Interagency Arctic Research and Policy Committee (IARPC):
Wildfire Implementation Team (WIT)
v1 (1-10-13)

Milestone 3.2.4.c. Identify studies that have occurred or are ongoing that are looking at post-fire tundra succession.

List of sources of information and key Alaska studies on post-fire succession in tundra

Data Source	***Description***	***Link/Citation***	***Comments/Issues***
Studies: Interagency studies on North Slope mega-fire.	Short- and mid-term vegetation recovery, soils, active layer, Carbon budget, hydrology, soil microbe, fire fuels biomass and burn severity data were collected at the 2007 Anaktuvuk River fire that burned over 250,000 acres. Unpublished agency Final Report: Jandt, R.R., *et al. Findings of Anaktuvuk River fire recovery study 2007-2011*. 39 p.	**www.frames.gov/afsc/map** -Mack, M. C. et al. 2011. *Carbon loss from an unprecedented Arctic tundra wildfire.* Nature 475: 489–492. -Jones, B.M. et al. 2009. *Fire behavior, weather, and burn severity of the 2007 Anaktuvuk River tundra fire, North Slope, Alaska.* AAAR 41(3): 309–316. -Bret-Harte, et al. 2013. *The response of Arctic vegetation and soils following an unusually severe tundra fire.* Phil. Trans. R. Soc. B **368**, 20120490.	Several more published studies on various aspects of this fire, including vegetation (Bret-Harte), burn severity mapping (Kolden), and more. Search the AK Fire Reference Database: www.frames.gov/afsc/refs
Published articles: Summary of fire effects and other factors on tundra caribou range in Northwestern AK	Reviews data from interdisciplinary studies including vegetation plots on their implications for change in caribou winter ranges.	Joly, K, R.R. Jandt and D.R. Klein. 2009. *Decrease of lichens in Arctic ecosystems: the role of wildfire, caribou, reindeer, competition and climate in north-western Alaska.* Polar Research 23(3): 433–442. Joly, K., and R.R. Jandt. 2007. *The unidirectional influences of wildfire, disturbance by caribou, global climate change and shrub expansion on Arctic ecosystems.* 7th Intl. Conf. on Global Change: Connection to the Arctic (GCCA-7). IARC-UAF. Fairbanks, AK. p 217-220.	Many more published articles-. Search the AK Fire Reference Database: www.frames.gov/afsc/refs See also bibliography on fire effects on caribou: Saperstein, Lisa B. and Kyle Joly. 2004. The role of wildland fire in caribou ecology: an annotated bibliography. Anchorage, AK: USGS Alaska Science Center. 106 p.

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Study: Paleo-ecological studies of prehistoric fire regimes in tundra	Studies of lake core study of charcoal and pollen inputs from the Noatak by Higuera, Feng Sheng Hu and NPS place modern tundra fire occurrence in the context of natural variability, provide long-term fire-history information, and elucidates drivers of tundra fire regimes with relevance to past, present and future tundra ecosystems.	Higuera, P.E. et al. 2011. Tundra fire history over the past 6000 years in the Noatak National Preserve, northwestern Alaska. Alaska Park Science 10:37-41 Higuera, P.E., Chipman, M.L., Barnes, J.L., Urban, M.A., and F.S. Hu. 2011. Variability of tundra fire regimes in Arctic Alaska: millennial scale patterns and ecological implications. *Ecological Application*s, 21: 3211-3226.	Lake charcoal layer fire histories—more publications available.
Monitoring: BLM/NPS Long-term fire recovery transects on the Seward Peninsula	Mid- and long-term data has been collected on permanently marked tundra fire transects from 1970's fires by Charles Racine and others. 1977 fire (Imuruk Lake study) had pre-fire data, 8 transects. Widespread tundra and forest fires occurred in 1977, when one million acres burned during an extremely dry year in northwestern Alaska Other fires—1972, 1977 (McCarthy's Marsh) were monumented post-burn with paired control transects.	**www.frames.gov/afsc/map** -Racine, C.R, et al. 2010. *Long-term monitoring of 1977 tundra fires in the Northwest Alaska Parks*. Alaska Park Science 9(1):24-25 -Racine, C., et al. 2004. *Tundra fire and vegetation change along a hillslope on the Seward Peninsula, Alaska, U.S.A.* AAAR 36(1):1-10.	Seward Peninsula burns had little caribou disturbance. Three of the longest monitored sites (~30 years) in Arctic Alaska for vegetation change and post-fire tundra succession located in Bering Land Bridge (BELA) in northwestern Alaska.
Monitoring: BLM long-term fire study in Buckland valley	Mid- and long-term data has been collected on vegetation and lichen recovery in permanently marked tundra fire transects from 1981 tundra fire. Changes in caribou dietary study also at these sites (Joly K., et al. 2007. Diets of overwintering caribou, Rangifer tarandus, track decadal changes in Arctic tundra vegetation. Canadian Field-Naturalist 121, 379–383.)	**www.frames.gov/afsc/map** -Jandt, R. R., et al. 2008. Slow recovery of lichen on burned caribou winter range in Alaska tundra: potential influences of climate warming and other disturbance factors. AAAR 40(1):89-95. -Jandt, R.R. and C. R. Meyers. 2000. Recovery of lichen in tussock tundra following fire in northwestern Alaska. BLM-Alaska OFR 82:1-12.	Light severity small burn in tundra with continuous caribou disturbance. Re-monitoring in 2012-2013 should yield additional reports (J. McMillan, BLM)

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Monitoring: Legacy long-term vegetation plot study near Umiat, Alaska	Churchill and Miller surveyed 12 permanent vegetation plots on the North Slope over a period from 1951-2013	-E.D. Churchill. 1955. Phytosociological and Environmental Characteristics of Some Plant Communities in the Umiat Region of Alaska. Ecology 36(4):606-627. **http://www.jstor.org/stable/1931299**	Original PhD dissertation at ARLIS; E.A. Miller, BLM-AFS, revisited in 2013, vegetation, soils, and plant community data.
Monitoring: NPS Long-term fire recovery transects in the Noatak valley	Mid- and long-term data has been collected on 8 permanently marked tundra fire transects from fires in 1972, 1977, and 1982 fires by Charles Racine and others. Published studies include:	**www.frames.gov/afsc/map** - Racine, C., Allen, J.L., and Dennis, J.G. 2006. Long-term monitoring of vegetation change following tundra fires in Noatak National Preserve, Alaska. Technical Report: NPS/AKRARCN/NRTR-2006/02. Arctic Network Inventory & Monitoring Program, National Park Service, Alaska Region. Fairbanks, AK. http://science.nature.nps.gov/im/units/arcn/documents/documents/NPS_ARCN_NRTR-2006-02-LongTermMonitoringVegetationChangeFollowingTundraFiresNoatakNPAlaska.pdf -Racine, C.R, et al. 2010. *Long-term monitoring of 1977 tundra fires in the Northwest Alaska Parks*. Alaska Park Science 9(1):24-25	One of the longest monitored sites (~30 years) in Arctic Alaska for vegetation change and post-fire tundra succession located in Noatak (NOAT) National Preserve in northwestern Alaska.
Monitoring: FWS post-fire recovery study in the Northwest Alaska	Mid- and long-term data on vegetation and caribou use has been collected on tundra fire transects from a 1988 fire in the Waring Mountains, on the Selawik NWR by Joan Foote & others.	FWS report: Foote, J. 2002. Recovery of the vegetation following the 1988 Waring Mountains wildfire (A119), in northwest AK. Unpublished USFWS report, Fairbanks, AK. 26 pp. Conference Proceedings and Poster: Foote, M.J. 2000. Response of tundra vegetation following the 1998 Waring	Contact: Lisa Saperstein, USFWS Alaska Region.

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		Mountain wildfire in western Alaska. Fire 2000 Conference, special session on frostfire. San Diego, CA.	
Monitoring: NPS paired plots study on 2004 Uvgoon fire (Fire Code: A35A)	Three pairs of burned and recent unburned plots on Noatak 2004 Uvgoon Cr Fire to study effects vegetation and permafrost. The goals of the study are to determine the vegetative and structural components that are important to fuel models, and identify fire effects under varying burn severity levels. The plot methods follow the same protocol as the Alaska Interagency Fire Effects Task Group (FETG) Fire Plots (2005).	**www.frames.gov/afsc/map**	NPS has paired plot data established during the 1980s on numerous other fires in Bering Land Bridge, Gates of the Arctic and Noatak, see: **www.frames.gov/afsc/map**
Monitoring: UAF studies of hydrology and permafrost on Seward P. 2002 fire	The Kougarok area of the central Seward Peninsula, Alaska, experienced a severe fire in August 2002. This may be the only tundra fire where high-quality prefire (1999-2002) and postfire (2003-2006) active layer and meteorology measurements have been collected in the same locations.	-Liljedahl, Anna, et al. 2007. Physical short-term changes after a tussock tundra fire, Seward Peninsula, Alaska. Journal of Geophysical Research 112(F02807). -Yi, S., A.D. McGuire, J. Harden, et al. 2009. Interactions between soil thermal and hydrological dynamics in the response of Alaska ecosystems to fire disturbance. *Journal of Geophysical Research – Biogeosciences* 114, G02015, 20 pages, doi:10.1029/2008JG000841.	Continued monitoring of site in 2007-2013 by UAF/Hokkaido University scientists Yoshikawa/Harada, et al. for fire effects on permafrost and soil temperatures:
Study: UAF study of light severity 2002 fire on North slope	Early successional data on vegetation recovery of 2002 Sagavanirktok River fire by Arctic LTER.	Bret-Harte M.S. *et al*. 2001. Developmental plasticity allows *Betula nana* to dominate tundra subjected to an altered environment. *Ecology* **82:** 18–32.	Fire is reasonably close to Dalton Hwy.
Study: NASA/MTRI extent and	Loboda/Jenkins/French working with NASA to obtain imagery for an inventory of North American tundra fires beginning in 1980's and new remote sensing algorithms to detect fires.	http://cce.nasa.gov/cgi-bin/cce/cce_profile.pl?project_group_id=963	Field work component in tundra fire chronosequences in western and northern Alaska

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detection of NA tundra fires			
Organization: ALASKA FIRE SCIENCE CONSORTIUM	AFSC is one of several regional consortia funded by the Joint Fire Science Program to improve fire science delivery. The AFSC provides links to the latest publications, hosts webinars and workshops, and maintains archived science information, presentations, and resources about fire in Alaska and the arctic.	http://akfireconsortium.uaf.edu	Gateway to many sources of information including tundra fire and successional pathways.
Web Tool: Fire and Fuels Research Map for Alaska	Boreal Forest and tundra fire research study locations	**www.frames.gov/afsc/map**	Last updated about 5 years ago; planned maintenance on this site by AFSC
Web Tool: Alaska Fire Reference Database	The database provides a listing of fire research publications relevant to Alaska and a venue for sharing unpublished agency reports and works in progress that are not normally found in the published literature.	www.frames.gov/afsc/refs	Has many key studies on succession in tundra as well as boreal forest; searchable by keyword/author/title; maintained by AFSC
Study: Discovery of pre-historical large fires on North Slope using remote sensing	Pre-publication dataset by Benjamin Jones, USGS-Anchorage included in recent PhD Thesis on remote sensing in tundra.	Ben Jones, et. al. 2013. Identification of unrecognized tundra fire events on the north slope of Alaska. Journal of Geophysical Research: Biogeosciences 118: 1334-1344. Contact info: http://permafrost.gi.alaska.edu/users/bjones	Large fires apparently had long-term permafrost changes and surface roughness characteristics allowing them to be detected a century later.
Dataset: Boreal Forest and tundra fire history and records	Alaska Interagency Coordination Center (AICC) maintains spatial data for fire perimeters (extent) and fire locations (frequency) each year since 1939. This site is the most complete fire history information available for the period of record-keeping in Alaska. Data is searchable and	http://afsmaps.blm.gov/imf_fire/imf.jsp?site=fire	Dataset is comprehensive and easy to use but incomplete because methods of mapping fires and map quality have changed over the years. Most gaps in Large Fire History are

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	downloadable, and public access to individual fire event records is provided, along with ability to make fire history and lightning strike event maps of areas of interest.		from 1939 to 1960. Systematic record-keeping started in the 1950's. Prior to 1987 the perimeter data included only fires >1000 ac.
Published article:	Characteristics of over 50 tundra fires, located primarily in the western Arctic, are summarized, with discussion of extent and seasonality of tundra fires.	Wein, Ross W. 1977. Frequency and characteristics of arctic tundra fires. Arctic 29(4):213-222.	Legacy article: one of many. . Search the AK Fire Reference Database: www.frames.gov/afsc/refs
Study: USGS study on post-fire trajectories in tundra	Ongoing USGS project (Barrett) characterizing recovery in various fires on the Seward Peninsula: *Characterizing post fire succession trajectories in tundra ecosystems*.	http://alaska.usgs.gov/portal/project.php?project_id=296	
Study: UAF/USFS study on post-fire effects in tundra	Ongoing project T. Hollingsworth, A. Breen studying sites on the Seward Peninsula	No citation as of yet	3 publications currently in the works: a) using these data in combination with other tundra fire work to produce a model of the effects of fire on shrub and tree expansion across the Alaskan Arctic, b) Variation in wet acidic vegetation communities post-fire on the Seward Peninsula, and c) changes in biomass and ecosystem function post-fire on the Seward Peninsula
Study: Arctic LTER/MBL/USGS studies on North Slope	Barrett, Shaver, and others have studied longer-term vegetation and remotely sensed characteristics of tundra fires on the North Slope	Barrett, K, AV Rocha, MJ van de Weg, and GR Shaver. 2012. Vegetation shifts observed in arctic tundra 17 years after fire. *Remote Sensing Letters* 8: 729-736.	
Dataset: Alaska Geobotany Center	Skip Walker and others have multiple datasets on North Slope tundra vegetation, commonly used as base layers for analyses of vegetation and succession.	http://www.geobotany.uaf.edu/	Datasets from North Slope vegetation projects, Arctic Vegetation Archive, and the

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			Circumpolar Arctic Vegetation Mapping Project.
Study: NPS study in Noatak on burn severity effects on vegetation and age of carbon burned in 2010 Fires	NPS funded project to assess within 2010 tundra fires in Noatak National Preserve: 1) the effects of burn severity on vegetation; and 2) the age of carbon burned in these fires.	Informal write-ups about project and preliminary results: http://www.nps.gov/fire/wildland-fire/connect/fire-stories/2013-parks/noatak-national-preserve.cfm Barnes, J. 2013. Does burn severity effect the age of soil carbon released during a tundra fire? A case study from Noatak National Preserve. Rx Effects NPS Fire Ecology Program. Vol 1, Issue 12. Pg. 8.	Final report due in 2014. Publications to follow. Contact: Jennifer Barnes, NPS Alaska Region or Feng Sheng Hu University of Illinois for more information
Study: NPS Remote Sensed Burn severity assessment in tundra and boreal forests	Assessing the use of remote sensed based burn severity mapping (dNBR) ability to map burn severity in the boreal forest and tundra ecosystems of Alaska's national parks. Includes fires in Noatak and Seward Peninsula.	Allen, J.L. and Sorbel, B. 2008. Assessing the differenced Normalized Burn Ratio's ability to map burn severity in the boreal forest and tundra ecosystems of Alaska's national parks. International Journal of Wildland Fire. 17: 463-475. Sorbel, B. and Allen, J. 2005. Space-based burn severity mapping in Alaska's National Parks. Alaska Park Science. Vol 4(1): 4-11 http://www.nps.gov/akso/nature/science/ak_park_science/PDF/2005Vol4-1/sorbel.pdf	Additional burn severity plots have been measured in Noatak at 6 different fires since this study.