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Project Title: The Alaska Fire Science Consortium:
Building Bridges Between Fire Scientists and Managers in Alaska

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I. Key Accomplishments, Challenges and Lessons Learned

Over the past two years, we have worked hard to establish the Alaska Fire Science Consortium (AFSC) as a recognized and effective boundary organization (Guston 2001) and have collaborated with other consortia in the Joint Fire Sciences Program (JFSP) Knowledge Network to establish recognition of the network and synthesize regional needs assessment results (Kocher et al. Accepted). We aim to improve fire science communication in Alaska and provide services and products that meet the needs of our fire and land management community. Our main activities have corresponded closely with our outputs (products, services and events). We present these activities, outputs and corresponding outcomes below. Details on activities, products, and event participation can be found in our annual report submitted December, 2011.

A. Workshops

We have hosted three fire science workshops to provide an open platform for presenting research findings and ongoing projects and encouraging discussion and dialog between scientists and consumers (those who use scientific information). This is one of the few organized opportunities for the broad fire community to gain knowledge and provide input on fire related research in Alaska.

- ***Workshop Outcomes:*** Our annual Fire Science Workshop has become recognized as part of the annual Alaska Interagency Fall Fire Review. Cross over in attendance is high, with many travelers planning to attend both events. After three annual workshops, we are beginning to observe a shift in attitude and interest in the workshop with participants now seeking out and planning for this event in advance. These workshops have become part of the "annual routine" for many of our stakeholders. On-line, archived, workshop presentations have been accessed from our website and bog up to six months post-event.

- Workshop evaluation surveys in 2011 indicate that our annual workshop is an important event for achieving our desired outcomes (see section II. E. logic model outcomes): 92% of respondents learned something at the workshop that they can use immediately in their job; 88% learned something that they perceive will help them in their professional development; 73% plan to contact a fire scientist or fire manager to develop research ideas that could help them in their work; 73% believe the consortium is having a long-term impact on how science is used and applied in fire management decisions; 65% met new consortium participants with whom they plan to stay in touch; 35% report thinking differently about fire science as a result of this workshop. Open-ended survey responses help guide us in future workshop planning by commenting on content, speaker presentation effectiveness, and logistics.

B. Webinars

With reductions in budgets and busy schedules, webinars have become a popular way to disseminate information, and they support real-time audience interaction. Webinars are topic-driven and they attract a narrow but highly interested and engaged group of participants. All of our webinars are recorded and archived on-line for future access.

- ***Webinar Outcomes:*** As knowledge and interest in the consortium has grown, researchers are beginning to request webinar presentation slots as they recognize the consortium to be a useful tool in technology transfer. Respondents to post-webinar evaluation surveys indicate overwhelmingly that the information in the webinars is useful and/or interesting (asked after three of our webinars). We have recently refined our post-webinar evaluation questions to collect more specific information. In our most recent webinar, 100% of respondents both learned something new and found the webinar relevant to their work. The response rate for these webinars has been 28-41%.

C. Written Products

AFSC has released newsletters, project summaries, event summaries, brochures, peer reviewed articles, as well as contributions to several other documents. These documents are generally distributed electronically to our mailing list and highlighted on the web through multiple feeds (twitter, blog, e-newsletter, etc.).

- ***Written Product Outcomes:*** Recent implementation of social communication tools allows us to now track and determine usage of our written on-line products. Prior to this, informal comments and survey results have been positive.

D. Website and Internet Products

We view our website as one of the primary modes of communication with our stakeholders and partners. We therefore place priority on website development, maintenance, improvement, evaluation, and the incorporation of new, more interactive tools.

- ***Website and Internet Product Outcomes:*** As we continue to grow, website visits have increased along with twitter followers and blog views. Our twitter account was established on May 4, 2011. As of February 21, 2012 we had 113 followers. We average fifteen new twitter followers per month. Our blog was created in July 2011. As of February 21, 2011 we have had 1,311 total views with an average of 164 views per month. We have five blog followers representing Natural Resources Canada, National Park Service (2), Oregon State University and the University of Idaho. Our website and webinar services are increasingly utilized by other partner groups, such as the newly formed Alaska Fire Modeling Discussion Group, to provide web space and project support. According to the national survey, our web-based resources are among the most often accessed resource, second only to personal communication with co-workers.

E. Field Trips

Small, focused field trips have provided targeted audiences with personal interaction with managers, artists, fire fighters, ecologists, and other researchers. The knowledge gained and relationships developed through informal personal interaction during field trips can far out-weigh information given in a classroom/conference setting.

- ***Field Trip Outcomes:*** Four of our five trips were part of the *In Time of Change: The Art of Fire* humanities project, providing local professional artists with access to managers, operations activities, scientists, and field research projects from which to base their artwork. The resulting art pieces will be displayed in a professional art show in August 2012. Evaluation of this *Art of Fire* project is planned for year 1 of this renewal project (see section II.D. planned activities).

F. Primary Challenges

To date, our primary challenges have revolved around gaining community recognition, assessing program effectiveness and engaging suppression management interest in AFSC activities. For example, we have experienced relatively low response rate on regionally administered program and event evaluation surveys (roughly 10-30 total responses) as well as on the national evaluation survey (45 total responses). The Alaska fire community is also relatively small so this may represent as much as 30-40% of our stakeholders. However, we do not know the perspectives and opinions of our constituents who have not participated in the survey. It has also been a challenge to capture the interest of suppression managers and establish AFSC products as relevant to their specific management applications (see section II. A. logic model situation). We have also experienced a challenge in designing field experiences that can be relevant to a broad audience and are logistically feasible. It is reasonable to believe that these challenges are to be expected in the early stages of the normal and natural evolution of creating a known and trusted boundary organization. See section II. D. planned activities for ways in which we propose to address these challenges, including developing a more robust program evaluation framework.

G. Successes

Overall, our program and event evaluation surveys have conveyed positive response to our activities and approach, as well as suggestions for improvement and support for AFSC as a whole. We continue to grow and every event leads to more stakeholders being added to our list-serv. As noted above, our workshops and products are gaining increasing recognition and participation by scientists, land managers and decision-makers.

H. Lessons learned

Through our work over the past two years, we have learned two primary lessons related to the process of fire science outreach and delivery in Alaska. First, we have a diverse stakeholder base with diverse needs and interests. Not everyone is interested in everything; quality communication to a smaller, high-interest audience can be more effective than generalized information for a large audience. In addition to our annual workshop, we can effectively meet our stakeholder needs by designing products and events targeted with specific topics to specific audiences. Proposed future field experiences, fire behavior modeling workshop and fire effects workshop/training are some examples (see above and section II.D. planned activities). Second, partnerships are key; without the interest and support of others, we will not succeed. We therefore plan to continue cultivating existing and new partnerships in co-hosting events and written products (see section II. D. planned activities and section IV. partnerships).

I. Relevant consortium evaluation data from national on-line survey

Overall, responses to the national on-line evaluation survey indicate support and enthusiasm for AFSC. Our relatively low response rate noted above indicates that there may be constituents that

believe differently but have not expressed their opinions in the survey. Over seventy five percent of respondents to the on-line national evaluation survey agree or strongly agree that the consortium has helped improve the accessibility of fire science information. Seventy percent agree or strongly agree that AFSC has helped improve the use and application of fire science in the region. On the whole, over fifty percent of respondents were neutral in their beliefs on whether AFSC has helped improve policy regarding fire management in the region. However, over seventy percent believe that AFSC has helped improve communication among fire managers and fire scientists in the region and over seventy-five percent indicated that they would recommend AFSC involvement to co-workers.

In terms of obstacles to accessing relevant fire science information, the largest percentage of respondents disagreed that the obstacles presented in the survey exist in Alaska. However, in most cases this percentage was less than fifty percent and with a small sample size it is possible that our respondents are already active consortia participants. Representative open ended quotations on the survey indicate overall support for AFSC. Other open ended responses provided suggestions for activities that would improve fire science outreach and delivery such as providing more field trips, demonstrations and hands-on activities. We are addressing these comments in our planned activities (see section II. D. planned activities).

II. AFSC Logic Model

The complete AFSC logic model is presented in Figure 1. We also provide a brief narrative below.

A. AFSC- Situation

Situation: There is currently insufficient communication between fire managers and scientists. Existing products and results of Alaska fire science research are not directly relevant to manager's information needs. Fire managers need prompt delivery of up-to-date scientific research results because the fire regime and fuel conditions in Alaska are being impacted by rapid climate change. While, participation in AFSC is growing, low response rate on program and workshop evaluation surveys limits our ability to gauge participants' needs and consortium effectiveness.

Opportunities: The situation outlined above offers parallel opportunity to increase communication and sharing of fire science information among professionals and organizations. There is additional opportunity for translation of fire science research into information directly relevant to managers as well as opportunity to bring fire scientists and managers together to develop research that meets management needs while also advancing the scientific endeavor. This has been referred to as the co-production of science and policy, the co-production of knowledge, or the generation of use-inspired science (Lemos and Morehouse 2005, Stokes 1997). There is additional opportunity to build a survey response culture and to develop additional methods for program evaluation.

B. AFSC – Inputs

Inputs to our program include JFSP funding and other leveraged funding as available; the time, expertise, knowledge and professional networks of our program coordinator, principal investigator, website technician, advisory board, and partner organizations (see section IV. partnerships). We also rely on administrative support from the University of Alaska, Fairbanks

(UAF), the Scenarios Network for Alaska and Arctic Planning (SNAP), and Bureau of Land Management Alaska Fire Service (BLM AFS) for office space and office equipment such as printers, photocopier, and fax machine, and for grant processing.

C. AFSC – Outputs

Activities outlined in section I. have been successful in the first round of funding, based on program and event evaluation surveys, feedback from our advisory board and informal feedback from our constituents. We therefore plan to continue these activities in the next round of funding: workshops; webinars; website; printed material including fact-sheets, newsletters, and research summaries; and a centralized point of contact for fire science information, or "help desk" (see section I. key accomplishments).

D. AFSC - Planned Activities

In the next funding period, our focus will be to **actively enhance opportunities for communication between managers and scientists** (see section II. A. logic model situation). In addition to activities and products listed in section I, planned new activities and target audiences for years 1, 2 and 3 are listed in Table 1 below. Furthermore, the following activities will be on-going throughout the three year funding period. The target audiences for these outputs and activities are all fire and land managers in Alaska and scientists engaged in fire research.

- Deepen and expand our partnerships and collaborations (see section IV. partnerships).
- Update, maintain and keep current AFSC program website in order to make decision-support tools more easily accessible and highlight social media. This includes, incorporating the Alaska research needs list and adding dedicated space for products of the Alaska Wildland Fire Coordinating Group (AWFCG) Fire Research Development and Applications Committee (FRDAC).
- Expand printed materials to include longer and more detailed technical papers.

E. AFSC – Outcomes

Based on our assessment of the current situation in fire science outreach and delivery in Alaska, our proposed inputs, activities and outputs, we have identified short, medium and long-term outcomes for AFSC as indicated in Figure 1. These are milestones in AFSC performance that will be measured and evaluated on an on-going basis through national and regional program and event participant surveys, focus groups, web metrics and participation in AFSC events (i.e. type/format, number of people participating and organizational diversity - see Table 1). In the short-term, in addition to establishing recognition among the fire community for our primary products and as a central source for relevant science information, we aim to produce information that is salient, credible and legitimate to our target audience (Cash et al. 2003). In the medium-term we aim for more concrete evidence of the co-production of knowledge through fire scientists consulting the identified research needs list as they prepare projects and research proposals and land managers directly turning to AFSC for scientific information that is relevant to their decision-making.

It has been established through work in climate science communication that effective science outreach and delivery cannot be achieved by simply providing data and scientific results to decision-makers or unloading information directly from the scientist to the target audience (Cash, Borck and Patt 2006). Our long-term vision is to establish and sustain engaged

Figure 1. **Logic Model For Alaska Fire Science Consortium**

Situation	Inputs	Activities	Outputs	Outcomes: Short - term	Outcomes: Medium	Outcomes: Long - term
Description of Challenge: Insufficient communication between managers and scientists Research results and products not relevant to management applications Need for timely delivery of research results Low responses on program and event evaluation surveys **Opportunities:** Increase interagency information sharing Translation of research findings Co-production of knowledge Build survey response culture, innovate evaluation methods	**Time, Expertise, Knowledge and Professional Connections:** Coordinator Project PI Web Technician AFSC Advisory Board AWFCG Fire Research Committee AWFCG Fire Behavior Committee All Collaborating Organizations **Administrative Support:** University of Alaska, Fairbanks Scenarios Network for Alaska Planning BLM – Alaska Fire Service	**What We Propose to Do:** Provide opportunities for manager and scientist interaction Strengthen AFSC presence in fire science community Strengthen relationships with AFSC partners and collaborating groups Update and maintain website Create graduate level internships at management agencies Facilitate research communication and collaboration opportunities through planned activities Organize topic specific trainings, field exercises, or workshops Program evaluation Printed materials and technical papers	**Products, Services and Events:** Workshops (general and topic/project specific) Webinars Website and Social Media Products Printed Materials (fact sheets, research summaries, e-newsletters, tech reports and brochures) Help Desk (centralized point of contact) Field Trips/Training Exercises **Target Audiences:** Fire Managers and Practitioners Land Managers Researchers and Scientists Support Agencies and Organizations	**Knowledge:** Increased awareness of AFSC and the services provided AFSC acknowledged and used as fire science hub Increased use and understanding of available products and tools (e.g., Alaska Fire and Fuels Research Map) Stakeholders find AFSC credible and relevant **Methods for Measurement:** Surveys, focus groups and web metrics.	**Actions:** Project consultations with AFSC Scientists seek out identified research needs for projects Managers actively seek results for decision-making **Methods for Measurement:** Surveys, focus groups and statistics from AFSC activities.	**Conditions:** Manager and scientist "co-production of knowledge" Research designed to meet regionally identified management research priorities Managers actively use research results in decision-making **Methods for Measurement:** Surveys, focus groups and statistics from AFSC activities.

Target Audience	Year 1	Year 2	Year 3
Goal: Provide more formal and informal opportunities for interaction between scientists and managers			
Fire and land managers in Alaska, scientists engaged in fire science in Alaskan ecosystems	Expand and adjust annual workshop schedule Collaborate with fire managers and fire scientist to host topic specific trainings, field exercises, or workshops	Additional and/or expanded workshops to highlight existing research projects (i.e. projects funded by the Department of Defense Strategic Environmental Research and Development Program, relevant research on smoke, and other projects with AFSC written into proposals)	Additional and/or expanded joint field experiences to highlight new research projects
Goal: Develop a greater and more in-depth interaction with the fire science community			
Scientists engaged in fire science in Alaskan ecosystems	Dedicated outreach efforts to publicize identified regional research needs	Presentations at fire ecology meetings	Peer-review publications about AFSC process
Graduate students and their advisors, intern hosts	Explore the possibility of setting up graduate student internships with fire ecologists at land and fire management agencies	Follow-up on setting up potential internships based on outcome from year 1	Continue based on outcomes from years 1 & 2
Goal: Evaluate progress toward desired outcomes			
AFSC program management, AFSC Advisory Board, JFSP	Evaluate effectiveness and accessibility of on-line tools and data-bases as well as outcomes from the *Art of Fire* humanities project Invest more effort in survey recruitment and response rate	Innovate and test alternative methods of evaluation, i.e. semi-structured phone interviews with key people, dedicated focus groups, and shorter more targeted surveys with specific partner groups (see section IV. partnerships). Continue with national and regional surveys	Implement alternate evaluation methods based on outcome from year 1 Continue with national and regional surveys

Table 1. Program goals and planned activities for years 1, 2 and 3.

interaction between scientists and managers in all stages of the research process (problem identification, design, analysis, reporting of results.) This will be achieved when fire science research projects are designed to meet regionally identified research needs and fire managers are actively using results of scientific research in their decision-making.

III. Governance

Overall the AFSC governance structure has worked well. Members of the AFSC advisory board are generally at a mid-organizational level which gives them access to the priorities and challenges of both the upper level management and on-the-ground activities. Members represent Alaska State Division of Forestry (DOF), Bureau of Indian Affairs (BIA), BLM, BLM AFS, FRAMES, National Park Service (NPS), US Fish and Wildlife Service (USFWS), US Forest Service Pacific Northwest Research Station (PNW) and UAF; they meet monthly via teleconference with members convening at the AFSC conference room as they are able. We do not plan any changes.

IV. Partnerships

AFSC partnerships are critical to our success and growth. Indeed, the very definition of "consortium" implies a collaborative partnership toward a common goal. In the past two years we have developed many partnerships at varying levels of support and involvement. AFSC partners encourage participation and support of AFSC within their organizations and professional networks, promote AFSC events, and provide critical input to activities and programs.

In accordance with on our logic model (Figure 1), we evaluate the effectiveness of AFSC partnerships based on the extent to which they move us forward toward our short, medium and long-term goals and outcomes (see section II. E.). We are already seeing increased knowledge of the AFSC through partnership engagement.

To date, one of our most effective partnerships is with the AWFCG Fire Research Development and Applications Committee (FRDAC). There is strong crossover between membership in the FRDAC and our advisory board, which provides a robust link to land and fire management officers in the region. The Bonanza Creek Long Term Ecological Research station (BNZ LTER) and their participating scientists have also been effective partners as participants and speakers in our annual workshops and in providing field experiences for the current *Art of Fire* humanities project. Partners have already begun to turn to the AFSC for outreach and information sharing assistance. For example, USFWS approached us for help and collaboration with the LANDFIRE webinar series and calibration workshop.

In the next funding period, we intend to further cultivate and develop partnerships and collaborations with agencies and organizations represented on our advisory board (see governance section III.) as well as with FRDAC, the newly established Alaska Fire Modeling Discussion Group, BNZ LTER, SNAP, the Alaska Center for Climate Assessment and Policy (ACCAP), and the Canadian Forest Service. We also plan to work more closely with the relevant USFWS Landscape Conservation Cooperatives (LCCs - particularly Arctic and Northern Interior Forest) and US Geological Survey (USGS) scientists working on boreal fire

and related climate change science (see logic model inputs section II.B. and planned activities section II. D).

Our partners and advisory board members support AFSC with their own agency resources including labor, expertise, and occasional travel (see section II. B. inputs). This allows us to supplement the funding we receive from JFSP and to improve our outreach products and services by ensuring that our work is strongly grounded in management needs and priorities.

We do not anticipate any major changes in partnership composition or strategy in the next funding period. We will seek additional grant awards as a supplement to base funding as applicable.

V. Future direction

In the past two years, AFSC has established a solid base of support from both the scientific and fire management communities in Alaska. All of the major state and federal fire management entities are represented on our advisory board and board members play an active role in providing guidance, feedback and input on AFSC activities. Program evaluation in the first two years, including data from the national-scale survey, annual program and workshop evaluation surveys and advisory board member feedback indicates growing participation and enthusiasm for AFSC activities. Program evaluation has also revealed managers requesting more opportunity for collaborations, direct contact, and informal communication with fire scientists.

In the up-coming funding period, we will therefore focus on increasing opportunities for both formal and informal interaction and collaboration between fire scientists and fire managers. As outlined in the logic model above (Figure 1.), our short-term goal is to expand the recognition of AFSC as a central source for relevant, useful, credible and salient fire science information. In the medium term, we aim for this to manifest in AFSC serving as a focal point for linking fire scientists and managers in developing research projects and seeking scientific information for application in management decision-making. Our long-term goal is to facilitate collaborative use-inspired science in which scientific research is conceived, designed, conducted and reported with the dual goal of informing land, resource and fire management decisions as well as advancing scientific knowledge.

To achieve our short-term goals, we will continue with existing products and outputs, placing new emphasis on providing additional and enhanced opportunities for both formal and informal communication between scientists and managers. In aiming toward our mid-term goals, we will use the agency vetted list of identified regional research needs as a focal point for bringing scientists and managers together in collaborative research projects. With continued guidance from our advisory board, we will work to build strong communication and relationships between fire scientists and fire managers in Alaska.

VI. References

Cash, D. W., J. C. Borck & A. G. Patt (2006) Countering the Loading-Dock Approach to Linking Science and Decision Making. *Science, Technology & Human Values,* 3, 465-494.

Cash, D. W., W. C. Clark, F. Alcock, N. M. Dickson, N. Eckley, D. Guston, J. Jager & R. B. Mitchell (2003) Knowledge systems for sustainable development. *Proceedings of the National Academies of Sciences,* 100, 8086-8091.

Guston, D. H. (2001) Boundary Organizations in Environmental Policy and Science: An Introduction. *Science, Technology & Human Values,* 26, 399-408.

Kocher, S., E. Toman, S. F. Trainor, V. Wright, et. al. (Accepted) Wildland Fire Science and Management in the U.S.: Spanning the Boundaries through the Regional Knowledge Exchange Network. *Journal of Forestry*.

Lemos, M. C. & B. J. Morehouse (2005) The co-production of science and policy in integrated climate assessments. *Global Environmental Change,* 15, 57-68.

Stokes, D. E. 1997. *Paseur's Quantrant, Basic Science and Technological Innovation*. Washtington, D.C.: Brookings Institution Press.