Alaska Fire Science Consortium
FY19 Annual Report Narrative

1. ***Highlights and achievements***

In FY19, the Alaska Fire Science Consortium (AFSC) activities included: 2 semi-annual workshops, 1 co-production workshop, 3 training sessions, attendance and participation at 7 conferences and symposia, a keynote presentation at the 6th Fire Behavior and Fuels Conference, 2 presentations for the general public, 5 direct partner/agency/leadership briefings, 10 field consultations and engagements as members of an expert cadre, 1 poster presentation, 1 peer-reviewed publication (Colavito et al, 2019), a feature article in *Wildfire* (Ziel, 2019), a volume of workshop proceedings (York and Jandt, 2019), an illustrated almanac of fuel treatments (Jandt et al, 2019), 5 webinars, 65 responses to help desk inquiries, 3 fact sheets, 29 archived videos, 5 Fire Science Highlights (blog posts), 17 email newsletters, 276 Facebook posts, the ongoing maintenance and expansion of a research map and database and a reference database, and many activities to advance collaborations between scientists and managers. The AFSC website, which serves as a complete archive of events, publications, reports, videos, and webinar recordings, successfully transitioned in FY19 to a new design and platform, still hosted by the Fire Research And Management Exchange System (FRAMES). All AFSC activities include opportunities for participant feedback, and these evaluation data are regularly reviewed.

Primary partnership with Advisory Board and Alaska Wildland Fire Coordinating Group. The Alaska Fire Science Consortium's primary partnership with Alaska's interagency fire management community is guided by the 16 member AFSC advisory board, whose membership reflects that of the Alaska Wildland Fire Coordinating Group (AWFCG), the coordinating organization for planning and implementing interagency fire management statewide since 1994. AFSC's ongoing collaboration with the AWFCG and its committees includes iterative information exchange to develop AFSC's activities to meet the community's identified fire science needs. In general, Alaska's fire managers share a broad range of information needs related to the rapidly changing northern climate, including

- Improved understanding of **climate change effects** on the region's environment and its fire regimes; and
- Improved scientific basis for **management responses** to changing fire regimes, including advancing the use of remotely sensed data, evaluating fuel treatment effectiveness, enhancing seasonal depiction, analysis, and prediction, and acquiring the most accurate and relevant geospatial data available for use in decision-support tools.

Recent peer-reviewed publications provide evidence that AFSC has been effective in spanning the boundaries between fire scientists and fire managers (Maletsky et al, 2018), assisting Alaska's fire management community in using the best available science to adapt to climate change (Rutherford and Schultz, 2019), and helping develop co-produced science to meet specific management needs (Colavito et al, 2019). Specific highlights of AFSC's FY19 activities are detailed below.

Seasonal Workshops. In FY19, AFSC convened 2 half-day workshops--one in March and one in October--each in association with seasonal statewide interagency management meetings (fall workshop attendance 88 individuals from 18 agencies, spring workshop 69 from 16 agencies). These workshops are now an established part of the management community's annual calendar of events. The fall workshop focused on updates from relevant research projects; the spring workshop focused on the science of fire hazard, potential, and risk. Proceedings of these workshops are available on the AFSC website (https://www.frames.gov/event/539807 and https://www.frames.gov/event/543305), and their recorded presentations have been played 84 times on the AFSC Vimeo site (https://vimeo.com/channels/alaskafirescience). The FY19 workshop evaluations were quite positive and offered great feedback:

Fall 2018

- *This group is very valuable to the fire agencies, application of the science is always a challenge, but we are making progress. It is great that we have the consortium available to us!*
- *Good to actually see (demo) spatial products that are relevant to the majority of attendees (fire managers)*
- *I appreciated the continued effort to provide (real time) current tools to decision makers.*
- *Great utility for the wildland fire community and beyond for many additional resource management disciplines.*
- *Very applicable area of research...from the perspective of a public lands manager.*
- *All talks were excellent- a good diversity of topics. Really great to see the great attendance by the fire community at the workshop.*
- *Glad you followed-up with requests to show your organization structure and specific study area. Thanks!*
- *Fire management officers that work for the Federal government are tasked with using the Best Available Science. AFSC brings this info to managers in the form of workshops, webinars, webpage- they bridge the gap between scientists and managers that otherwise would be a large gap.*
- *Fire managers already wear many hats. Attention to latest and greatest science and research without having to seek it out personally is critical for progression of fire management in a changing environment. You make this information available in a setting that is comfortable.*
- *The fall and spring meetings are bringing a range of science applications to fire management questions.*
- *As Area Manager /Agency Administrator, this info gives me more tools in the toolbox to make decisions.*

Spring 2019

- *These workshops provide one of the only opportunities that I am aware of for these topics to be aired/discussed/presented! Great job!*
- *Great talks today. All of these presentations were applicable to the resource + fire management agencies in Alaska.*
- *Insight to cutting edge research that will impact future management practices and/or decisions is key to being prepared for change*
- *I liked the theme of risk assessment transitioning into fuels treatment assessments. Excellent flow*
- *Consortium continues to be a good information/research sharing mechanism with our agencies.*
- *Will look at potential to use this [risk assessment process] in other areas of Alaska. Nice explanation of the process.*
- *We've been hearing about this; thanks for this detailed talk.*

- *Good idea bringing Canadian fire managers in to compare management systems and how risk is managed*
- *Great presentation on using evolving technology to address timely issues*
- *I use the AFSC website and research briefs on a regular basis for fire management strategic decisions. Always learn new research brought out at in-person workshops.*

Topical workshop. AFSC convened the *Alaska Climate Adaptation Science Center Fire Weather Co-production Workshop* in November 2018. This small workshop (attendance 12 people from 6 organizations) brought managers together with leadership of the U.S. Geological Survey (USGS) Alaska Climate Science Center (AK CASC) to discuss ideas for new CASC projects to support fire weather analyses and predictive capabilities. The resulting project to evaluate reanalysis climatologies that are most applicable to fire analysis is underway.

Webinars. AFSC hosted or co-hosted 5 webinars in FY19 (total attendance 154) on a mix of research and management topics, such as incorporating drought information into wildland fire management applications and a guide to Alaska-specific data resources for fire behavior modeling. All were recorded and available on the AFSC website (total of 293 plays; https://www.frames.gov/afsc/events-webinars/archive).

Other videos. AFSC supplements its webinar and workshop offerings by recording and sharing presentations such as thesis defenses or departmental seminars when relevant. In FY19, AFSC recorded 12 such presentations. Examples include a seminar on climate scale predictability and variability of Alaska wildfire and a presentation on carbon emissions from boreal wildfire. These recordings have been viewed 78 times; https://www.frames.gov/partner-sites/afsc/events/previous-events/previous-webinars/

Subject matter experts. The AFSC staff includes 2 part-time subject matter experts who are retired from careers in fire management: fire ecologist Randi Jandt and fire analyst Robert (Zeke) Ziel. Their valuable and complementary experience provides a critical foundation to every AFSC activity. Specific highlights from their work in FY19 included:

- Help desk. In FY19, AFSC responded to 65 inquiries from managers, scientists, students, the media, and the public on topics related to fire science and management in Alaska. Examples include providing information to a researcher seeking legacy fire perimeter data and discussing tradeoffs in implementing fuelbreaks in boreal systems with an Alaska Division of Forestry Fire Management Officer.
- Agency and leadership briefings. In FY19, AFSC staff provided 5 targeted briefings on specific wildland fire science issues in Alaska to agency and leadership audiences, including Department of Interior headquarters and Office of Wildland Fire staff and the Alaska State Forester.
- Field consultations and expert cadres. AFSC personnel provided subject matter expertise on specific issues 10 times in FY19. For example, fire analyst Ziel worked with Alaska Interagency Coordination Center staff to support Predictive Services use of weather data. Fire ecologist Randi Jandt worked with academic and USGS scientists to synthesize results from multiple studies on fire self-regulation in boreal forests.
- Training. AFSC personnel contributed to 3 training sessions, supported by supplemental agency funding in some cases. Fire analyst Ziel served on the cadre for CAN S290 (Intermediate Fire Behavior) in Alaska. The National Wildland Fire Coordinating Group provided supplementary funding for him to continue his work updating the online Fire Behavior Field Reference Guide. Fire ecologist Jandt taught Minimum Impact Strategies and Tactics and Fireline Rehab to a Resource Advisors training at Alaska Fire Service.
- Public presentations. AFSC fire ecologist Randi Jandt presented a very well-received evening lecture to public audiences in Alaska (130 attended as part of the UAF Science for Alaska series) and Oregon (42 attended at the Wallowology Discovery Center) on "Will defrosting the icebox lead to more wildfires in Alaska".

- Meetings and conferences. Because Alaska is relatively underserved in science, AFSC staff monitor and assess the relevance of new and emerging research by attending scientific meetings and other events. Meetings also offer opportunities to engage specific audiences. AFSC personnel attended and/or presented at 7 meetings in FY19. Highlights included PI Sarah Trainor presenting on AFSC as a model system in a special session on Disaster Diplomacy at the American Geophysical Union and fire analyst Ziel giving a keynote presentation on Alaska's Fire Environment at the 6th Fire Behavior and Fuels Conference, which led to an invitation to author a feature article on the topic in Wildfire (Ziel 2019).

2. *Priorities and initiatives*

As outlined in section 1, the community we serve directs our priorities; AFSC works closely with the Alaska interagency fire management community to guide our activities. In addition, AFSC leverages partnerships and opportunities from beyond the fire management community to serve their science needs and support their involvement in relevant activities.

Co-production of knowledge. Knowledge co-production occurs when scientists work directly with managers or practitioners throughout the research process, including idea generation, proposal writing, data collection, analysis, and creating research products. AFSC investments over the past few years in maintaining reciprocal and iterative knowledge exchange between the region's researchers and practitioners resulted in several funded co-produced research projects addressing management research priorities and often involving agency personnel as collaborators (Table 1). Much of our co-production effort in FY19 has been dedicated to maintaining the two-way flow of information between and among scientists and managers with these projects as they move forward. We use a variety of mechanisms for this, including small group meetings, demonstrations, workshop and webinar presentations. Our evaluations indicate that managers appreciate being kept in the loop as researchers design their projects and collect and analyze data:

> *Nice intro- good to see progress on this project since it was introduced in the spring/early summer.*
>
> *Interesting project. Looks like a challenge but will have benefits if they can pull it off. Good presentation to solicit input early in project.*
>
> *Thanks for making this information available to us as the project was conceived through until the report/findings are published.*

AFSC has been collaborating with the Alaska Center for Climate Assessment and Policy (ACCAP) since FY17 on a research and assessment project investigating the respective roles of AFSC and ACCAP as boundary organizations working together to meet fire managers' needs regarding climate change impacts on wildfire. This collaboration resulted in a peer-reviewed publication in FY19 (Colavito et al, 2019). More details on the ongoing AFSC-ACCAP collaboration are below.

Leveraged funding. In addition to their part-time support from AFSC's JFSP award, AFSC staff (Jandt, York, and Ziel) received salary from 8 additional sources (Table 2) in FY19. This leveraging enables them to participate fully in specific co-produced projects and strengthens the AFSC network.

AFSC/ACCAP collaboration. Information regarding climate impacts on wildfire is among the top research needs identified in Alaska. AFSC's ongoing partnership with the Alaska Center for Climate Assessment and Policy (ACCAP), a NOAA program housed at the University of Alaska Fairbanks (UAF), is key to AFSC's ability to address these information needs. In FY18, ACCAP and AFSC collaborated to host two undergraduate NOAA Hollings Scholars for a 9 week summer research internship focused on fire weather in Alaska; in FY19, the scholars gave a joint AFSC/ACCAP webinar on their work, and presented at the American Geophysical Union, the American Meteorological Society, and the International Association for Wildland Fire meetings. One of the FY18 Hollings Scholars enrolled at UAF as a PhD student in FY19 to continue his research with AFSC and ACCAP. We will host new Scholars for a follow up project in FY20.

EPSCoR Fire and Ice. *Fire and Ice: Navigating Variability in Boreal Wildfire Regimes and Subarctic Coastal Ecosystems (F&I)* is a 5-year, $20 million effort by Alaska NSF EPSCoR to study two major Alaskan regions undergoing climate-driven changes. One of the program's two major research groups is a Boreal Fires team. Boreal Fires researchers will identify large-scale climate drivers relevant to fire weather; use hyperspectral remote sensing to better map and measure fuel conditions and active fire behavior; and conduct research into the economics of fire management and into impacts of fire on subsistence communities. AFSC personnel are members of the Boreal Fires core team along with 10 faculty and staff from UAF and University of Alaska Anchorage. The program got underway at the beginning of FY19, and one of its first activities was a presentation on its plans at the AFSC fall 2018 workshop. Since then, AFSC has worked actively to ensure that management perspectives and priorities are understood and incorporated into the project. Several managers are participating on F&I research projects, and the Boreal Fires team engages with the larger management community by providing them with progress reports at every AFSC seasonal workshop. This effort is beginning to yield a series of truly co-produced research projects as the program enters its second year. AFSC is also engaging to a lesser extent with the F&I education team, who are currently revising curriculum materials related to boreal fire and will support several activities in the coming years to advance STEM education. We anticipate that these materials will be useful in our planned work with public audiences (see section 3, Plans for the Future).

Ongoing partnerships. AFSC also maintains partnerships with other programs at the University of Alaska Fairbanks (UAF), including the Scenarios Network for Alaska and Arctic Planning, Geophysical Institute, Alaska Center for Unmanned Aerial Systems Integration, Bonanza Creek Long Term Ecological Research, Geographic Information Network for Alaska, and USGS Alaska Climate Adaptation Science Center as well as with several research teams outside of Alaska who are pursuing relevant lines of work in boreal/arctic ecosystems, including Michigan Tech Research Institute (remote sensing, soil moisture), University of Idaho (paleoecology/modeling), and Colorado State University (climate change, management response options). Most of these entities have been involved in AFSC activities in FY19.

National initiatives. In FY19, AFSC continued to actively participate in ongoing national initiatives that are relevant to wildland fire science in Alaska. These include:

- Arctic Boreal Vulnerability Experiment (ABoVE). The NASA Arctic Boreal Vulnerability Experiment (ABoVE) is a major, 10-year research initiative with a focus on climate change vulnerability, including wildland fire, in Alaska and western Canada. The ABoVE science portfolio has clear applicability to wildland fire management problems, and AFSC has engaged directly with ABoVE planning and implementation since 2013 to advance that application. At the May 2019 ABoVE science team meeting (STM), fire ecologist Jandt presented a poster on the outcomes of the 2017 AFSC remote sensing workshop. In FY20, AFSC is collaborating with ABoVE to convene a Research to Operations workshop on using ABoVE data in management in association with the May 2020 ABoVE STM.
- Interagency Arctic Research Policy Committee (IARPC). AFSC fire ecologist Randi Jandt and coordinator Alison York continue to assist the Interagency Arctic Research Policy Committee's (IARPC) efforts to advance interagency collaboration on wildland fire in high latitudes, now as a working group under the Terrestrial Ecosystems Collaboration Team (TECT). This setting provides valuable opportunities to engage federal science agencies such as EPA with AFSC issues. York presented material on the 2019 Alaska fire season to the August 2019 online meeting.

Opportunities to Apply Remote Sensing in Boreal/Arctic Wildfire Management & Science: A Workshop. With funding from the NASA Applied Sciences Program, in 2017 AFSC convened an international, interdisciplinary workshop to share information and advance tools and data for improving the use of current remote sensing technologies in Alaska wildland fire management. Details on the workshop itself are provided in the FY17 annual report. FY19 activities that resulted from the workshop included:

- Randi Jandt presented a poster on the workshop outcomes at the May 2019 ABoVE science team meeting,
- AFSC published the workshop findings and recommendations in May 2019 (York and Jandt, 2019),
- The workshop was the topic of a JFSP Success Story.

The AFSC-ABoVE collaborative Research to Operations workshop planned for FY20 builds on the progress made at the 2017 workshop.

3. Plans for the future

As outlined in our 2019 renewal proposal, AFSC bases its priorities for the future on feedback from our Advisory Board, Alaskan fire managers, our evaluation responses, identified regional research needs, and recent research. AFSC will continue to provide the services that our audience has come to expect and, in response to requests from the fire management community, we propose the following innovations, which are discussed in more detail in our 2019 proposal. First, because the fire environment in Alaska is isolated from the rest of the US, much national applied fire management research and technology development advances without Alaska-relevant data domains. We increasingly find that managers require regionally relevant data for use in required fire management tools, such as LANDFIRE. We will continue to work with managers, scientists and tool developers to ensure that accurate data is available for use in the Alaska domain including MesoWest data for weather and forecasting tools, expanded multiple-day precipitation data, and remotely sensed active fire and burn severity data. Second, compared to other regions, there are relatively few visual communication products available in Alaska. On recommendation from our Advisory Board and other fire managers, we propose to develop interpretive geo-spatial products such as story maps to meet manager needs. Story maps provide a useful structure for communicating topics related to fire ecology and management by using the intuitive format of storytelling with the benefit of being geospatially integrated. Alaska in particular benefits from geocentric media because of the scale and complexity of the state's geography. Third, the exceptionally active 2019 Alaska fire season rekindled public interest in wildland fire. In turn, agency administrators and public information officers have asked AFSC to assist in updating their information resources that target the general public. To address this need, we will work directly with the requesting personnel and the AWFCG committee on Education and Prevention. Anticipated activities will include reviewing and updating website content, providing photos, references and graphics, and developing multi-use geospatial communication tools such as story maps.

In addition to supporting relevant funded studies, such as those in Tables 1 and 2, with tech transfer and science delivery, we will continue to foster communication, build relationships, and convene opportunities that lead to knowledge co-production. AFSC will continue its efforts to advance agency and research partnerships and capacity among scientists to become aware of, understand, and meet agency science needs, building on our existing strong partnerships with the interagency fire management community and with researchers and scientists. AFSC's role as boundary spanner, convener, translator, and facilitator has proven effective in assisting agency and academic partnerships to leverage funding, increase collaborative proposal submissions, and support new research that is designed to meet regional management priorities (Colavito et al, 2019). We will also maintain our internal evaluation efforts to ensure that we remain responsive to our audience needs.

Staffing. Our staffing model of employing fire ecologist Randi Jandt and fire analyst Robert Ziel as part-time subject matter experts who are retired from management careers has been key to our success (Colavito et al, 2019). These individuals provide deep experience in fire management problems and are therefore exceptionally skilled in understanding how research can help managers and in building bridges between science and management. The expertise of our subject matter experts in the fields of fire ecology, fire behavior, and fire danger will continue to be a centerpiece of our team. In FY19, our part-time Science Communication Specialist Maija Wehmas moved on to a PhD program, and in early FY20 we were able to

replace her with Zav Grabinski, who recently earned a MS in Natural Resource Management from Humboldt State. Zav has excellent GIS skills and will be a key resource as AFSC develops interpretive geospatial products to meet manager needs such as story maps. Zav also assists coordinator Alison York with tasks such as archiving video and audio recordings, website updates, and social media strategy.

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References

Colavito, M.M., Trainor, S.F., Kettle, N.P., & York, A. (2019). Making the Transition from Science Delivery to Knowledge Coproduction in Boundary Spanning: A Case Study of the Alaska Fire Science Consortium. Weather, Climate, and Society, 11 (4), 917-934.

Jandt, R.R., Little, J.M., Drury, A.D., Molina, A., & Lane, B. (2019). Forest treatments to reduce fire hazard in Alaska: a compilation of case studies. Special Report from JFSP Project 14-4-01-027. Fairbanks, AK: University of Alaska Fairbanks. 57 p.

Maletsky, L.D., Evans, W.P., Singletary, L., & Sicafuse, L.L. (2018). Joint Fire Science Program (JFSP) Fire Science Exchange Network: A National Evaluation of Initiative Impacts. Journal of Forestry, 116 (4), 328-335.

Rutherford, T.K., & Schultz, C.A. (2019). Adapting wildland fire governance to climate change in Alaska. Ecology and Society, 24 (1):27.

York, A.D., & Jandt, R.R. (2019). Opportunities to Apply Remote Sensing in Boreal/Arctic Wildfire Management & Science: A Workshop Report. Fairbanks, AK: University of Alaska Fairbanks. 72 p.

Ziel, R. (2019). Alaska's fire environment: not an average place. Wildfire, 28 (4), 20–29.

Funding Agency	PI	Proposal Title	Project Dates
JFSP	Little	*Duration and cost effectiveness of fuel treatments in the Alaska boreal region*	*2014-18*
NOAA	Bhatt	*Seasonal Climate Forecasting Applied to Wildland Fire Management in Alaska*	*2016-19*
JFSP	Schultz	*Impacts of Climate and Management Options on Wildland Fire Fighting in Alaska*	*2016-19*
JFSP	Gaglioti & Mann	*Alaskan Tundra Fires during a Time of Rapid Climate Change*	*2016-20*
NASA	Bourgeau-Chavez	*SMAP data for organic soil fuel moisture estimation in boreal-arctic ecosystems*	*2016-19*
NOAA	Thoman	*Hollings Scholar project: Forecastability of rapid growth periods of Alaska wildfires in both boreal and tundra ecosystems*	*2017-19; Research internship summer 2018*
USGS	Bieniek	*Assessing Alaska fire indices for daily to seasonal wildfire prediction under present and future climate scenarios*	*2017-19*

JFSP	Buma	*Evaluating Flammability of Reburns in the Boreal Forests of Interior Alaska*	*2019-2021*
NSF-EPSCoR	Veazey	*Fire and Ice: Navigating Variability in Boreal Wildfire Regimes and Subarctic Coastal Ecosystems*	*2018-2023*

Table 1. Funded projects active in FY19, co-produced with AFSC involvement to address Alaska fire management research priorities. Co-production in this context includes direct involvement of AFSC personnel and/or management personnel (facilitated by AFSC) in reciprocal and iterative information exchange with project personnel throughout the research process.

Funding Agency	Project	Project Dates	AFSC staff	Time
JFSP	*Duration and cost effectiveness of fuel treatments in the Alaska boreal region*	2014-19	Jandt	1 mo/yr
NOAA	*Alaska Center for Climate Assessment and Policy (ACCAP)*	2006-21	York	1 mo/yr
NOAA	*Seasonal Climate Forecasting Applied to Wildland Fire Management in Alaska*	2016-19	York	1 mo/yr
USFS	*Revising and updating the online Fire Behavior Field Reference Guide*	2017-21	Ziel	5 wks/yr
			York	16 hrs/yr
JFSP	*Assessment of HRRR model forecasts of convective outflows in the fire environment*	2017-20	Ziel	3 mo/yr
USGS	*Assessing Alaska fire indices for daily to seasonal wildfire prediction under present and future climate scenarios*	2017-20	Ziel	1 mo/yr
DoD-SERDP	*Resiliency and Vulnerability of Boreal Forest Habitat to the Interaction of Climate and Fire Disturbance across DoD Lands of Interior Alaska*	2018-22	Jandt	100 hrs/yr
			York	100 hrs/yr
NSF-EPSCoR	*Fire and Ice: Navigating Variability in Boreal Wildfire Regimes and Subarctic Coastal Ecosystems*	2018-23	Jandt	2 wks/yr
			York	2 wks/yr

Table 2. Supplementary funding sources for AFSC staff, FY19.