Reducing spring flood impacts for wellbeing of communities of the North

U.S.-Russia Peer-to-Peer Dialogue Initiative 2015-2016

Quarterly report: October - December 2015

Peer-to-Peer Mobile Team and friends in front of a WWII memorial during the site visit to the village of Edeytsy, Namskiy Ulus, Sakha Republic, Russia in November 2015. Only on third of Edeytsy men who went to war survived. – Semeyon Yadreev (2013 flood) and jce

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Summary

This project engages communities of interior Alaska State and central Sakha Republic in a dialogue on spring breakup floods of the Yukon and Lena Rivers, respectively. Its purpose is to document lessons learned and to identify best practices of mitigating flood risk through case studies of the rural communities of Edeytsy, Sakha Republic and Galena, Alaska. The project also seeks to establish a lasting connection between Edeytsy and Sakha and enhance exchange between the their respective urban hubs, the Sister Cities of Fairbanks and Yakutsk. The dialogue is unusually diverse in that it involves scientists, local, regional, and federal governments, and community residents.

Sudden massive floods due to formation of ice jams as ice breaks up on Arctic rivers in late spring is a major hazard for riverine communities and therefore a threat to the Indigenous cultures they sustain. Hence, inclusion of Indigenous perspectives is a central aspect of the dialogue.

Edeytsy, Sakha Republic during ice jam flood. Scenes familiar to residents of rural Alaska
-Semeyon Yadreev, Head Administrator, Edeytsy

Fourth quarter 2015, the project's first quarter, comprised extensive preparatory bilateral discussions and planning climaxing in a three-week trip of 7 Americans (including two Native Alaskans, the Mayor of Galena, and one scientist funded entirely by NOAA) to Yakutsk, Edeytsy, and Arkhangelsk. There the Americans joined

the 7 Russian members of our Mobile Team for meetings In Yakutsk, the Namskiy Region, and Edeytsy as well as a survey of opinions about the flood issue in Edeytsy. The American members also visited Northern (Arctic) Federal University's Integrated Safety Institute in Arkhangelsk to learn about emergency management education and more about flood management in Russia.

The team found flooding conditions and community attitudes in Edeytsy and Galena to be similar in a number of ways, for example a very strong sense of community contributing to resilience, an increasing emphasis on "shelter-in-place" vs. evacuation, and an aversion to relocation despite the high risk. However, there appears to be better coordination vertically and horizontally among government agencies in Sakha, and there is more effort devoted to preparation, monitoring, and forecasting as flood season approaches. This comparison, with distillation of best practices, will improve in clarity as the team conducts the complementary visit to Fairbanks and Galena during the next quarter.

Project accomplishments

At the center of the project is a bilateral Mobile Team comprised of 7 Americans, all from Interior Alaska, and 7 Russians, all from the Yakutsk region. We qualify "team" with "mobile" because we consider the broader team to be open to anyone interested in the dialogue. The Mobile Team travels together in both countries and so unites the insights from both countries. (The US participants are funded by our Peer-to-Peer Grant whereas the Russian participants are funded by a combination of Russian and UAF cost-sharing.) On November 5, the Alaskan members of the Mobile Team joined their Sakha counterparts at the Northern Forum 12th General Assembly[1], in Yakutsk, Russia. The Mobile Team participated in a meeting hosted by the Northern Forum Water and Climate Change Working Group with the goal of identifying best practices in springtime river ice breakup forecasting and monitoring, ice jam prediction, and community flood preparedness. The meeting consisted of fruitful discussions among community leaders from Galena, hydrologists and meteorologists from the Sakha Division of the Federal Service for Hydrometeorology and Environmental Monitoring of Russia (Roshydromet), the Fairbanks Forecast Office of the National Weather Service (NOAA), the Geographic Information Network of Alaska (GINA), the Permafrost Institute in Yakutsk, the Science Research Center in Khanty Mansyisk, and the Dept. of Environmental and Earth Sciences at the Hokkaido University. This meeting was organized by the chair of the working group, Dr. Nikita Tananaev, who is a Leading Research Fellow at the Permafrost Institute, Siberian Branch of Russian Academy of Sciences, an invited professor at the Institut National Politechnique in Toulouse, France, and now a new friend and collaborator of the Peer-to-Peer team.

Northern Forum, 12th General Assembly…jce

In Yakutsk, the Mobile Team also participated in a round-table discussion focused on ice jam and flood risk mitigation, disaster preparedness, and response and recovery operations in the northern regions of the United States and Russia. The round-table was held at the North-Eastern Federal University (NEFU), and organized by the project's co-PI Dr. Tuyara Gavrileva and by Dr. Mikhail Prisyazhniy, Vice Rector of NEFU and also a member of the project's Advisory Committee. The round-table participants included the P2P Mobile Team and representatives from Russian state and federal agencies dealing with hazard mitigation and emergency management in the Russian Far

[1] Northern Forum General Assembly - an international and interdisciplinary gathering of scientists and policymakers with the goal to outline future interregional cooperations in the fast changing Arctic.

East[2]. These included:

1. Innokentiy Androsov, Director of the *Lena River Basin Water Management, Federal Agency for Water Resources*
2. Alexander Gorkun, Director of the *Russian Ministry of Emergency Situations (MChS) of the Republic of Sakha*
3. Nikolai Nakhodkin, Director of the *Rescue and Emergency Services, Sakha Branch*
4. Constantine Kusatov, vice-Director of the *Sakha Branch of the Roshydromet*
5. Semeyon Yadreev, Head of the *Administration of the Edeyskiy Nasleg*
6. Yelena Volkova, Director of the *National Information and Analytical Center for Environmental Monitoring*

Meeting with government officials and scientists. Russian P2P PI Tuyara Gavrilyeva at extreme right; NOAA/NWS meteorologist Ed Plumb next to her……jce

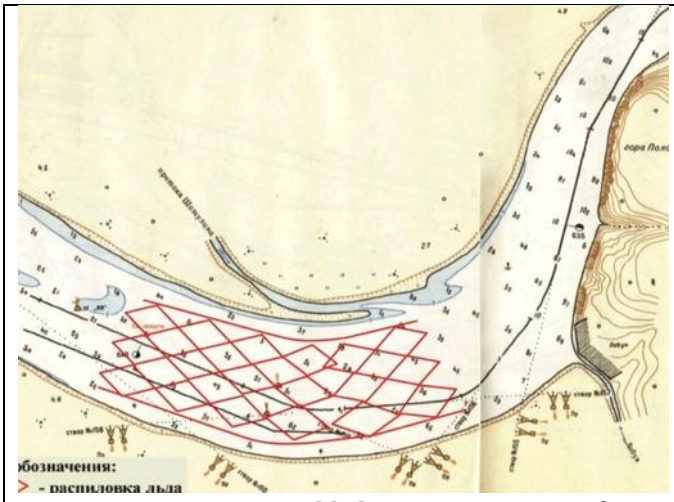
During the round-table, our team learned that the success of the emergency response operations in the Russian Far East primarily depends on the year-long ongoing collaborations and communications among the agencies mentioned above. For example, Roshydromet hydrologists first share their prognosis about ice thickness and amount of snowpack - factors contributing to the severity and timing of breakup floods and also about river channel channels in location and depth with the emergency managers and community leaders during the river ice freeze-up in late October and then revised weather forecasts with actual snow depths and ice thickness observations starting well before the beginning of the river ice breakup that occurs in mid May. As a result, emergency managers have time to prepare for potential disasters by knowing risk distribution. Emergency drills are contact in communities judged to be at high risk. Emergency managers maintain an ongoing dialogue with the administration of flood-prone communities about potential flood threats weeks prior to the formation of a potentially harmful ice jam. As a result, the communities have enough time to take necessary precautions, e.g. relocation of cattle and valuables to higher ground.

The Mobile Team was especially impressed with the proactive short-term ice jam mitigation efforts that the local emergency response personnel take every year. Some examples include dusting or sanding[3] of known

[2] It was immediately clear that this type of gathering of these high level of officials outside of an emergency situation is unusual, to say the least. The Peer-to-Peer team is very appreciative that they found an interest in our bilateral project and took the time to join us that day.

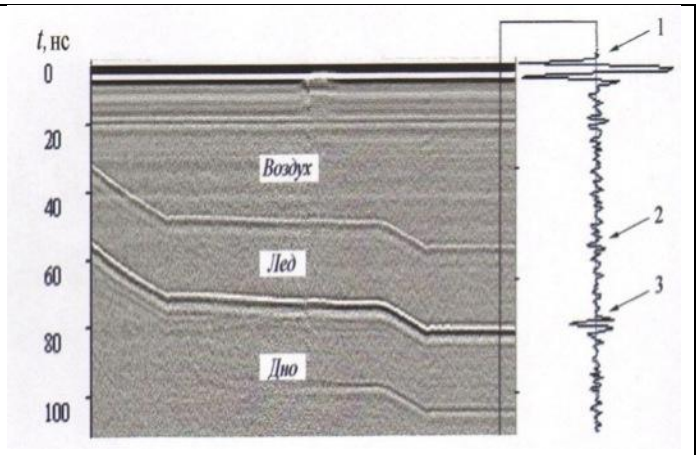
[3] River ice sanding/dusting is a process of distributing dark sand or coal dust along the river ice to increase sun radiation.

ice jam formation locations, cutting of river ice in gridded patterns with specially developed machinery, and, as the last resort - using explosives to weaken a developing ice jam. There is only anecdotal evidence and no or little official record reflecting the effectiveness of these methods. Indeed, it would be a challenging statistical problem to demonstrate that a particular mitigation technique did reduce flood damage.



Cutting river ice in a gridded pattern upstream of a jam point using a huge, truck-mounted chain saw. -Alexander Vikov, Sakha Rescue Service

Representatives from republic, federal, and local administrations also maintain dialogues about the implementation of long-term breakup flood mitigation strategies, such as construction of protective levees (which require annual inspection, maintenance, and sometimes federal funding), and both partial and permanent relocation of at-risk populations. One of the presentations during the round-table included a description and outcomes of a relocation pilot project that launched in 2010. This case study is valuable not only for Sakha Republic, but also communities in Alaska and elsewhere in the Arctic that face potential relocation.



Monitoring river ice prior to breakup. UAS (drones) are also used. -Alexander Vikov, Sakha Rescue Service

For the reasons further to be outlined, these relocation efforts were not completely effective; however, they still provide valuable lessons that could inform future relocation projects. In the 2010 relocaton, approximately one third of the at-risk population remains in the flood zone. The relocation site was constructed on higher ground, away from dangerous springtime floodwaters and ice debris. However, the greater distance from the river also meant that people had difficulty grazing their cattle, which is the primary activity of the local economy.

While in Yakutsk, the Mobile Team also participated in a round-table at the Institute for Humanities Research and Indigenous Studies of the North (IHRISN), Siberian Branch of the Russian Academy of Sciences. The discussion was primarily centered on two subjects: the dilemma of preserving a traditional lifestyle while adapting to the modern and globalized world, and the preservation of traditional languages, knowledge, and culture in the Far North. Sharon Hildebrand, a Master of Public Administration at the University of Alaska and Athabascan who grew up down the river from Galena and a Mobile Team member, and Jenny Pelkola, Galena's Tribal Leader, exchanged their expertise and experience on tribal governance and history in Alaska with the IHRISN researchers and students. In Russia there is no analog to the "parallel" tribal governance that is practiced in Alaska.

L: Sharon Hildebrand explains tibal governance and federal and state laws pertaining to "Indian Country"; R: Faculty of the Institute for Humanities Research and Indigenous Studies of the North and P2P team….jce

Throughout the course of the discussion, we learned that Native communities in Alaska and Sakha Republic face similar issues, such as young people leaving their homes for bigger cities and better financial opportunities. Considerable efforts have been put in both regions, though probably more in Sakha than Alaska, to ensure that the small rural communities attract not only their educated young people, but also new families. It was interesting to learn that in Sakha Republic recent college graduates receive financial incentives, such as increased wages and affordable or even free real estate, if they choose to reside in their home regions in the Far North. Sakha is the dominant language in the region, and native culture, traditions, and cuisine are cherished and practiced throughout the region, in both small rural communities and large cities, like Yakutsk.

While in Sakha Republic, the Mobile Team also traveled to the village of Edeytsy (~ 50 km north of Yakutsk). Edeytsy experienced major ice jam flooding in May 2013, similar to Galena. These two rural (largely Native, although in Russia the definition of "indigenous" is limited by population and Sakha people exceed that criteria) villages are being studied for the purpose of conducting comparative analysis to outline best practices in breakup forecasting and monitoring, ice jam and flood mitigation, community disaster preparedness, emergency response, and disaster recovery. The primary goals for this visit were to familiarize our group with the layout of the community, meet the local administration, tour the flood prone areas, see the recovery projects since the 2013 flood, and learn about the culture and history of Edeytsy. The mayor and the first chief of Galena showed pictures of the Galena flood at a "town hall" meeting, which required no translation for Edeytsy residents.

Galena and Edeytsy are very similar in many ways, especially in the strong connection of families and community, the valuing of education, traditional culture, sports and a healthy lifestyle, and an emphasis on resiliency to flooding and the harsh climate. A significant difference is the local reliance on agriculture and

livestock[4] in Edeytsy, which doesn't exist in Galena. Partly as a result, Edeytsy is less involved in subsistence lifestyle and is tied to the road system.

Residents of Edeytsy view presentation about Galena by Mayor Jon Korta and Chief Jenny Pelkola

Bilingual, bicultural school in Edeytsy -jce

Minor flooding of the surrounding grazing lands occurs annually in Edeytsy, and the number of more severe floods has increased in the last three decades. A flood in May 2010 inundated the entire village. The water rose so quickly that people were caught off guard. As a result, the village suffered severe socioeconomic consequences, e.g., loss of property, cattle, and means of livelihood. After the flood in 2010, preparedness has been taken much more seriously and preparation for the flood season now begins at least a month prior to the breakup. So although the flood in May 2013 was the highest in recent memory, the social and economic effects were less severe due to the community's more stringent preparedness measures.

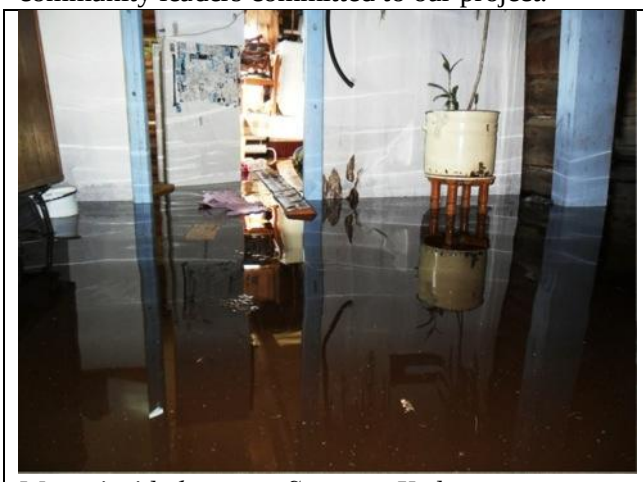
L to R: Galena Mayor Korta, Galena Chief Pelkola, Edeytsy Head Yadreev exchange gifts.

Kindergarten class in Edeytsy. Monday is Native dress day. –jce

During our trip to Edeytsy, the team strengthened engagement with Semeyon Yadreev, the Head of Edeytsy Administration and also a member of the Mobile Team. This was an especially a valuable experience for the mayor of Galena, Jon Korta, and Galena's Tribal Leader, First Chief Jenny Pelkola, as they compared

[4] The soils in Edeytsy are much better drained so there are fewer wetlands, even though the region is on continuous permafrost. The area also receives very little snow, so animals are able to easily graze on dried grasses in the winter. It is prime cattle country, therefore village relocation conflicts with economic productivity.

governance strategies, community structure, and options for educational, economic, and cultural development in rural communities in Alaska and Sakha Republic. Semeyon will reunite with the entire group during the second part of the project in Fairbanks and Galena, Alaska in March 2016. We are very fortunate to ahev these three community leaders committed to our project.



Water inside house…..Semeyon Yadreev

New, elevated shelter-in-place facility……jce

While in Edeytsy, the Mobile Team, with help from the local administration and in compliance with US regulations on human subject research, distributed surveys pertaining to the effects of the flood in May 2013, and the assistance the village received before, during, and after the disaster. Sixty surveys were completed. Similar surveys will be distributed in Galena in March 2016, with the goal to later conduct comparative analysis between the two communities. The key objectives of the analysis are to determine the effectiveness of the flood preparedness actions on the local level, and also the effectiveness of state and ederal assistance in both regions. The main goal is to derive best practices in ice jam and flood risk mitigation, and disaster response and recovery.

Typical flood damage, abandoned house; new elevated housing next-door……6/2015 jce

According to the preliminary analysis of the surveys, the village of Edeytsy has experienced moderate to severe flooding from 5-7 times in the last twenty years. The most severe flood took place in May 2013. The flood waters inundated the village for almost a week. Almost 100 percent of the agricultural land was submerged by the floodwaters. When the water receded, the land available for planting potatoes and cabbage was reduced to 80 percent, and the planting period was delayed for almost a month. As a result, there was a significant reduction in the autumn harvest. Moreover, private and public property also suffered significant damage during the flood in May 2013. On average, the residents estimated total damage in the amount of 370-

500 thousand rubles per household. This average does not adequately reflect the impact, because some households lost nothing and others lost everything.

The local administration informs the public about potential flood risk a month prior to the adverse event. The evacuation begins 2-3 days before the flood. The population then receives information about the flood risk and evacuation from the local authorities. Survey participants marked that the actions of the local administration before and during the spring flood as very good. Overall, the dissemination of information about potential flood risk is very effective in Edeytsy. Information about the progression of breakup is easily accessible to the at-risk population. According to the survey results, the information is primarily accessed via the local TV station (NVK-Sakha). Other preferred channels of information include phone calls with relatives who live upstream, local radio, and the Lena River Basin Water Management's website, which provides live broadcasting of the breakup progression.

According to the preliminary analysis of the survey results, the effectiveness of the disaster response and recovery efforts of the local administration is evaluated as very good. The disaster response and recovery efforts of the Namskiy region (regional level) are evaluated as good. The efforts of the Spring Breakup Flood Response and Recovery Operations (State level) are evaluated as very poor (no help at all). There was no public opinion relative to the efforts of the charity organizations. The assessment of the help provided was evaluated by the amount of allocated building materials, help with evacuation, and financial aid. According to survey result, the affected population received significant financial aid from their employers. There were no efforts mentioned from the agencies responsible for ice jam mitigation efforts, such as channel dredging.

The vast majority indicated no plans for permanent relocation, and no support for the relocation plans of the entire village. The primary reason was indicated as no desire to change their way of life.

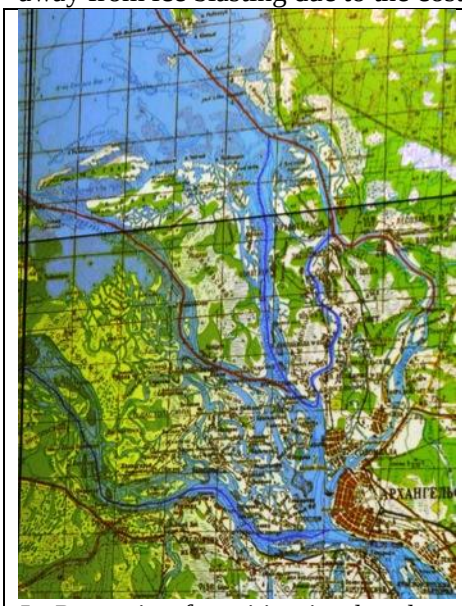
All of the surveyed residents indicated that the quality of water significantly decreased during the flood, and remain bad for 2-3 months after the flood. A significant part of the surveyed group noticed health problems, specifically increases in colds, allergies, intestinal diseases, and stress. According to the surveys, many houses had various fungi and mold problems after the flood. As a result, the foundation of their houses had to be replaced, which is a huge financial burden.

At NArFU, Integrated Safety Institute Director Sergey Markov explains the crisis simulation laboratory and response ship simulator. Sharon Hildebrand, UAS MPA student tries driving the ship towards the site of a terrorist attack. ……jce

The American members of the Mobile Team left Sakha Republic on November 14, and then spent three in the port city of Arkhangelsk in the northwestern Russia. Arkhangelsk lies on both banks of the Northern Dvina River near its exit into the White Sea. As a consequence, Arkhangelsk and many of its neighboring rural communities are prone to annual springtime flooding.


Students and Director at ISI listen to a presentation about the P2P flood project by UAF PhD student Katia Kontar (team member Jenny Pelkola to her left). Through ISI, NArFU offers bachelor and master degrees in emergency management……- jce

In Arkhangelsk, the team visited the Northern Arctic Federal University (NARFU)'s Integrated Safety Institute, which specializes on training specialists in emergency management relevant to natural and industrial hazards, including spring breakup floods. The team observed several experiential lessons, which involved computer simulations of emergency situation simulations, and conversed with the faculty and students about the effectiveness of emergency management education strategies. At the Integrated Safety Institute we learned that Dvina river ice is thin enough in the spring to use icebreakers to cut the ice and thus prevent development of ice jams. Sanding techniques, on the other hand, are not effective in the region due to frequent cloudiness. Similar to Sakha Republic, ice jam blasting is implemented as a last resort. Emergency teams have been trying to stay away from ice blasting due to the cost of the procedure and danger to both personnel and the environment.




L: Preparing for mitigating breakup on the Dvina Delta, Arkhangelsk. Red lines denote paths for icebreakers to break ice; blues are for river ice that must be cut. R: Inundation model for town up-river….jce

The following day was spent at the NARFU's Institute of Socio-Humanitarian and Political Science, where the group resumed discussions about the history of indigenous peoples in the US and Russia, and the role of traditional and local knowledge (TLK) in hazard mitigation and community preparedness.

Results and future Deliverables

Although less than halfway through the project, the team has already collected a significant amount of information about ice jam and flood risk mitigation, community preparedness, and disaster response in the Russian Far East and Interior Alaska. Some of the information has been analyzed and presented at the Fall 2015 American Geophysical Union conference in December 2015. The results were shared during the NH13C: New Ideas and Best Practices in Climate Change Adaptation and Hydrological Hazard Risk Mitigation and Disaster Response and Recovery and PA31D: Exploring the Role of Arctic Science in Developing International Arctic Policy sessions, and the NH12A-04: Natural Disaster Risk and Engagement in the Arctic, PA31D-01: Climate change and natural hazards in the Arctic, and NH12A-05: Reducing disaster risk in rural Arctic communities through effective communication strategies presentations.

The major activity of the second quarter, for which the entire team is now preparing, is a series of science sessions and dialogue meetings in Fairbanks and Galena during March 10 – 20.

The group was also invited to contribute a peer-reviewed manuscript on their results to the upcoming Cambridge University Press edited monograph entitled *Global Change and Future Earth: The Geodetic and Geophysical Perspective*. The manuscript is due on September 1, 2016. Another invitaion is for the team to contribute an edited monograph, featuring best practices and new ideas in breakup forecasting, and ice jam and flood mitigation, to the Springer Science Book Series.

One publication inspired by the Peer-to-Peer to project was recently published in Russia: Kostin, A.V. and Gavrileva, T.N., 2015. Implementation of GIS in Flood Damage Evaluation. *GEORISK-2015*, p. 214-221.

To further expand the outreach of this project, the group has been invited (see Record of Decision form the Working Group's Reykjavik meeting, December 2015) to submit a proposal for endorsement of the project by the Arctic's Council's Emergency Prevention, Preparedness and Response Working Group (EPPR) via the US and Russian (and possibly Athabaskan) delegations. If successful, the project will be listed as an accomplishment under the U.S. Department of State's two-year chairship of the Arctic Council.

The project's next milestone will be participation in the Arctic Science Summit Week (ASSW)[5]. The team will host a natural hazards symposium entitled Natural Hazards and Risk Management in the Arctic. The symposium will consist of two sessions, one highlighting new ideas and best practices in the fields of hazard preparedness, monitoring, forecasting, prevention and mitigation, disaster response and recovery in the Far North. The second session will be an open dialogue about the P2P flood project. The team will then travel to Galena to continue the dialogue at the local level.

Acknowledgements

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[5] ASSW is an annual gathering of international scientists and policymakers who advance research in the Far North through international cooperation and collaboration in various scientific fields of Arctic science.

Native Alaskan Studies and Rural Development at UAF; and the U.S. National Oceanic and Atmospheric Administration.

What to do in a flood; public outreach, Namskiy District……..jce