Years	2	5%
	6-10 Years	3	7%
	11-15 Years	15	34%
	15+ Years	22	50%
	Not Sure	0	0%
	Total	44	100%
Dillingham	Less than 1 Year	0	0%
	1-5 Years	19	5%
	6-10 Years	20	6%
	11-15 Years	27	8%
	15+ Years	281	81%
	Not Sure	0	0%
	Total	347	100%

Slightly less than half the homes in both communities have not received an energy audit or participated in a weatherization program offered by the local housing authority or tribe. At the state level, there are two main energy efficiency and conservation programs for residents: The Home Energy Rebate Program and the Expanded Weatherization Program. The rebate program reimburses homeowners up to $10,000 for energy efficiency upgrades, and requires before ("As-Is") and after ("Post-Improvement") energy audits. The weatherization program is for renters and homeowners who meet state income guidelines, and is managed through regional service providers. The survey questionnaire did not ask about barriers or obstacles associated with participation in such programs.

Table 4. Home Energy Audit, Weatherization in Each Community





Section B: Home Heating (Primary & Secondary)

Heating oil (Heating Fuel #1) is the primary energy fuel source for space heating in both communities by an overwhelming majority (greater than 85 percent). More homes in Dillingham (14 percent) rely on firewood as their primary heating source than Aleknagik 11 percent); this is attributable to the hydronic heaters (outdoor wood boilers) that more residents in Dillingham are installing. Firewood is the main secondary energy source with a slightly higher percentage of participants in Aleknagik supplementing their space heating with firewood than in Dillingham. The survey questionnaire did not ask what factors (e.g. even higher prices for stove oil) would trigger more homeowners to use firewood as their primary or secondary heating source.

The everyday reference to heating oil in Bristol Bay is "stove oil." This comes from the historical practice of using an oil fired cook stove to also heat the house.

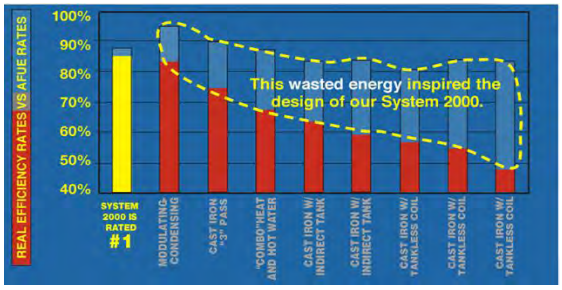
Table 5. Primary Heating Source, Secondary Heating Source and Percentage of Total in Each Community

	Fuel Type	Primary Heating Source	Percentage of Total	Secondary Heating Source	Percentage of Total
Aleknagik	Heating Oil	39	87%	5	12%
	Firewood	5	11%	36	86%
	Pellets	0	0%	0	0%
	Other	0	0%	0	0%
	Not Sure	1	2%	1	2%
	Total	45	100%	42	100%
Dillingham	Heating Oil	309	85%	46	26%
	Firewood	51	14%	125	71%
	Pellets	1	.5%	0	0%
	Other	1	.5%	6	3%
	Not Sure	0	0%	0	0%
	Total	362	100%	177	100%

At time of report, the average price of Heating Fuel #1 for both communities was over $5.00 per gallon and fast approaching $6.00 per gallon.

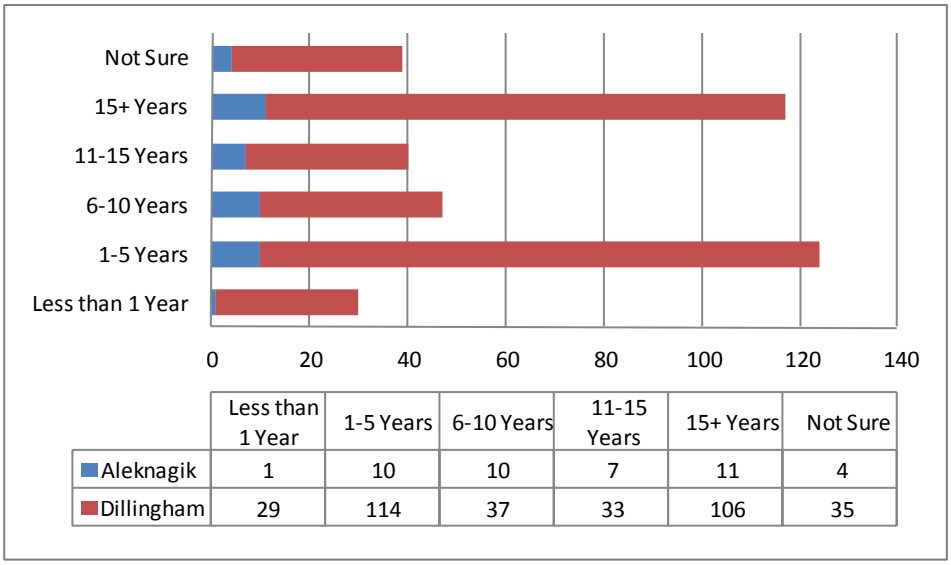
The most common brand names of primary heating systems in Aleknagik are Toyotomi (Toyostove) and Weil-McLain. The most common brand names of primary heating systems in Dillingham are Toyotomi (Toyostove), Weil-McLain, Monitor, and Energy Kinetic System 2000. A few examples are shown below. A full listing of manufacturer models identified through the survey can be found in Appendix D. The survey questionnaire did not measure the condition and maintenance of systems.

Table 6. Examples of Primary Heating Systems in Both Communities

 Toyostove Laser 56	"The Toyostove Laser 56 is a medium output wall furnace available from Toyotomi. The Toyostove Laser 56 can heat up to 1100 Sq. Ft. of living space for a fraction of alternative heat sources. The Toyostove Laser 56 is a sealed combustion or direct-vent system that uses only outside air for combustion and vents combustion gases directly to the outdoors. This modern high-efficiency model provides safe, comfortable warmth for zone heating or smaller homes. The L-56 features an optional removable fuel tank." (Source: http://www.rural-energy.com/)
 Energy Kinetic System 2000	"System 2000 combines heat and hot water with a single high efficiency appliance to maximize efficiency in all seasons, with the additional benefits of virtually unlimited hot water and whisper quiet operation. System 2000 is designed for use with conventional heat and hot water systems for homes, buildings, pools, spas, snow melt systems and more. It's also fuel neutral and runs on natural gas, propane and oil heat. This study shows Energy Kinetics is the most efficient."  (Source: http://www.energykinetics.com)
 Toyostove Laser 73	"The Toyostove Laser 73 is the largest output wall furnace available from Toyotomi. The Toyostove Laser 73 can heat up to 2000 Sq. Ft. of living space for a fraction of alternative heat sources. The Toyostove Laser 73 is a sealed combustion or direct-vent system that uses only outside air for combustion and vents combustion gases directly to the outdoors. This modern high-efficiency model provides safe, comfortable warmth for zone heating or whole house heat." (Source: http://www.rural-energy.com/)

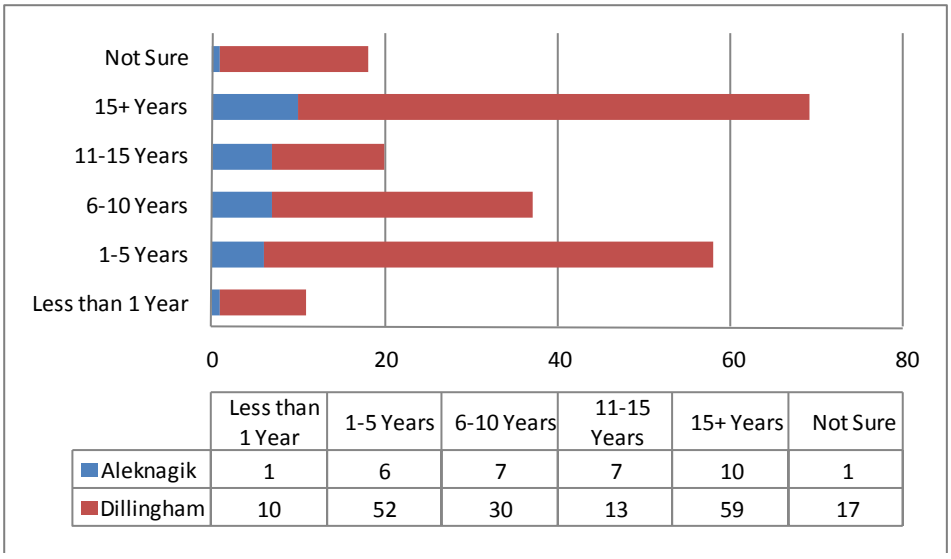
The results for Dillingham show that most primary and secondary heating systems are either relatively old (15 plus years) or relatively new (1 to 5 years). The results for Aleknagik presented a more even spread in the age of primary and secondary heating systems. The survey questionnaire did not ask questions about barriers or obstacles for homeowners linked to upgrading heating systems in their homes.

Table 7. Age of Primary Heating Systems in Both Communities



	Less than 1 Year	1-5 Years	6-10 Years	11-15 Years	15+ Years	Not Sure
Aleknagik	1	10	10	7	11	4
Dillingham	29	114	37	33	106	35

Table 8. Age of Secondary Heating Systems in Both Communities



	Less than 1 Year	1-5 Years	6-10 Years	11-15 Years	15+ Years	Not Sure
Aleknagik	1	6	7	7	10	1
Dillingham	10	52	30	13	59	17

The most common brand names of secondary heating systems found in Aleknagik are Country, Blaze King and Dutchwest wood stoves. The most common brand name of secondary heating systems in Dillingham is Blaze King. A few examples are pictured below. A full listing of brands identified can be found in Appendix D. The reported heating systems for both communities are rated high for efficiencies relative to size of home and maintenance. The survey questionnaire did not measure the condition of systems.

Table 9. Examples of Secondary Heating Systems in Both Communities

 Country Stoves Inc.	The following are models EPA certified: Winslow PS40 and PI40 Striker S160 and C160 Canyon S310 Canyon ST310, C310, E310 Alpine Converter C-30, C-35 Legacy S260, C260, and E260 Performer S210, SS210, ST210, C210 & E210 T-TOP S 240 C-240 and E-240 STRIKER S130, C-50L, C130, CA-50, CA-50L, CA-55 T-Top C-40, C-45, C-46 Performer S180, C180, E180 Starlite C-20, C-21
 Dutchwest (CFM Corporation, Vermont Castings, Inc. & Monessan Hearth Systems)	The following are models EPA certified: DutchWest Large 2479 DutchWest Small Model DutchWest Medium 2478 Century/Dutchmaster FW and CDW Dutchwest Small Convection Heater #2460 Dutchwest Extra Large Convection 2462 Dutchwest Large Convection Heater (Model 2461) Century/Dutchmaster FW and CDW

 Blaze King Industries	The following are models EPA certified: Chinook / Scirrocco/Ashford 30 Blaze King KEJ 1107 Blaze King, King Catalytic KEJ-1101 Princess Insert Model PI 1010A Chinook / Scirrocco/Ashford 20 Heat Pro C210 Blaze King, King Catalytic Insert KEI-1300 Princess PEJ 1006 Blaze King, Auto Light PAL-4000 Blaze King, Royal Heir RHT-2200, 2250 Blaze King Princess Insert Model PI 1010 Heat Pro C110 Blaze King, Royal Heir RHT-2100 Blaze King PEJ 1003 Briarwood II/90 Blaze King, Princess Catalytic PEJ-1002 Blaze King KEJ-1102 Eagle/Pioneer E90, PZ-90, Briarwood XE-90, XEI-90

Section C: Home Heating with Firewood

Spruce and birch are the main types of firewood used by both communities to heat homes. Dillingham participants also reported "cottonwood", "pilings", "anything" and "everything" as part of "other" sources. Both communities burn approximately 5.6 cords a year on average per household with Aleknagik burning slightly more than Dillingham. The total amount of firewood burned by both communities is 1,034 cords.

Table 10. Type of Firewood Burned, Responses and Percentage of Total in Each Community

	Type of Wood	Responses	Percentage of Total
Aleknagik	Birch	10	21%
	Spruce	31	66%
	Pallets/Scrap Wood	5	11%
	Other	0	0%
	Not Sure	1	2%
	Total	47	100%
Dillingham	Birch	94	30%
	Spruce	171	55%
	Pallets/Scrap Wood	34	11%
	Other	12	4%
	Not Sure	2	0%
	Total	313	100%

Table 11. Average Cord Burned per Household for Home Heating in Both Communities

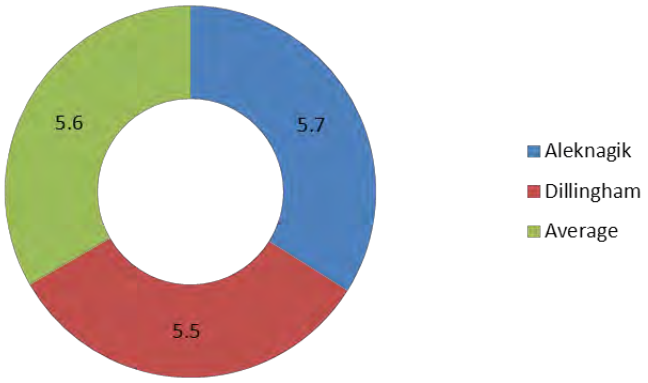


Table 12. Total Cord Burned for Home Heating and Percentage of Total in Each Community

	Total Cords	Percentage of Total
Aleknagik	159	15%
Dillingham	875	85%
Total	1,034	100%

Most of the firewood is being stored covered and stacked outside. Participants also reported storing firewood inside the house in the "arctic entryway" or "closet."

Figure 7. Firewood Stored in Closet and Outside

Participants who harvest firewood report traveling between 0 to 10 miles for both communities. In Dillingham, some report traveling up to 20 miles, and buying wood from friends and family members. The majority of participants report harvesting "only dry wood" or "dead wood."

Table 13. Distance Traveled, Responses and Percentage of Total in Each Community

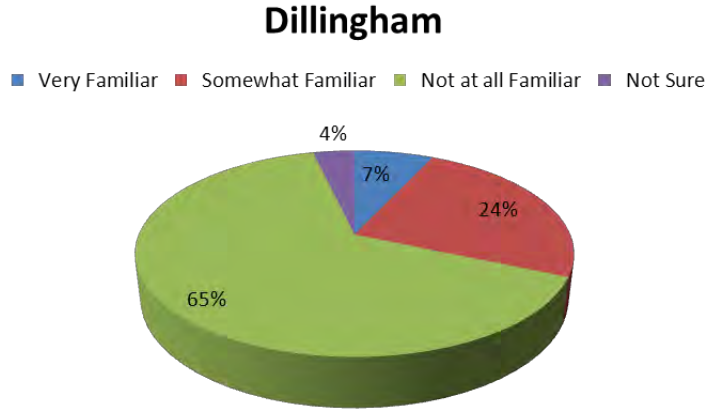
	Distance	Responses	Percentage of Total
Aleknagik	Less than 5 Miles	17	53%
	5-10 Miles	13	41%
	11-20 Miles	1	3%
	21+ Miles	0	0%
	Buy Wood	0	0%
	Family/Friends	0	0%
	Not Sure	1	3%
	Total	32	100%
Dillingham	Less than 5 Miles	60	26%
	5-10 Miles	80	35%
	11-20 Miles	36	16%
	21+ Miles	10	4%
	Buy Wood	24	11%
	Family/Friends	15	7%
	Not Sure	3	1%
	Total	228	100%

Table 14. Stored Firewood, Responses and Percentage of Total in Each Community

	Stores	Responses	Percentage of Total
Aleknagik	Stacked Outside/Covered	17	55%
	Wood Shed	6	19%
	Stacked Outside/Uncovered	7	23%
	Not Sure	1	3%
	Total	31	100%
Dillingham	Stacked Outside/Covered	103	52%
	Wood Shed	61	31%
	Stacked Outside/Uncovered	32	16%
	Not Sure	1	1%
	Total	197	100%

The majority of participants indicated they are "not at all familiar" with EPA certified wood stoves for both communities. However, the results show a high percentage of participants in Aleknagik report their primary and secondary stoves are actually EPA certified.

Table 15. Familiarity with EPA Certified Wood Stoves



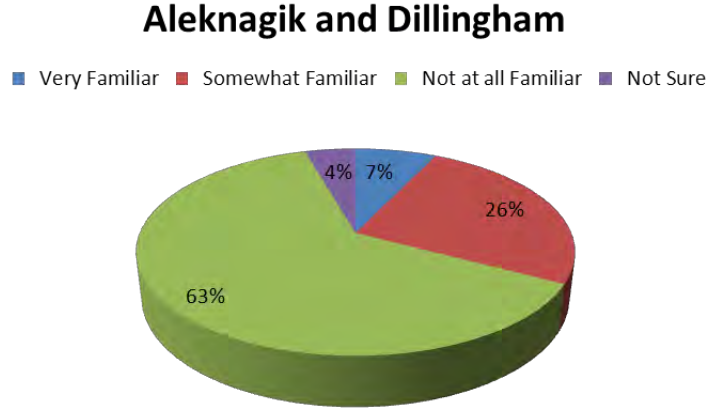


Table 16. EPA Certified Wood Stoves, Primary, Secondary and Percentage of Total in Each Community

	EPA Certified	Primary	Percentage of Total	Secondary	Percentage of Total
Aleknagik	Yes	5	100%	22	85%
	No	0	0%	2	8%
	Not Sure	0	0%	2	8%
	Total	5	100%	26	100%
Dillingham	Yes	23	42%	65	53%
	No	15	27%	29	24%
	Not Sure	17	31%	29	24%
	Total	55	100%	123	100%

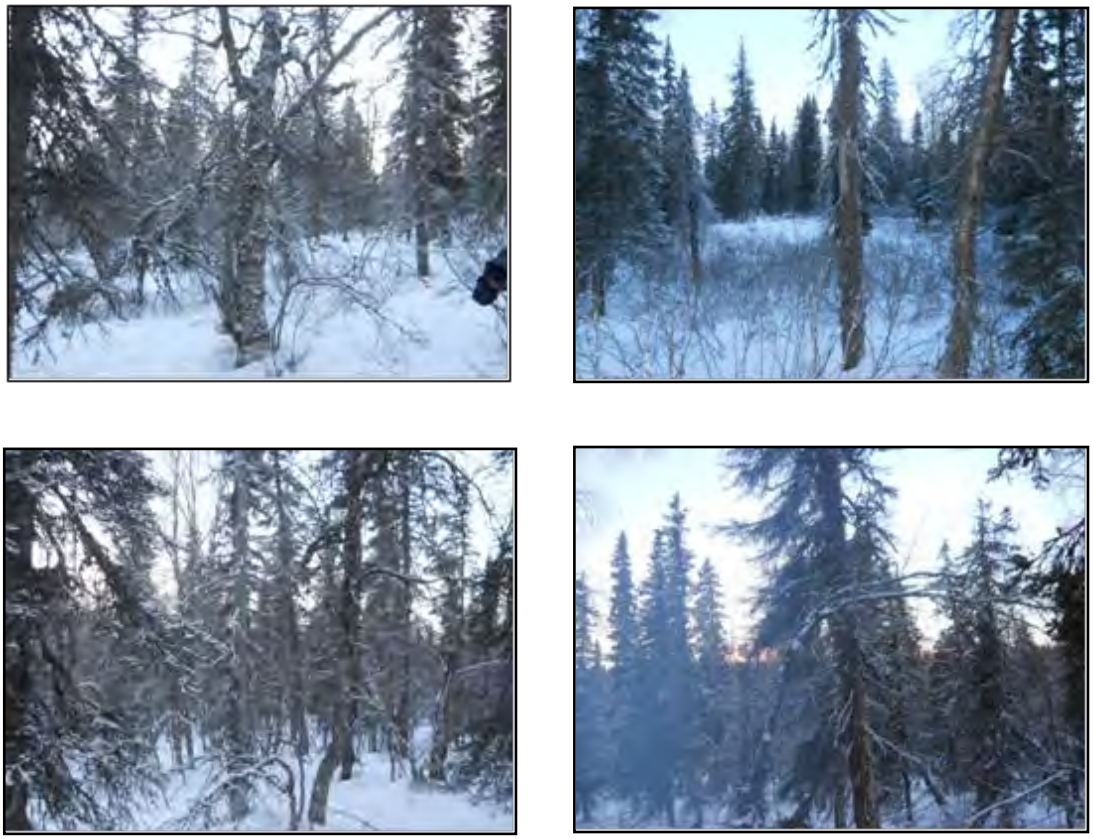


Figure 8. Examples of Birch and Dead Wood Harvested

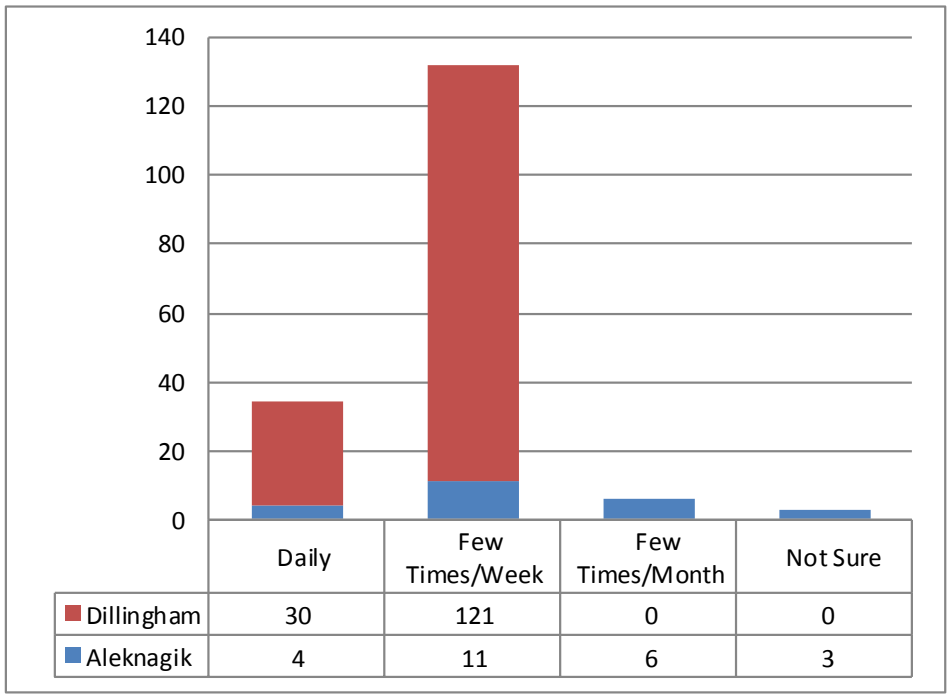
Section D: Steam Bath

The preferred fuel for steam bath owners is firewood. The main type of firewood is spruce, followed by "other" (e.g. pallets and scrap wood) and birch. The majority of participants "light" their steam a few times a week, consistent with cultural and social norms. Some Dillingham participants (20 percent) reported using oil as the heating source.

Table 17. Heating Fuel for Steam Bath, Wood Type, Responses and Percentage of Total in Each Community

	Type of Fuel	Responses	Percentage of Total	Type of Wood	Responses	Percentage of Total
Aleknagik	Oil	1	4%	Birch	2	7%
	Wood	22	96%	Spruce	20	74%
	Other	0	0%	Other	5	19%
	Not Sure	0	0%	Not Sure	0	0%
	Total	23	100%	Total	27	100%
Dillingham	Oil	30	20%	Birch	28	15%
	Wood	121	80%	Spruce	106	58%
	Other	0	0%	Other	45	25%
	Not Sure	0	0%	Not Sure	3	2%
	Total	151	100%	Total	182	100%

Table 18. Frequency of Steam Bath Use in Both Communities



The majority of Aleknagik participants travel between 0 and 10 miles to harvest firewood for steam baths. The majority of Dillingham participants travel between 5 and 10 miles. Results are also almost evenly split among Dillingham participants who report traveling less than 5 miles to harvest, between 11 to 20 miles to harvest, and buying firewood. Both communities burn about 2.85 cords a year on average for steam baths with Aleknagik burning slightly more than Dillingham. The total amount of firewood burned by both communities for steam baths every year is 342 cords.

Table 19. Travel Distance to Harvest Firewood for Steam Bath, Responses and Percentage of Total in Each Community

	Distance	Responses	Percentage of Total
Aleknagik	Less than 5 Miles	10	43%
	5-10 Miles	9	39%
	11-20 Miles	1	4%
	21+ Miles	0	0%
	Buy Wood	1	4%
	Family/Friends	0	0%
	Not Sure	2	9%
	Total	23	100%
Dillingham	Less than 5 Miles	22	14%
	5-10 Miles	59	38%
	11-20 Miles	20	13%
	21+ Miles	8	5%
	Buy Wood	20	13%
	Family/Friends	2	1%
	Not Sure	24	15%
	Total	155	100%

Table 20. Average Cord Burned for Steam Bath in Both Communities

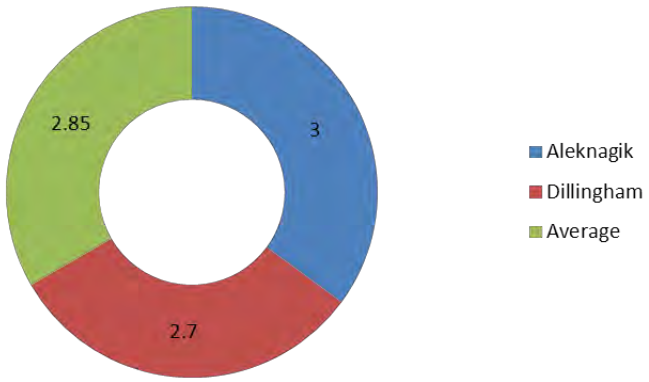


Table 21. Total Cord Burned for Steam Bath in Each Community

	Cords	Percentage of Total
Aleknagik	57	17%
Dillingham	285	83%
Total	342	100%

Section E: Smoke House

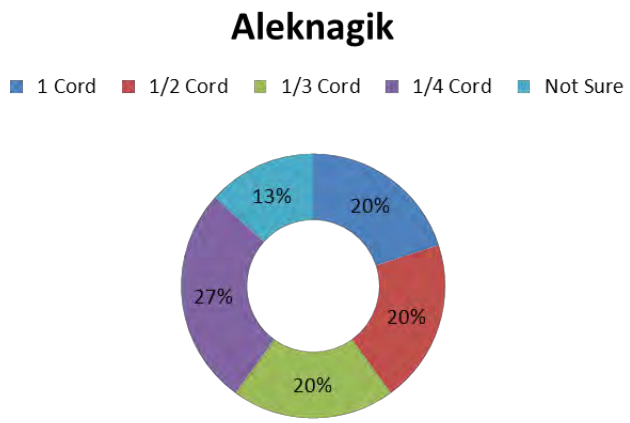
The preferred type of firewood for smoke houses is cottonwood, especially for Aleknagik participants. This is consistent with regional and historical preferences. Dillingham participants also use driftwood, consistent with geography and local availability.

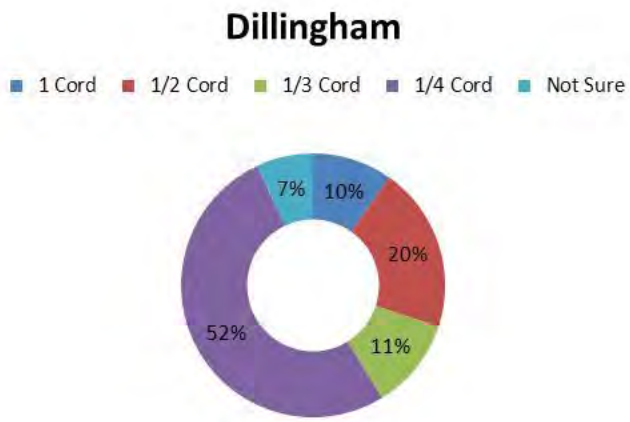
Table 22. Heating Fuel for Smoke House, Responses and Percentage of Total in Each Community

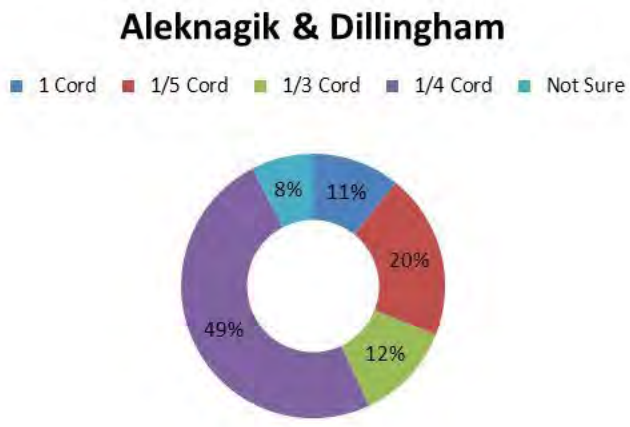
	Type of Firewood	Responses	Percentage of Total
Aleknagik	Cottonwood	12	71%
	Alder	1	6%
	Birch	1	6%
	Driftwood	1	6%
	Other	2	12%
	Buy Wood	0	0%
	Total	17	100%
Dillingham	Cottonwood	95	49%
	Alder	28	14%
	Birch	19	10%
	Driftwood	45	23%
	Other	6	3%
	Buy Wood	1	1%
	Total	194	100%

Aleknagik participants report an even spread among how much firewood is burned in smoke houses between 1 cord, 1/2 cord and 1/3 cord, but the majority of participants indicated they burned about 1/4 cord. The majority of Dillingham participants burned on average about 1/4 cord with some reporting 1/2 cord.

Table 23. Amount of Cord Burned for Smoke House in Each Community

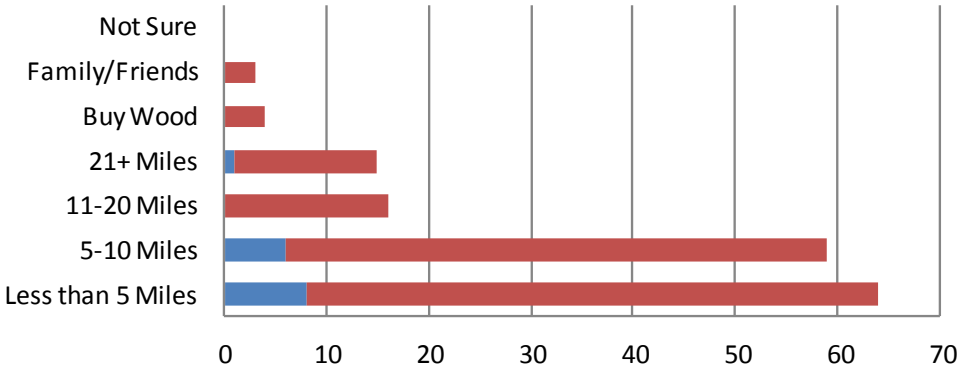






Aleknagik and Dillingham participants generally travel between 0 and 10 miles to harvest firewood for the smoke houses. Dillingham participants also report sometimes traveling between 11 and 21 miles, and even more than 21 miles to harvest firewood. This is consistent with travel via small boat or skiff up rivers and lakes where the preferred firewood – cottonwood - grows in stands by creeks, river bottoms and sand bars.

Table 24. Travel Distance to Harvest Firewood for Smoke House in Each Community



	Less than 5 Miles	5-10 Miles	11-20 Miles	21+ Miles	Buy Wood	Family/Friends	Not Sure
Aleknagik	8	6	0	1	0	0	0
Dillingham	56	53	16	14	4	3	0

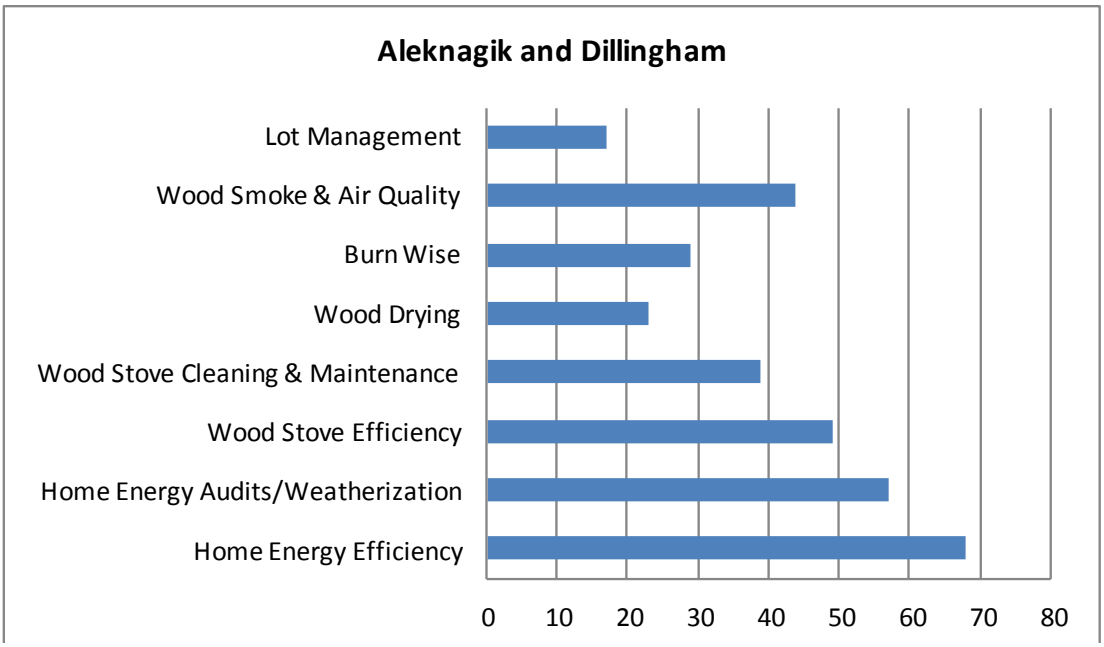
Section F: Other (Informational Materials & Comments)

Results show Aleknagik participants would like more information on home energy efficiency, wood stove cleaning and maintenance, and home energy audits/weatherization. Dillingham participants would like more information on home energy efficiency, home energy audits/weatherization, as well as wood stove efficiency, wood smoke and air quality. Comments from participants delivered a range of suggestions mostly relating to the high price of oil, and concerns regarding the sustainability of the wood resource.

Table 25. Desire for Informational Materials, Responses and Percentage of Total in Each Community

	Information Material	Responses	Percentage of Total
Aleknagik	Home Energy Efficiency	11	31%
	Home Energy Audits/Weatherization	5	14%
	Wood Stove Efficiency	3	8%
	Wood Stove Cleaning & Maintenance	6	17%
	Wood Drying	2	6%
	Burn Wise	2	6%
	Wood Smoke & Air Quality	3	8%
	Lot Management	4	11%
	Total	36	100%
Dillingham	Home Energy Efficiency	57	20%
	Home Energy Audits/Weatherization	52	18%
	Wood Stove Efficiency	46	16%
	Wood Stove Cleaning & Maintenance	33	11%
	Wood Drying	21	7%
	Burn Wise	27	9%
	Wood Smoke & Air Quality	41	14%
	Lot Management	13	4%
	Total	290	100%

Table 26. Desire for Informational Materials, Combined Responses



Discussion

This section includes the conclusions and recommendations by the three programs within BBNA – the Tribal Energy, Environmental, and Tribal Forestry Programs – that collaborated on the overall project. The environmental health recommendations were developed in consultation with the Alaska Native Tribal Health Consortium.

Conclusions and Recommendations: Energy

The goal of energy efficiency is to reduce the amount of energy required and thereby consumed without impacting comfort or convenience. This is typically achieved through technology as opposed to behavior change. Energy efficiency is often referred to as the "first fuel," "first alternative," and the "low hanging fruit." Energy efficiency projects are often discounted and unappreciated, despite their classification as alternative energy resources critical to the overall model of sustainability.

ENERGY STAR is an example of a trusted, government-backed symbol for technology that helps save money and protects the environment. The label was established to identify products that reduce greenhouse gas emissions and other excess pollutants produced by the inefficient use of energy; and make it easy for consumers to identify and purchase products that offer savings on energy bills without sacrificing performance, features and comfort. "EPA Certified Wood Stoves" is another example of a trusted, government-backed symbol for products that help save money and protect the environment. An EPA certified wood stove or wood heating appliance has been independently tested by an accredited laboratory to meet a particulate emissions limit of 7.5 grams per hour for non-catalytic wood stoves and 4.1 grams per hour for catalytic wood stoves. All wood heating appliances subject to the New Source Performance Standard for New Residential Wood Heaters under the Clean Air Act offered for sale in the United States are required to meet these emission limits.

Energy efficiency and the condition and age of the technology in homes and buildings must be a part of any "sustainable" solution when factoring in both consumption and production relative to an energy resource. The survey questionnaire revealed a large percentage of homes and heating systems greater than 15 years old. While the survey questionnaire did not ask about maintenance or general condition of heating systems, this study recognizes that even an older heating system can still be efficient if maintained properly. The age of homes may also translate to the age of other technologies in homes such as insulation, windows, doors, lighting, major and minor appliances, and hot water heating systems. There appears to be a general need to support and educate homeowners more about efficiency, as well as the connection to technology, energy, the environment and potential for cost savings.

From an energy perspective, the following is recommended:

- Assess the state of technology in the residential and non-residential building sector.

- Create fact sheets to help educate homeowners on the various energy saving technologies and their associated cost savings and reduced emissions potential.
- Develop an energy efficiency campaign outlining a clear path to private, state and federal resources with a relevant message and delivery system that resonates at the local, sub-regional and/or regional level.
- Explore public and private partnerships to help support technology change-out programs.
- Explore partnership with ENERGY STAR.

Conclusions and Recommendations: Environmental

Good indoor and ambient (outdoor) air quality is directly related to human health and the environment. A major focus of the study was to determine how many homes in Dillingham and Aleknagik use wood stoves as a primary or secondary heating source as well as the burning practices in those homes. Residential wood smoke contains microscopic or fine particulate matter (referred to as PM2.5) and, when inhaled, can cause health problems and agitate respiratory conditions. While newer stoves are more efficient and produce fewer emissions, they cannot eliminate fine particulate matter. Incomplete combustion generates toxic by-products from wood burning. Combustion is a function of several factors but a key variable is the moisture content in wood.

From an environmental health perspective, the following is recommended:

- Wood smoke can impact both indoor and ambient air quality. Community education material can inform homeowners about the health risks associated with wood smoke and how to minimize exposure.
- The number of wood burning stoves identified in the survey was significant, with 51 percent of respondents using wood as a primary or secondary heating source. Currently, there are no measurements of the impact of wood burning on ambient air quality in Dillingham and Aleknagik. Future assessment of air quality could include ambient PM2.5 monitoring during the heating season to determine a baseline.
- Limited research on burning driftwood and dioxin has been conducted to date. The health risks of using driftwood and of the associated emissions are poorly defined in published literature and text. Measuring emissions and indoor air quality in proximity to burning driftwood is important in building regionally appropriate education material and air quality assessment tools.
- While most people burning indicated that the wood they used was harvested dry, wood moisture content was undetermined. Future assessment of wood moisture would be valuable with baseline PM2.5 assessment.
- Despite improved combustion technology, current regulations on emissions from wood burning stoves have not been updated for over a decade. Furthermore, the State of Alaska has no regulations on the specifications of wood burning appliances that may be sold in the state. We recommend updating these regulations to reduce emissions from stoves purchased for use in rural Alaska in

the future, especially in light of the increasing cost of heating oil and dependence upon wood as a heating source.

- Using wood as a heating source instead of fossil fuels has been described to have a net negative carbon footprint when forestry and wood harvesting practices are optimal. The reduction of greenhouse gas emissions is a very important topic among Alaskans who face more severe impacts of climate change in the historically arctic climate. Future research on the net carbon footprint of heating using wood as a source of fuel in Alaska is of great interest.
- While heating oil typically results in lower emissions than wood burning, homes may have higher indoor air pollution from volatile organic compounds when heating systems are not operated and maintained properly. Education materials on operation and maintenance of fuel oil heating systems would be appropriate for Dillingham and Aleknagik. Educational outreach would benefit from collaboration between public health workers and tribal environmental programs.

Conclusions and Recommendations: Forestry

Harvesting firewood has been a common task in local households for many years. As fuel costs continue to rise, more people are slowly transitioning to wood energy as their primary heating source. This trend is expected to continue and result in increasing consumption of firewood to heat homes, garages and steam baths.

Areas with "dead" standing wood suitable for heating structures are becoming more difficult to find as harvest levels increase. Unless fuel prices go down or an alternative heating source is found, the volume of firewood harvested to heat homes and other structures will continue to rise over time. Practical measures residents can take to get the most out of the wood they harvest is to improve the efficiency of wood burning systems in homes as well as implement proper drying and seasoning techniques.

Highly efficient woodstoves are available and can be sized to individual homes for residents that have not already upgraded. By increasing efficiencies, less wood is required to heat the residence and installing the proper size stove will prevent burning more wood than is necessary. If proper drying and seasoning practices are followed, users will see an increased level of heat or BTUs for the same amount of wood being burned. Moisture meters are a useful tool to identify the moisture content of the wood supply, indicating if it is ready to burn or if it needs to dry longer.

From a Forestry perspective, the following is recommended:

- Inspect homes for leaks and overall efficiency and make upgrades as necessary.
- Select a woodstove made for the size of the home with a high level of efficiency.
- Practice proper wood drying techniques to ensure maximum efficiency from woodstoves.
- Use a moisture meter to monitor the levels in the wood before it is burned.
- Identify barriers to proper wood drying techniques.
- Explore resources and methods for dry wood programs (e.g. wood banking programs).

Appendix A: Survey Questionnaire

Home Heating & Wood Harvest Survey 2012

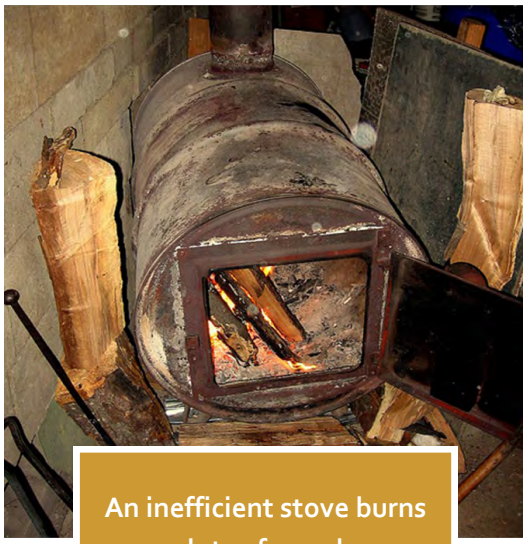
Thank you for participating!

This survey attempts to collect information on home heating systems and practices with a focus on wood stoves, steam baths and smoke houses.

Results will be used to assess the possibility of a wood stove change out program for homes, tailor follow-up education and outreach programs, and assist with research needed to determine sustainable harvest levels.

This project is a collaboration between BBNA's environmental, forestry and energy programs, and the Aleknagik Tribal Council's environmental program.

Thank You!



An inefficient stove burns lots of wood

Bristol Bay Native Association
P.O. Box 310
Dillingham, AK 99576

907.842.5257

Aleknagik Tribal Council
P.O. Box 115
Aleknagik, AK 99555

907.842.2080

SECTION A: HOME INFORMATION

A1. Home Address/Location: (Optional) ❒ Aleknagik ❒ Dillingham

_____

A2. How many people live in your home? _____

A3. What is the size of your home?

- ❒ 1,000 sq. ft. or less
- ❒ 1,001 – 1,500 sq. ft.
- ❒ 1,501 sq. ft. or more
- ❒ I Don't Know/Not Sure

A4. How old is your home?

- ❒ Less than 1 Year
- ❒ 1-5 Years
- ❒ 6-10 Years
- ❒ 11-15 Years
- ❒ 15+ Years
- ❒ I Don't Know/Not Sure

A5. Has your home had an energy audit OR weatherization?

- ❒ Yes _____
- ❒ No _____
- ❒ I Don't Know/Not Sure _____

SECTION B: HOME HEATING (PRIMARY & SECONDARY)

B1. What is the primary heating source for your Home?

- ❒ Heating **(Stove)** Oil
- ❒ Firewood
- ❒ Pellets/Briquettes
- ❒ Other (please specify) _____
- ❒ I Don't Know/Not Sure

B2. What is the manufacture name & model number of your primary heating system?

_____

B3. If your primary heating system is a wood stove, is it EPA certified?

- ❒ Yes **Month _____ Year _____**
- ❒ No
- ❒ I Don't Know/Not Sure
- ❒ Does Not Apply

B4. How old is your primary heating system?

- ❒ Less than 1 Year
- ❒ 1-5 Years
- ❒ 6-10 Years
- ❒ 11-15 Years
- ❒ 15+ Years
- ❒ I Don't Know/Not Sure

B5. What is the secondary heating source for your Home? ❒ **Does Not Apply (go to next section)**

- ❒ Heating **(Stove)** Oil
- ❒ Firewood
- ❒ Pellets/Briquettes
- ❒ Other (please specify) _____
- ❒I Don't Know/Not Sure

B6. What is the manufacture name & model number of your secondary heating system?

_____

B7. If your secondary heating system is a wood stove, is it EPA certified?

- ❒ Yes **Month _____ Year _____**
- ❒ No
- ❒ I Don't Know/Not Sure
- ❒ Does Not Apply

B8. How old is your secondary heating system?

- ❒ Less than 1 Year
- ❒ 1-5 Years
- ❒ 6-10 Years
- ❒ 11-15 Years
- ❒ 15+ Years
- ❒ I Don't Know/Not Sure

SECTION C: HOME HEATING WITH FIREWOOD

IF YOU DO NOT HEAT YOUR HOME WITH FIREWOOD, PLEASE GO TO THE NEXT SECTION.

C1. What type of firewood have you burned in the past year?

- ❒ Birch
- ❒ Spruce
- ❒ Pallets/Scrap Wood
- ❒ Other (please specify) _____
- ❒ I Don't Know/Not Sure

C2. How far have you travelled to harvest firewood in the past year?

- ❒ Less than 5 Miles
- ❒ 5-10 Miles
- ❒ 11-20 Miles
- ❒ 21 Miles +
- ❒ I Buy My Wood
- ❒ I Get My Wood from Family/Friend
- ❒ I Don't Know/Not Sure

C3. How long do you dry your firewood before burning it?

- ❒ Hours
- ❒ Days
- ❒ Weeks
- ❒ Months
- ❒ Years
- ❒ I Harvest only Dry Wood
- ❒ I Don't Know/Not Sure

C4. How do you store/stack your firewood?

- ❒ Stacked Outside/Covered
- ❒ Wood Shed
- ❒ Stacked Outside/Uncovered
- ❒ I Don't Know/Not Sure

C5. How much have you burned in the past year?

Cord(s) (Firewood): _____ **(Sled is about 1/3 Cord)**

Pounds (Pellets/Briquettes): _____

- ❒ I Don't Know/Not Sure

C6. How familiar are you with EPA certified wood stoves?

- ❒ Very Familiar
- ❒ Somewhat Familiar
- ❒ Not at All Familiar
- ❒ I Don't Know/Not Sure

SECTION D: STEAM BATH

D1. Do you own a Steam Bath?❒ Yes ❒ No (Go to Next Section)

D2. What is the heating source for your Steam?

- ❒ Oil
- ❒ Wood
- ❒ Other (please specify) _____
- ❒ I Don't Know/Not Sure

D3. How often do you light your Steam?

- ❒ Daily
- ❒ A Few Times a Week
- ❒ A Few Times a Month
- ❒ I Don't Know/Not Sure

D4. If you heat your Steam with firewood, what type have you burned in the past year?

- ❒ Birch
- ❒ Spruce
- ❒ Other (please specify) _____
- ❒ I Don't Know/Not Sure
- ❒ Does Not Apply

D5. If you heat your Steam with firewood, how far have you travelled to harvest wood in the past year?

- ❒ Less than 5 miles
- ❒ 5-10 miles
- ❒ 11-20 miles
- ❒ 21 miles +
- ❒ I Buy My Wood
- ❒ I Don't Know/Not Sure
- ❒ Does Not Apply

D6. If you heat your Steam with firewood, how much have you burned in the past year?

Cord(s) (Firewood): _____ **(Sled is about 1/3 Cord)**

❒ I Don't Know/Not Sure

SECTION E: SMOKE HOUSE

E1. Do you own a Smoke House? ❒ **Yes** ❒ **No (Go to Next Section)**

E2. What type of firewood have you burned in the past year in you Smoke House? (Please check all that apply)

- ❒ Cottonwood
- ❒ Alder
- ❒ Birch
- ❒ Driftwood
- ❒ Other (please specify) _____
- ❒ I Buy My Wood
- ❒ I Don't Know/Not Sure

E3. How far have you travelled to harvest firewood for your Smoke House in the past year?

- ❒ Less than 5 miles
- ❒ 5-10 miles
- ❒ 11-20 miles
- ❒ 21 miles +
- ❒ I Buy My Wood
- ❒ I Don't Know/Not Sure

E4. How much firewood have you burned for you Smoke House in the past year?

- ❒ I Cord
- ❒ 1/2 Cord
- ❒ 1/3 Cord **(sled size)**
- ❒ 1/4 Cord
- ❒ I Don't Know/Not Sure

SECTION F: OTHER

F1. Would you like more information on any of the following?

- ❒ Home Energy Efficiency
- ❒ Home Energy Audits/Weatherization
- ❒ Wood Stove Efficiency
- ❒ Wood Stove Cleaning & Maintenance
- ❒ Wood Drying
- ❒ Burn Wise (EPA Program)
- ❒ Wood Smoke & Air Quality
- ❒ Lot Management
- ❒ Other _____

F2. Do you have any questions, concerns, comments?

_____

_____

_____

_____

_____

Date of Survey: _____

Name of Surveyor: _____

Appendix B: Quality Assurance Project Plan

CAA 103 - Tribal Air Quality Grant Agreement

Bristol Bay Clean Air Act Project

Prepared by:
Melody Nibeck

In Consultation with:
Susan Flensburg
Tina Tinker
Chris Fish

Bristol Bay Native Association
P.O. Box 310
Dillingham, Alaska 99576

May 2012

Table of Contents

List of Tables

List of Appendices

1. Project Title & Approval

1.1 Project Title
Bristol Bay Clean Air Act Project

1.2 Project Approval
The Bristol Bay Clean Air Act Project is recommended for approval and commits the project to follow the elements described within.

BRISTOL BAY NATIVE ASSOCIATION

_____ _____
Susan Flensburg, Environmental Program Manager Date

_____ _____
Melody Nibeck, Tribal Energy Program Manager Date

ALEKNAGIK TRADITIONAL COUNCIL

_____ _____
Tina Tinker, Environmental Program Assistant Date

EPA REGION 10

_____ _____
MPH Erin Mader, EPA Project Officer Date

_____ _____
Christopher Hall, EPA Air QA Coordinator Date

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM

_____ _____
Chris Fish, Environmental Health Consultant Date

2. Distribution List
All copies and subsequent revisions are distributed to the following individuals.

Table 1

Name	Position	Organization	Contact Information
Susan Flensburg	Environmental Project Manager	Bristol Bay Native Association	P.O. Box 310 Dillingham, AK 99576 907.842.5257 sflensburg@bbna.com
Melody Nibeck	Tribal Energy Program Manager	Bristol Bay Native Association	P.O. Box 310 Dillingham, AK 99576 907.842.5257 mnibeck@bbna.com
Tina Tinker	Environmental Program Assistant	Aleknagik Traditional Council	P.O. Box 115 Aleknagik, AK 99555 907.842.4407 Tina.tinker@yahoo.com
Erin Mader	Community Environmental Health Specialist	US EPA, Region 10	1200 Sixth Avenue, Suite 900, AWT-107 Seattle, WA 98101-3140 206.553.1254 Mader.erin@epa.gov
Christopher Hall	Air QA Coordinator	US EPA, Region 10	1200 Sixth Avenue, Suite 900, OEA-095 Seattle, WA 98101-3140 206.553.0521 1.800.424.4372, ext. 0521 Hall.christopher@epa.gov
Chris Fish	Environmental Health Consultant	Alaska Native Tribal Health Consortium	1901 Bragaw Street, Suite 200 Anchorage, Alaska 99508 907.729.3489 cfish@anthc.org

3. Project Organizations & Responsibilities

3.1 Project Organizations
The Bristol Bay Native Association (BBNA), a tribal consortium serving 31 federally-recognized tribes in the Bristol Bay region situated in southwest Alaska, functions as a service agency dedicated to the betterment of the Native people of the region. The association administers a wide range of federally and state funded programs, including the Environmental, Energy and Forestry Programs dedicated to assisting and building capacity at the local level.

The Aleknagik Traditional Council (ATC) is one of the federally-recognized tribes within the BBNA service area. The council has a well-established environmental program that has successfully operated for more than 10 years.

The Alaska Native Tribal Health Consortium (ANTHC) has agreed to provide technical assistance to BBNA through its Environmental Health & Engineering division.

3.2 Project Responsibilities

BBNA Environmental Program Manager – Susan Flensburg
- Management of overall grant agreement including quarterly progress reports to EPA, coordination with BBNA accounting department on financial reports and draw downs
- Prepare and manage sub-recipient agreement with Aleknagik Traditional Council
- Organize quarterly meetings with project team

- Assist with pre-survey implementation tasks (finalizing questionnaire and script, Quality Assurance Project Plan, educational materials for homeowner packet)
- Assist with survey implementation (conducting questionnaire with homeowners and entering data into database)
- Assist with final report summarizing findings and recommendations)
- Assist with project outreach and workshops in Dillingham & Aleknagik

BBNA Tribal Energy Program Manager - Melody Nibeck
- Prepare draft questionnaire and script
- Conduct pre-test of questionnaire
- Prepare Quality Assurance Project Plan
- Prepare information packet for homeowners
- Assist with conducting questionnaire with homeowners
- Create database and manage data input
- Analyze data and formulate recommendations
- Prepare final report (summary of findings & recommendations)
- Help with project outreach and workshops in Dillingham & Aleknagik

Aleknagik Tribal Environmental Program - Tina Tinker
- Assist with finalizing draft questionnaire and script, and pre-testing questionnaire
- Conduct questionnaire with homeowners in Dillingham and Aleknagik
- Input data from completed questionnaires
- Assist with project outreach and workshops in Aleknagik & Dillingham

ANTHC Environmental Health Consultant - Chris Fish
- Provide technical assistance with development and pre-testing of questionnaire
- Provide technical support for Quality Assurance Project Plan development and maintenance
- Provide technical assistance with establishing database, analyzing data and formulating recommendations
- Provide technical review of draft report summarizing findings & recommendations
- Assist with project outreach and workshops in Aleknagik & Dillingham

4. Problem Statement/Background

Concerns about indoor and outdoor air quality are escalating. Wood smoke from home heating systems and effects on air quality is an issue of particular concern. As fuel prices continue to increase in Rural Alaska, more homeowners are supplementing their need for space heating with a wood type of fuel. Responsible wood-burning techniques are not always used as evidenced by chimney stack smoke and odors. To date, no data has been systematically collected in Aleknagik or Dillingham to determine the type and age of wood burning systems in homes, and the type and amount of wood fuel being used.

5. Project Description & Components

5.1 Project Description

The project will collect and share information on home heating systems and practices, through interviews and outreach, with a focus on wood burning stoves, steam baths and smoke houses. A questionnaire will be used to gather information on wood collection and wood burning systems. The questionnaire will be piloted with a small test group and refined as necessary. A Quality Assurance Project Plan will be developed to ensure data collected is valid and can be relied upon for its intended purpose. A sub-recipient agreement with the Aleknagik Traditional Council will be developed to help administer the questionnaire and face-to-face interviews. Homeowners will be provided educational materials. Survey results will be used to assess the possibility of wood heating system exchange programs, tailoring follow up education and outreach programs, and assist with research needed to determine sustainable harvest levels.

5. 2 Components

The project consists of three components with associated commitments, time frames, outputs and deliverables.

Component 1: Management of Grant Agreement
This component focuses on management of the grant agreement to ensure compliance with all the terms and agreements. It includes commitments related to the quarterly reports, financial reports, sub-recipient agreement, and quarterly meetings with project members.

Component 2: Survey Questionnaire/Data Collection
This component focuses on data collection. It includes commitments related to the preparation of a draft questionnaire, script for interviewer and pre-test with small group of homeowners, preparation of the QAPP, and creation of database. It also includes the completion of the questionnaire with a face-to-face interview with homeowners, the input of data from the questionnaire into the database, and the associated analysis, including preparation for the final report. The draft questionnaire was revised twice based on input from project team members and suggested changes from the EPA Office of Air, Waste, and Toxics Tribal Air Program. The final revised survey questionnaire was subsequently pre-tested with a small group and minor changes made as a result. A copy of the final survey questionnaire is provided in Appendix A.

Component 3: Education & Outreach
This component focuses on education and outreach. It includes the compilation and distribution of information for homeowners, the organization of workshops in both communities and any outreach with other targeted audiences at the local, regional, state and federal levels via presentations.

6. Data Quality Objectives
This section describes how good the data is in relation to the project objectives. The questionnaire includes 6 sections, 26 closed-ended questions, and 6 open-ended questions. The closed-ended questions are standardized answers organized in a set format and exhaustive. The open-ended questions are there for the responded to formulate his or her own answer. The sections and questions flow logically. In some cases, sections will not apply to the respondent and the interviewer may skip to the next appropriate one. For all questions a response of "I don't know/not sure" is provided. For some question a "does not apply" or "other" is provided.

Table 2

Section	Question Number	Question	Type of Question	Objective
Header	N/A	Survey Number	Automatic generated number	A field in the header has been formatted to generate numbers 1-500 using a merge feature when printing.
Section A	A1	Address/Location	Open	The address/location question is optional.
Section A	A2	Number of People Living in Home	Open	Basic home information. This question links to data in relation to total number of individuals surveyed.
Section A	A3	Size of Home	Closed	Basic home information. This question links to data in relation to the total square footage of homes surveyed.
Section A	A4	Age of Home	Closed	Basic home information. This question links to data in relation to age of home, home efficiency, home weatherization and age of home heating systems.
Section A	A5	Energy Audit	Closed	Basic home information. This question links to data in relation to participation in state and federal home energy audit/weatherization programs for information sharing.
Section B	B1	Primary Heating Source	Closed	Basic home heating information. This question provides direct feedback on the primary heating source for the home.

Section B	B2	Brand of Primary Heating System	Open	Basic home heating information. This question allows the homeowner to provide a description of their primary home heating system that can be cross-referenced with manufacture specifications to determine its efficiency standard.
Section B	B3	Age of Primary Heating System	Closed	Basic home heating information. This question links to data in relation to the age of the primary heating system and efficiency.
Section B	B4	Secondary Heating Source	Closed	Basic home heating information. This question provides direct feedback on the heating source of the secondary system for the home.
Section B	B5	Brand of Secondary Heating System	Open	Basic home heating information. This question allows the homeowner to provide a description of their secondary home heating system that can be cross-referenced with manufacture specifications to determine its efficiency standard.
Section B	B6	Age of Secondary Heating System	Closed	Basic home heating information. This question links to data in relation to the age of the secondary heating system and efficiency.
Section C	C1	Type of Firewood Burned	Closed	Basic home heating with firewood information. This question asks for the type of firewood and "other" wood being used to heat a home, if applicable.
Section C	C2	Length of Travel to Harvest Firewood	Closed	Basic home heating with firewood information. This question asks how far the homeowner has travelled to harvest firewood in the past year.
Section C	C3	Seasoning	Closed	Basic home heating with firewood information. This question asks how long the homeowner seasons their firewood before burning.
Section C	C4	Stacking	Closed	Basic home heating with firewood information. This question asks how the homeowner stacks and stores their firewood before burning.
Section C	C5	Quantity	Open	Basic home heating with firewood information. This question asks how much firewood the homeowner has burned in the past year in terms of cords and/or pounds. Prompts will be used to help homeowner answer the question.
Section C	C6	EPA Firewood Heating Systems	Closed	Basic home heating with firewood information. This question asks how familiar the homeowner is with EPA qualified wood heating systems
Section D	D1	Steam Bath	Closed	Basic steam bath information. This question asks whether there is a steam bath associated with the home.

Section D	D2	Heating Source	Closed	Basic steam bath information. This question asks the type of heating source for the steam bath to determine if firewood is being used.
Section D	D3	Frequency	Closed	Basic steam bath information. This question asks how often the steam is utilized.
Section D	D4	Type of Firewood Burned	Closed	Basic steam bath information. This question asks the type of firewood the steam uses.
Section D	D5	Length of Travel to Harvest Firewood	Closed	Basic steam bath information. This question asks how far the homeowner has travelled in the past year to harvest firewood to burn in the steam bath.
Section E	D6	Quantity	Open	Basic steam bath information. This question asks how much firewood the homeowner has burned in the past year in terms of cords and pounds. Prompts will be used to help homeowner answer the question.
Section E	E1	Smoke House	Closed	Basic smoke house information. This question asks whether there is a smoke house associated with the home.
Section E	E2	Type of Firewood Burned	Closed	Basic smoke house information. This question asks the type of firewood the smoke house uses.
Section E	E3	Length of Travel to Harvest Firewood	Closed	Basic smoke house information. This question asks how far the home owner has travelled in the past year to harvest firewood for use in the smoke house.
Section E	E4	Quantity	Closed	Basic smoke house information. This question asks how much firewood in terms of cords the home owner has burned in the past year. Prompts will be used to help homeowner answer question.
Section F	F1	Information	Closed	Other information. This question asks whether the homeowner is interested in any other type of information related to energy efficiency and wood burning system.
Section F	F2	Questions	Open	Other information. This question asks the homeowner to provide in their own words any questions, concerns or comments they may want to share.

7. Documentation Recorded

The questionnaire will be used to record all data that is transferred from the field, and covers a series of queries and prompts to gather the required data. The same questionnaire will be administered with a face-to-face interview for standardization, and if necessary for collection of missing data or clarification of answers with a follow-up phone call. A copy of the most recent draft is attached for reference and replication.

8. Sampling Method/Handling

The questionnaire will be conducted in the communities of Aleknagik and Dillingham with a target of 500 homes in total. The sampling method includes coordination with city offices for a sharing and complete listing of home addresses. The two communities will be divided into data collection areas for field workers based on listing and local knowledge. Sufficient quantities of surveys will be provided to field workers, including space for the worker to input the date of survey and their name. Upon completion, the field worker will return the questionnaires to BBNA for recording and storage.

9. Data Validation & Storage
The data will be managed on an office personal computer where security measures are in place. The security measures include a user name and password necessary to access the computer's desktop. BBNA's network administrator assigns user names. The data will not be stored in a network drive. It will be stored on a personal desktop and shared via a removable storage device, as necessary. All data will be entered into a Microsoft Excel 2010 commercial application spreadsheet for calculations, graphics and use of pivot tables for sorting, counting and totaling data. All data will be backed up to an external drive on a weekly basis and secured in a safe off-site location.

9.1 Data Validation
The data validation is appropriate to prevent invalid data from being entered into a cell. The cells within the spreadsheet will be programmed for data validation. For closed-ended questions, each answer will be assigned a numeric value and cells will be formatted to fit the question and value range. For open-ended question, answers will be typed verbatim into the assigned cell.

Each cell will be assigned a validation criterion, input message, and error alert. The validation criterion will include a whole number with a minimum and maximum range allowing a rejection of any data entered outside the range. The input message will show when the cell is selected and serve as a prompt when entering data. The error alert will show after invalid data is entered. A large "stop" icon will appear with an error message alert prompting a correction. If necessary, a forced input from a dropdown list of values specified may be used for each cell.

9.2 Data Storage
Data storage and archive policies are shown below.

Table 3

Date Type	Medium	Retention Time	Final Disposition
Field Data from Questionnaire	Hardcopy	3 years	Discarded
Field Notes, if any	Hardcopy	3 years	Discarded
Field Data from Spreadsheet	Electronic	7 years	n/a
Reports	Electronic	7 years	n/a

10. Reports

10.1 Quarterly Reports
Quarterly reports will be submitted consistent with the Grant Agreement and project management.

10.2 Financial Reports
Financial reports will be submitted consistent with the Grant Agreement and project management.

10.3 Final Report
A final report will be submitted consistent with the Grant Agreement and project management. The final report will include analyzed and compiled responses from database as well as a summary of findings and recommendations. A copy of the final report will be shared with homeowners who expressed interest, project team and appropriate local, regional, state and federal partners.

Appendix C: Informational Material Distributed

NAME OF PUBLICATION	BRIEF DESCRIPTION	SOURCE
Burn Wise, Burn the Right Wood, the Right Way, in the Right Wood-Burning Appliance	General information on all aspects of wood burning. One-page handout.	US EPA, Burn Wise Outreach Material
Wet Wood is a Waste, Burn Dry Firewood to Save Money and Health	General information on splitting, stacking, covering and storing firewood; moisture meters, wood smoke and health. Brochure.	US EPA, Burn Wise Outreach Material, Tribal Section
Alaska Native Village Air Quality Fact Sheet Series, Wood Smoke	General information on wood smoke, impacts on health and best ways to "burn clean." Two-page handout.	US EPA, Region 10
Wood Energy, Heating your Home with Wood, Choosing the Right Wood Burning Appliance for You, Outdoor Wood Burners	General information on outdoor wood burners, including pictures, advantages and disadvantages and links to resources. Two-page handout.	University Alaska Fairbanks, Cooperative Extension Service Rural Development, Wood Energy Fact Sheet
Wood Energy, Heating your Home with Wood, Choosing the Right Wood Burning Appliance for You, Non-Catalytic Wood Stoves	General information on non-catalytic wood stoves, including pictures, advantages and disadvantages and links to resources. One-page handout.	University Alaska Fairbanks, Cooperative Extension Service Rural Development, Wood Energy Fact Sheet
Wood Energy, Heating your Home with Wood, Choosing the Right Wood Burning Appliance for You, Catalytic Wood Stoves	General information on catalytic wood stoves, including pictures, advantages and disadvantages and links to resources. One-page handout.	University Alaska Fairbanks, Cooperative Extension Service Rural Development, Wood Energy Fact Sheet

Wood Energy, Heating your Home with Wood, Choosing the Right Wood Burning Appliance for You, Pellet Stoves	General information on pellet stoves, including pictures, advantages and disadvantages and links to resources. Two-page handout.	University Alaska Fairbanks, Cooperative Extension Service Rural Development, Wood Energy Fact Sheet
Does Your Wood Stove Have a Dirty Little Secret?	General information on old stoves versus new stoves, efficiency and savings. Brochure.	US EPA, Burn Wise Outreach Material
Alaska Housing Finance Corporation's Home Energy Rebate Program Factsheet	General information on purpose, eligibility, rebate amounts, steps to participation in program, and contact information. One-page handout.	Alaska Housing Finance Corporation, Energy Program, Fact Sheet
Energy Savers Tips for Rural Alaska	General information on residential home efficiency, including tips and links to resources. Booklet.	Alaska Energy Authority, Southwest Alaska Municipal Conference, Alaska Housing Finance Corporation, Alaska Building Science Network
Visit the Wood Energy Website **www.alaskawoodheating.com**	Business size magnets with reference to web site including, six hints or reminders related to wood energy. Magnet.	University Alaska Fairbanks, Cooperative Extension Service Rural Development, Wood Energy Fact Sheet
Visit the Alaska Energy Efficiency Website **www.akenergyeffiency.org**	Business size card with reference to web site. Business card.	AK Energy Efficiency Partnership

Appendix D: Survey Results

Aleknagik Survey Results

Section A: Home Information

A1. Home Address/Location	
Aleknagik	44
Dillingham	0
Total Responses	44
A2. How many people live in your home?	
Average	2.7
A3. What is the size of your home?	
< 1,000 s.f.	9
1,001-1,500 s.f.	29
>1,501 s.f.	6
Not Sure	0
Total Responses	44
A4. How old is your home?	
Less than 1 Year	2
1-5 Years	2
6-10 Years	3
11-15 Years	15
15 Plus Years	22
Not Sure	0
Total Responses	44
A5. Has your home had an energy audit or weatherization?	
Yes	21
No	21
Not Sure	2
Total Responses	44
A5. Comments on energy audit or weatherization.	
Total Number of Comments	16

Aleknagik Survey Results

Section B: Home Heating (Primary & Secondary)

B1. What is the Primary heating source for your Home?

Heating Oil	39
Firewood	5
Pellets/Briquettes	0
Other	0
Not Sure	1
Total Responses	45

B2. What is the Make & Model of your Primary heating system?

Number of Responses	42

B3. If your Primary heating system is a wood stove, is it EPA certified?

Yes	5
No	0
Not Sure	0
Does Not Apply	39
Total Responses	44

B4. How old is your Primary heating system?

Less than 1 Year	1
1-5 Years	10
6-10 Years	10
11-15 Years	7
15+ Years	11
Not Sure	4
Total Responses	43

B5. What is the Secondary heating source for your home?

Does Not Apply	11
Heating Oil	5
Firewood	26
Pellets/Briquettes	0
Other	0
Not Sure	1
Total Responses	43

B6. What is the Make & Model of your Secondary heating system?

Number of Responses	30

B7. If your Secondary heating system is a wood stove, is it EPA certified?

Yes	22
Not	2
Not Sure	2
Total Responses	26

B8. How old is your Secondary heating system?

Less than 1 Year	1
1-5 Years	6
6-10 Years	7
11-15 Years	7
15+ Years	10
Not Sure	1
Total Responses	32

Aleknagik Survey Results

Section C: Home Heating with Firewood

C1. What type of firewood have you burned in the past year?

Birch	10
Spruce	31
Pallets/Scrap Wood	5
Other	0
Not Sure	1
Total Responses	47

C2. How far have you travelled to harvest firewood in the past year?

Less than 5 Miles	17
5-10 Miles	13
11-20 Miles	1
21+ Miles	0
Buy Wood	0
Family/Friends	0
Not Sure	1
Total Responses	32

C3. How long do you dry your firewood before burning it?

Hours	0
Days	0
Weeks	0
Months	1
Years	1
Harvest only Dry Wood	28
Not Sure	1
Total Responses	31

C4. How do you stack/store your firewood?

Stacked Outside/Covered	17
Wood Shed	6
Stacked Outside/Uncovered	7
Not Sure	1
Total Responses	31
Total Comments	62

C5. How much firewood have you burned in the past year?

Cords (number)	28
Pellets/Briquettes (pounds)	0
Not Sure	1
Total Responses	29
Average	5.7

C6. How familiar are you with EPA certified wood stoves?

Very Familiar	3
Somewhat Familiar	12
Not at all Familiar	15
Not Sure	4
Total Responses	34

Aleknagik Survey Results

Section D: Steam Bath

D1. Do you own a Steam Bath?

Yes	23
No	21
Total Responses	44

D2. What is the heating source for you Steam?

Oil	1
Wood	22
Other	0
Not Sure	0
Total Responses	23

D3. How often do you light your Steam?

Daily	4
Few Times/Week	11
Few Times/Month	6
Not Sure	3
Total Responses	24

D4. If you heat your Steam with firewood, what type of firewood have you burned in the past year?

Birch	2
Spruce	20
Other	5
Not Sure	0
Does Not Apply	1
Total Responses	28

D5. If you heat your Steam with firewood, how far have you travelled to harvest wood in the past year?

Less than 5 Miles	10
5-10 Miles	9
11-20 Miles	1
21+ Miles	0
Buy Wood	1
Family/Friends	0
Not Sure	2
Total Responses	23

D6. If you heat your Steam with firewood, how much have you burned in the past year?

Cords (number)	19
Not Sure	3
Total Responses	22
Average	3

Aleknagik Survey Results

Section E: Smoke House

E1. Do you own a Smoke House?

Yes	16
No	25
Total Responses	41

E2. What type of firewood have you burned in the past year?

Cottonwood	12
Alder	1
Birch	1
Driftwood	1
Other	2
Buy Wood	0
Not Sure	0
Total Responses	17

E3. How far have you travelled to harvest firewood for your Smoke House in the past year?

Less than 5 Miles	8
5-10 Miles	6
11-20 Miles	0
21+ Miles	1
Buy Wood	0
Family/Friends	0
Not Sure	0
Total Responses	15

E4. How much firewood have you burned in the past year?

1 Cord	3
1/2 Cord	3
1/3 Cord	3
1/4 Cord	4
Not Sure	2
Total Responses	15

Aleknagik Survey Results

Section F: Other

F1. Would you like more information on any of the following?

Home Energy Efficiency	11
Home Energy Audits/Weatherization	5
Wood Stove Efficiency	3
Wood Stove Cleaning & Maintenance	6
Wood Drying	2
Burn Wise	2
Wood Smoke & Air Quality	3
Lot Management	4
Other	0

F2. Comments/Questions/Concerns

Number of Responses	8

Aleknagik Survey Results

Primary Heating Systems

Brand	Responses
Blaze King	2
Earth Stove	1
Kinetic Energy System	1
Monitor	1
Oil Miser	1
Pacific Vista	1
Quietside	2
Slant/Fin	1
Toyostove	14
Toyotomi	1
Weil-McLain	18
Total	43

Aleknagik Survey Results

Secondary Heating Systems

Brand	Responses
Blaze King	3
Century	1
Country	10
Dutch West	3
Hearthstone	1
Monarch	1
Monitor	1
Napolean	1
Pacific Energy	1
Queen Blaze	1
Stove Tech	1
Toyostove	5
Warmock	1
Total	30

Dillingham Survey Results

Section A: Home Information

A1. Home Address/Location	
Aleknagik	0
Dillingham	361
Total Responses	361
A2. How many people live in your home?	
Average	3.1
A3. What is the size of your home?	
<1,000	91
1,001-1,500 s.f.	136
>1,501 + s.f.	114
Not Sure	21
Total Responses	362
A4. How old is your home?	
Less than 1 Year	0
1-5 Years	19
6-10 Years	20
11-15 Years	27
15+ Years	281
Not Sure	0
Total Responses	347
A5. Has your home had an energy audit or weatherization?	
Yes	151
No	185
Not Sure	25
Total Responses	361
A5. Comments on energy audit or weatherization.	
Total Number of Comments	91

Dillingham Survey Results

Section B: Home Heating (Primary & Secondary)

B1. What is the Primary heating source for your Home?

Heating Oil	309
Firewood	51
Pellets/Briquettes	1
Other	1
Not Sure	0
Total Responses	362

B2. What is the Make & Model of your Primary heating system?

Number of Responses	326

B3. If your Primary heating system is a wood stove, is it EPA certified?

Yes	23
No	15
Not Sure	17
Does Not Apply	304
Total Responses	359

B4. How old is your Primary heating system?

Less than 1 Year	29
1-5 Years	114
6-10 Years	37
11-15 Years	33
15+ Years	106
Not Sure	35
Total Responses	354

B5. What is the Secondary heating source for your home?

Does Not Apply	174
Heating Oil	46
Firewood	125
Pellets/Briquettes	0
Other	6
Not Sure	0
Total Responses	351

B6. What is the Make & Model of your Secondary heating system?

Number of Responses	162

B7. If your Secondary heating system is a wood stove, is it EPA certified?

Yes	65
Not	29
Not Sure	29
Total Responses	123

B8. How old is your Secondary heating system?

Less than 1 Year	10
1-5 Years	52
6-10 Years	30
11-15 Years	13
15+ Years	59
Not Sure	17
Total Responses	181

Dillingham Survey Results

Section C: Home Heating with Firewood

C1. What type of firewood have you burned in the past year?

Birch	94
Spruce	171
Pallets/Scrap Wood	34
Other	12
Not Sure	2
Total Responses	313

C2. How far have you travelled to harvest firewood in the past year?

Less than 5 Miles	43
5-10 Miles	67
11-20 Miles	35
21+ Miles	10
Buy Wood	24
Family/Friends	15
Not Sure	2
Total Responses	196

C3. How long do you dry your firewood before burning it?

Hours	2
Days	1
Weeks	5
Months	9
Years	16
Harvest only Dry Wood	139
Not Sure	2
Total Responses	174

C4. How do you stack/store your firewood?

Stacked Outside/Covered	86
Wood Shed	55
Stacked Outside/Uncovered	25
Not Sure	0
Total Responses	166
Total Comments	7

C5. How much firewood have you burned in the past year?

Cords (number)	162
Pellets/Briquettes (pounds)	0
Not Sure	11
Total Responses	173
Average	5.5

C6. How familiar are you with EPA certified wood stoves?

Very Familiar	21
Somewhat Familiar	74
Not at all Familiar	196
Not Sure	11
Total Responses	302

Dillingham Survey Results

Section D: Steam Bath

D1. Do you own a Steam Bath?

Yes	155
No	204
Total Responses	359

D2. What is the heating source for you Steam?

Oil	30
Wood	121
Other	0
Not Sure	0
Total Responses	151

D3. How often do you light your Steam?

Daily	11
Few Times/Week	81
Few Times/Month	45
Not Sure	7
Total Responses	144

D4. If you heat your Steam with firewood, what type of firewood have you burned in the past year?

Birch	28
Spruce	106
Other	45
Not Sure	3
Does Not Apply	24
Total Responses	206

D5. If you heat your Steam with firewood, how far have you travelled to harvest wood in the past year?

Less than 5 Miles	22
5-10 Miles	59
11-20 Miles	20
21+ Miles	8
Buy Wood	20
Family/Friends	2
Not Sure	24
Total Responses	155

D6. If you heat your Steam with firewood, how much have you burned in the past year?

Cords (number)	109
Not Sure	10
Total Responses	119
Average	2.7

Dillingham Survey Results

Section E: Smoke House

E1. Do you own a Smoke House?

Yes	151
No	203
Total Responses	354

E2. What type of firewood have you burned in the past year?

Cottonwood	95
Alder	28
Birch	19
Driftwood	45
Other	6
Buy Wood	1
Not Sure	1
Total Responses	195

E3. How far have you travelled to harvest firewood for your Smoke House in the past year?

Less than 5 Miles	56
5-10 Miles	53
11-20 Miles	16
21+ Miles	14
Buy Wood	4
Family/Friends	3
Not Sure	0
Total Responses	146

E4. How much firewood have you burned in the past year?

1 Cord	14
1/2 Cord	29
1/3 Cord	16
1/4 Cord	74
Not Sure	10
Total Responses	143

Dillingham Survey Results

Section F: Other

F1. Would you like more information on any of the following?

Home Energy Efficiency	57
Home Energy Audits/Weatherization	52
Wood Stove Efficiency	46
Wood Stove Cleaning & Maintenance	33
Wood Drying	21
Burn Wise	27
Wood Smoke & Air Quality	41
Lot Management	13
Other	0

F2. Comments/Questions/Concerns

Number of Responses	85

Dillingham Survey Results

Primary Heating Systems

Brand	Responses
AMA	1
Armstrong Air	1
Baseboard	4
Beckett	3
Blaze King	28
Bradley	1
Budures	1
Burnham	24
Coleman	2
Country	1
Ducane	1
Dutch West	1
Earth Stove	1
England's Stove Works	1
Fire King	1
Furnace (Force Air)	14
Garn	1
Hearthstone	1
Homemade	4
HS Tarm	1
Hydrotherm	1
Jotul	1
Kinetic Energy System	20
Lennox	3
Metzger's	1
Miller	2
Monitor	22
Napolean	1
Nordic Stove	2
Old Cooking Stove	3
Outside Wood Burner	7
Preway	1
Quietside	5
Rem System	1
Sears Roebuck	4
Singer	1
Slant/Fin	10
Temp-O-Matic	7
Toyostove	86
Toyotomi	23
Ultimate	2
Unica	1
Vogelzang	2
Weil-McLain	22
Wica	1
Total	293

Dillingham Survey Results

Secondary Heating Systems

Brand	Responses
Arrow	1
Baseboard	1
Blaze King	58
Bock's	1
Burkshire	1
Burnham	1
Central	2
Country	3
Dutchwest	2
Earth Stove	2
EdenPURE	1
Englander	1
French (?)	1
Garn	1
Hearth Stone	5
Heat & Glo	1
Homemade	4
HS Tarm	1
Intertherum	2
Jotul	3
Kinetic Energy System	7
Lang	1
Miller	1
Monitor	6
Montgomery Wards	1
Morso	1
Olsen	1
Osburn	6
Pioneer	1
Propane	1
Quadra-Fire	3
Quietside	2
Resolute Acclaim	1
Scandia 840	1
Sears and Roebuck	2
Temp-O-Mantic	1
Toyostove	12
Toyotomi	3
Traditions	1
Trane	1
Vermont Casting	6
Vogelzang	3
Weil-McLain	3
Wood Boiler	1
Total	145