



Friends Of Admiralty Island



Newsletter

Issue No. 20

February 2016

Toxic Metals Contaminate Hawk Inlet Sediments

by K.J. Metcalf, President

A 2015 field reconnaissance study conducted by Friends of Admiralty Island indicates that metals in Hawk Inlet sediment are significantly higher than the pre-mining baseline in the inlet and in Piledriver Cove, suggesting it is a result of mining activities. Hawk Inlet shellfish have high levels of heavy metals compared to elsewhere in Alaska and compared to historic levels in the inlet. The pattern of metals suggests considerable bioaccumulation of arsenic, copper, lead, nickel and zinc in several deeper dwelling edible and key food web invertebrates.

This corroborates data observed in the mine’s annual polychaete worm metal analysis, but the latter patterns are less clear because only shallow dwelling, filter-feeding mussels were sampled.

Bear, deer and a harbor seal liver from near the mine contained slightly to extremely elevated levels of heavy metals – suggesting that there may be multiple inputs for metals in the Hawk Inlet watershed and marine waters, including mine wastewater, fugitive dust, spilled ore and natural background.

ANNUAL MEETING

Saturday, February 27, 2016
Juneau Yacht Club

Featuring Dennis Rogers

Celebrate Seymour Canal with Dennis Rogers, charter captain of research and natural history *winter* trips to Seymour Canal.

PLEASE SEE THE FULL MEETING SCHEDULE ON PAGE 3.



Lead scientist, Michelle Ridgway records a Hawk Inlet sediment sample for lab analysis.

More Inside

Who Will Speak	p. 2
Annual Meeting	p. 3
Hawk Inlet Legacy	p. 4
Clean Water Violation	p. 5
Ore Spill	p. 7

Bioaccumulation	p. 7
Seals	p. 8
Treatment Alternative	p. 10
Fundraising	p. 10

Friends Of Admiralty Island

Friends of Admiralty Island is a non-profit, public interest, volunteer organization formed in 1987. We depend on member donations and grants to carry out a program of advocating for the island's protection through education, promoting research and supporting management that reflects the recognition of the island's values: ecological diversity (including its abundant fish and wildlife), wilderness setting, Tlingit Indian culture, prehistoric and historic record and geological makeup. We believe that as people and agencies understand and appreciate these values they will become stronger champions for the island's protection.

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Sue Warner

Newsletter design and layout
Andy Romanoff, *Island Design*
Editor, Bruce Baker

Friends of Admiralty Island

PO Box 20791
Juneau, Alaska 99802
(907) 586-6738

www.friendsofadmirty.org
admirty_friends@yahoo.com

Who Will Speak for Them?

by K.J. Metcalf, President

I shared our initial Hawk Inlet study findings with Tlingit Elder David Katzeek, Klukwan Thunderbird Elder and Joey Zuboff, Deisheetaan (Raven Beaver) Clan Leader of Angoon. Their look was as one of great loss. After a moment of silence David, his voice rising, said,

“Can you hear them? They are calling - they are crying - the salmon people, the seal people, all of the creatures of the sea are calling. Who will hear them? Who will speak for them? That is what our elders would ask, who will speak for them?”

“You have brought us the scientific evidence of the damage being done to Hawk Inlet and you have asked the agencies for a study and that’s okay, but our Elders would have said (to the mine and regulators) STOP doing what you are doing NOW - can’t you hear the voices of the sea people?” They can’t wait for the government to do a study - a study will give you promises, but we were promised this mine would not harm our food, not contaminate our water and not contaminate our land and our people. This is not just a Native issue. It is an issue for Native and non-Native. We must all hear and we must all speak?”

Joey Zuboff voiced agreement with David’s words. David Katzeek speaks with force, authority, spirituality and wisdom.

These are the same expressions I heard from the City of Angoon and the Angoon Tribe - they didn’t want more promises. They want action.

Angoon’s first request was to Alaska Health and Social Services Commissioner Valerie Davidson to use our laboratory results and determine if their traditional foods in Hawk Inlet are safe to eat. And, if not safe what will the State do? Angoon referred to all food: commercial, sports and personal use, not just their traditional food.

I value the Elder’s words to STOP the pollution NOW. Gov. Walker’s Administration has put the risk of Canadian mines to Southeast Alaska as an important issue, so our own mines should be at least of equal concern. The Forest Service will be starting a new tailing’s expansion EIS effort within two years. Hecla mine has to be rethinking options for tailing’s water treatment and disposal, given the 2003 FS decision to limit tailing’s expansion until more data is available or a different strategy for disposal is sought.

We endorse Angoon’s letter to Governor Walker’s Administration that requests four actions:

1. Determine if people’s health is at risk from eating food from Hawk Inlet.
2. Replicate a modified 1981 pre-mine baseline study to determine the mine’s impacts on the marine environment and adjacent watersheds.

...continued on page 3

FRIENDS OF ADMIRALTY ISLAND ANNUAL MEETING

Saturday, February 27, 2016 • Juneau Yacht Club • “All Are Welcome”

4:00 - 5:30 pm Business Meeting and Hawk Inlet findings and progress toward solutions

5:00 - 7:00 pm Silent Auction

Support our Hawk Inlet Study - bid generously on experiences, desserts, artwork and more. Please consider donating a dessert - encourage your friends also! Call Sue Warner (586-1972) to confirm and arrange pickup, if needed.

6:00 - 7:00 pm Potluck

Bring a dish to share and enjoy terrific food and conversation. Dessert auction.

7:00 - 8:30 pm - Dennis Rogers shares photography, natural history and research trips in Seymour Canal, where in the fall and early winter, one of the world's phenomenal gathering of whales takes place. Up to 200 humpback whales feast in preparation for their 3,000-mile trip to Hawaii. This Seymour banquet also attracts thousands of sea birds and other predators and offers sights and sounds seldom witnessed on earth.

Who Will Speak *...continued from page 2*

3. Once the exact sources and mechanics of pollution are discovered, design an effective way to stop it.

4. Establish a scientific and technical committee, with stakeholders involved to provide guidance and oversight to the entire study and restoration.

In addition we believe the following must happen soon:

1. The Forest Service must take responsibility and provide leadership for the health of the Inlet. They permit the mine and the standards are law in ANILCA (see Legacy section of this newsletter).

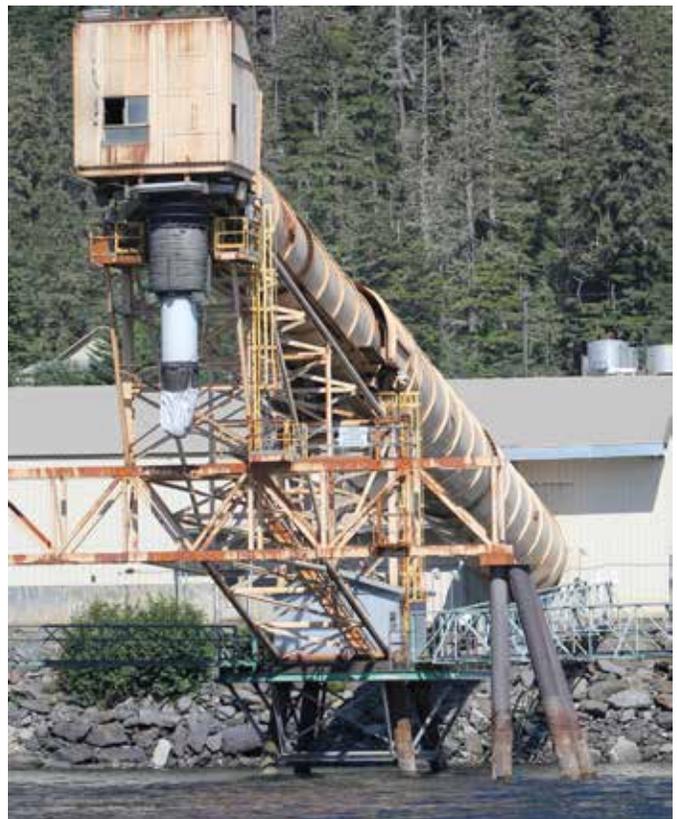
2. The state of Alaska must reevaluate the monitoring program under the state's waste water discharge permit and fix the errors that have allowed the monitoring to miss the obvious data that good science would have provided. Monitoring protocols must cover all trophic levels, and conclusions must be based on science.

3. Compensation to Angoon, and other villages, must be made for loss of traditional use areas.

4. The State of Alaska must declare the entirety of Hawk Inlet an “Impaired Water Body.”

5. The State of Alaska and EPA must set the Total Maximum Daily Limits (TMDL) of toxins that

...continued on page 9



Ore-loading conveyer in Hawk Inlet

The Legacy of Hawk Inlet *by K. J. Metcalf*

The making of a Monument - In 1978 President Carter proclaimed Admiralty Island as a National Monument, which ended the contentious debate whether to preserve Admiralty or log it. That proclamation was cemented in law in 1982 when Congress included Admiralty in the 1982 Alaska National Interest Lands Conservation Act (ANILCA) as a National Monument and Wilderness.

Including mines in the Monument - Key to congressional action was language to accommodate valid and potential mining claims on Mansfield Peninsula and the high-value claims at Greens Creek. To accomplish this, Hawk Inlet was set as the northern boundary of the Monument, excluding Mansfield Peninsula. Moreover, Greens Creek was excluded from Wilderness designation. The idea was to allow mining in the Monument, but there were some very specific conditions designed to protect Monument values – the core being that there was to be no irreparable harm to those values and during mining on Admiralty Island (both National Monuments managed by the Forest Service), all fish habitat was to be protected. The bar was set high to accommodate this all too frequent conflict of resource uses.

The pre-mining condition of Hawk Inlet - In preparation for the development of Greens Creek mine, two remarkable 1978 studies were undertaken to document the pre-mining condition of Hawk Inlet. The first was a comprehensive baseline study with special emphasis on the Hawk Inlet marine environment, uplands and freshwater systems. This study was done by an interdisciplinary team comprised of state, federal and Noranda (the original mine owner) scientists. An important element was the documentation of species diversity and their population numbers, and tissue samples for pre-mining metal content taken at selected inlet sites. This diversity/population approach was referenced in a 2013 Greens Creek Mine Annual Report as the best way to determine the health of an ecosystem.

The second study, in direct response to the developing mine was an Alaska Department of Fish and Game (ADFG) cutting-edge study on Admiralty brown bears on the northern end of the island. A number of bears were tagged and radio collared and their movements mapped to help establish their population numbers, home ranges, denning locations and seasonal movements. A valuable result of this study was the archiving of samples of their blood and hair. Though these have not been analyzed, they can be and will likely provide a valuable pre-mining baseline metal content for bears in the general vicinity of the mine. These studies were of gold standard quality and firmly established the pre-mining health of the area.

However, these studies would only be useful if they were periodically replicated to scientifically track changes in the health of the environment that could be related to mine operations. ADFG has replicated a portion of their bear study to help verify bear populations. But, strangely the Hawk Inlet study has been ignored, in fact it even disappeared for a number of years.

Advocating for a science based process - Friends of Admiralty has advocated since our 1997 founding to use the Hawk Inlet study to scientifically measure mine-caused ecosystem change. Our requests were dismissed for various reasons: too costly, can't be done because the original sample sites were not recorded with a GPS, and the most troublesome reason is that there are no indications in the on-going samples of elevated metals.

A second opinion - It became obvious that our voice was not being heard. That is, unless we had credible scientific evidence to indicate that, no the mine is not polluting, or yes it is. We were encouraged by Forest Cole, Tongass Forest Supervisor, when he signed the 2013 tailings expansion decision. He indicated he would make an interim decision because there was not enough known concerning the tailings deposit and how it

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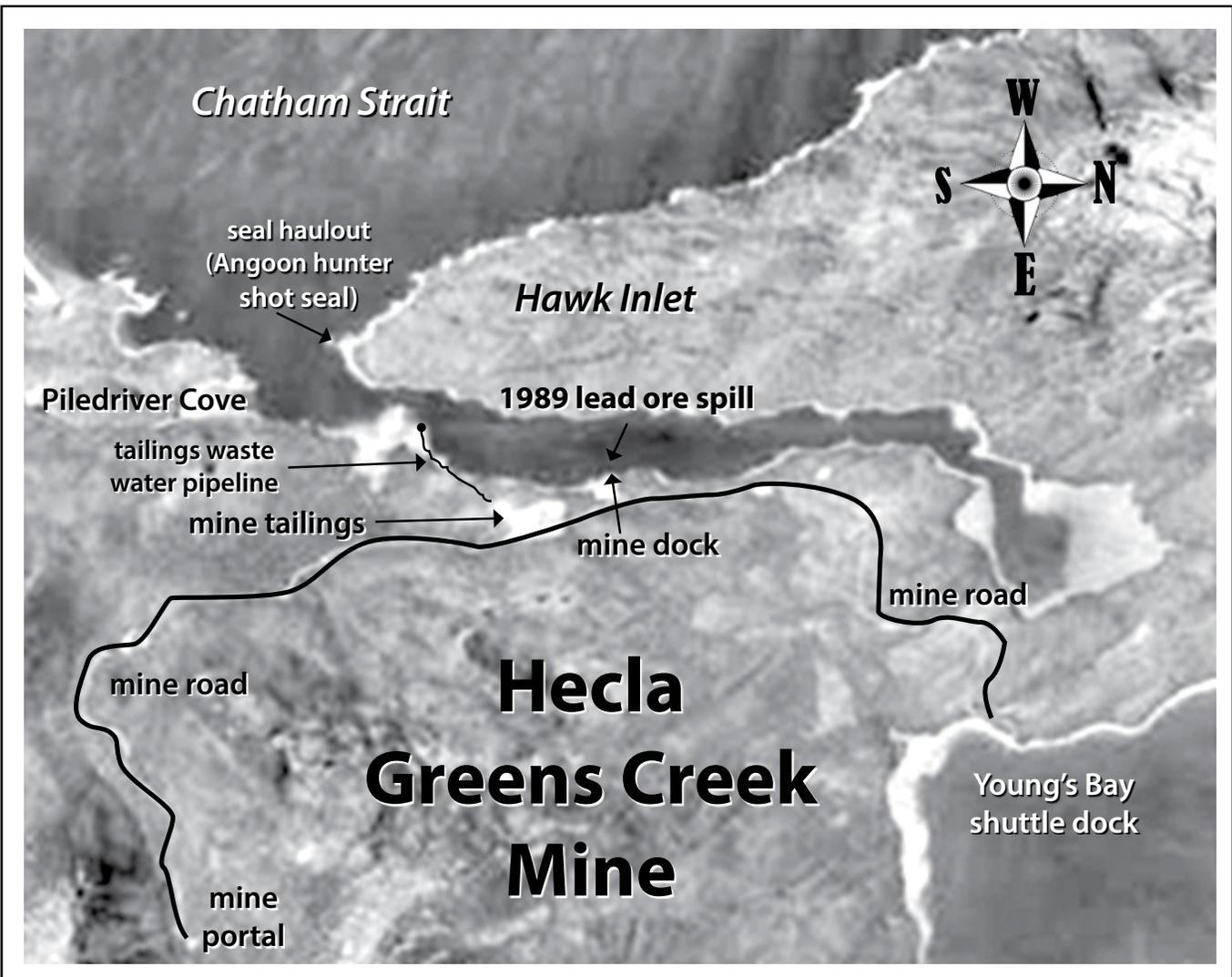
Highlights from Our Hawk Inlet Study

Hawk Inlet Water Violates Clean Water Standards

The mine and agencies have consistently proclaimed Hawk Inlet water is free of pollution and therefore wastewater treatment is effective and the standards for water uses have all been satisfied. In 2014 the state responded to our claim that Greens Creek water discharge violated the Clean Water Act by stating

“Under the Hawk Inlet Monitoring Program, which has continued in its present form since 1999, 12 years of quarterly water quality data have been collected from three locations in Hawk Inlet for constituents of concern in the wastewater discharged by Greens Creek Mine. Water quality

data for cadmium, copper, lead, mercury, zinc, pH, and weak acid dissociable cyanide indicate that the Hawk Inlet water sampled has been consistently high quality year round for the past twelve years. Since 1984, five years before mine production started, metal concentration data from Hawk Inlet sediments and marine organisms (mussels and marine worms) have been collected semiannually. Those data corroborate that water quality has been protective of existing uses. The Department [of Environmental Conservation] determined that the existing monitoring program is adequate to assess the effects of the mining operation on Hawk Inlet.”



Highlights from Our Hawk Inlet Study

Clean Water Violation...continued from page 5

The samples we took in our study led us to a very different conclusion. Why the differences? The state's protocol is to take water samples at a depth of 5 feet. We sampled the water column both shallow and deep.

What we found. Hawk Inlet ecosystem studies illuminated that seawater below the surface freshwater layer contains levels of copper and zinc that exceed acute and chronic Alaska Water Quality Standards both inside and outside the mixing zone. High levels of metals in sediment, benthic invertebrates and top predators in the Inlet suggest there may be multiple sources of metals contributing to observed bioaccumulation in the food web (fugitive dust washing from land to sea, metals leaching from the ore spill area, ore loading activities, plus the tailings and waste water outfalls). Tributyltin (highly toxic biocide found in bottom paint of foreign vessels), sedimentation and petroleum hydrocarbons in the system render Hawk Inlet less than pristine. Visual observations of some portions of the seabed and biota indicate that fish and shellfish rearing habitat and other designated uses for Hawk Inlet which require high ecosystem health have been degraded. Wildlife and fish populations remaining imply that some species tolerate and continue to inhabit Hawk Inlet for all to part of their life history; likely many of these organisms are compromised through ingestion or exposure to contaminants, depending upon their habitat uses and foraging strategies.

Why depth matters. Oceanographic data show that pycnoclines (water layers of density, temperature and salinity) occur throughout the inlet, measured at 3-5 meter depths in 2015, even on large tide events. Pycnocline density gradients form boundaries between shallow waters from about <5 m depth from deeper waters of the inlet. Since the outfall pipe is well below the pycnocline in the stratified water column, it appears that:



When Niskin water sampling bottle reaches desired depth with both ends open, weighted messenger is sent down wire to trigger closure. The bottle is retrieved having captured the sample.

- Micro and macro organisms trapped below the pycnocline in deep water likely receive higher exposure duration and concentration to the effluent.
- Monitoring in situ (on site) effluent levels at 5 feet is sampling rain and stream-influenced surface waters, not deeper waters below the pycnocline, where effluent flows into Hawk Inlet.
- Water column mixing predictions and effluent dispersal models using the 1980 dye study and tidal data may not incorporate effects of stratification on reducing water exchange.

Highlights from Our Hawk Inlet Study

Ore Spill

In 1989 an unknown amount of lead ore concentrate spilled into Hawk Inlet when the conveyer belt (then not enclosed) collapsed in the process of loading an ore boat. That spill was never cleaned up, though an attempt

was made. The spill resulted in DEC classifying slightly less than one acre of Hawk Inlet as an “Impaired Water Body.” The spilled ore has never been mapped and delineated. When ships come to the mine dock,

the water shallows and their props stir up the ore, which is spread by currents. This lead concentrate is another source of contamination.

Bioaccumulation

The 1981 pre-mining baseline study gives us a “before” snapshot of the health of Hawk Inlet – prior to the mine development and production. We now need the “after” snapshot to tell us what has changed during the last 36 years. And then we need to understand the processes that created those changes.

The process of how toxins move through the Hawk Inlet food chain is not well known. Generally the older bottom feeding organisms begin to “bioaccumulate” toxins - that is they store toxins, so that they have a greater load of toxins than the environment they live in. The story of the seal is a clear example of a top predator in food chain that had likely eaten numerous bottom feeding fish or octopi that had eaten snails and crab that had eaten worms that lived in toxin laden sediment.

When we raised the issue of bioaccumulation in our review of the current waste water permit the State of Alaska’s response was, “The results of the bio-monitoring program indicate no concern over bio-concentrating metals in higher trophic levels, and it was effectively designed to provide those data. Since the sensitive species are unaffected, it is reasonable to conclude that less vulnerable animals are also unaffected.” It is unclear what, if any “higher trophic level” animals the state tested to arrive at their “reasonable conclusion.”

Our data show, as do the mine’s data, that bioaccumulation, or concentration, is occurring

and that it starts with those organisms living on and in the sediment.

It was noted in the mine’s annual monitoring report, for example, that some indicator organisms such as cockles and polychaete worms are in such low numbers at some stations that they cannot be sampled “without potentially impacting their population,” or they simply cannot be found any longer. That is a concern.

Polychaete worms live in sediment and tend to bioaccumulate metals found in sediment and pass those accumulations up the food chain.



Highlights from Our Hawk Inlet Study

Seals

The Legacy Cove (Hawk Inlet) Project field team was provided with an opportunity to examine and analyze parts of a Hawk Point harbor seal, contributed by an Angoon subsistence hunter in May 2015. We made a visual assessment of its muscle, blubber, liver and kidney tissues and had each analyzed for eleven trace metals and organic contaminants. This was a large male seal and more prone to bioaccumulate toxins. The lab results reported:

- The seal liver had a total mercury concentration of 222 mg/kg which is 17-326 times the maximum concentrations found in any tissue of Alaskan earless seals reported at the time of this writing.
- Its kidney total mercury values are 3-20 times higher than concentrations in kidney samples from other Alaskan harbor seals.
- When compared to total mercury levels in earless seals worldwide, the wet weight concentration in the Hawk Point seal liver is 1.3-123 times higher than levels found in muscle, blubber, kidney and liver with few exceptions, those being harbor seal livers from San Miguel Island CA had total mercury concentrations of 341 and 700 mg/kg wet weight.
- When compared to a broader geographic area and other earless species, the wet wt total mercury concentration in the Hawk Point seal is 3 to 26 times higher than

values reported for Sweden, Canada, Greenland and coastal US.

- All tissues analyzed for nickel in the Hawk Point seal had concentrations exceeding the range of nickel concentrations reported for earless seals in Alaska and Sweden.

The Hawk Point seal was shot at the mouth of Hawk Inlet, adjacent to a reef where at up to 150 seals haul out. The pipe that carries some 4 million gallons/day of mine tailings waste water and other mine runoff water empties about a half mile away (see map on page 5).

The hunters returned to Angoon, and consistent with Tlingit tradition, shared the seal within the community. Seal is a highly prized and sought after commodity, so some was shared with relatives in other communities.

...continued on page 11



Hawk Point reef is frequented by up to 150 seals according to past NOAA surveys. We observed 12-20 swimming and hauled out on reefs (photo). According to ADFG, these seals prey on a variety of species that occur in Hawk Inlet and Chatham Strait, including walleye pollock, Pacific cod, capelin, eulachon, Pacific herring, sand lance, salmon, sculpin, flatfish (e.g., flounder and sole), octopus, and squid. Other prey occurring in abundance on the seafloor and in kelp beds around Hawk Point include rockfish, Irish lord, crab and halibut.

Legacy *...from page 4*

affects the environment. He urged stakeholders and the mine to work on different designs and better information so the next Forest Supervisor will be able to make a better informed long-term decision.

We took Supervisor Cole to be talking directly to us. In 2015 we designed a reconnaissance level study to sample a geographic representation of some of the 1981 sample sites, testing the feasibility of replicating a full study, or some modified version of it. We had the copies of the original field notes, photographs and compass directions and by matching similar extreme low tides we believe we were spot on. All of our samplings have photographs and GPS locations. We collected 100 samples including water, bottom sediment and organism tissue to be tested for a suite of 11 metals and some additional industrial pollutants. Our sampling strategy was to duplicate most of the ongoing mine sampling sites. We found our numbers were mostly close to the mine's numbers (though they test for only 5 metals). Additionally we tested some of the 1981 sites that have never been re-tested, and we took advantage of some unplanned opportunities (seal, bear, deer and additional benthic organisms).

Toward a solution - We are alarmed by our findings (highlighted in this newsletter) and feel stronger than ever that there have to be systematic changes in the processing and handling of mine wastes and monitoring procedures. It is abundantly

apparent that a replication of the 1981 baseline study is the immediate next step. We recognize that the mine is a reality and an important part of the Southeast Alaskan economy and it should continue in that role.

The mine's own web site states that "Hecla's 100%-owned and operated Greens Creek mine in southeast Alaska is one of the largest and lowest-cost primary silver mines in the world, last year producing 7.8 million ounces of silver at a cash cost of \$2.89/ounce . . . Production in 2015 is expected to be 7.3 million ounces." The mine also lists substantial gold and lead production and reserves, all of which suggests the mine will be in production for years.

If the mine operation is polluting to the extent we believe it is currently, what will the issues be with years more of operation? The mine is faced with a substantial investment in technology and infrastructure to make this the model mine that the State of Alaska has claimed it to be. The Forest Service and the State of Alaska have a significant responsibility to meet their permitting and oversight responsibilities.

I believe Congress was very clear when they specified, "No irreparable harm to Monument values." [Editor's note: Additional results of our 2015 reconnaissance may be examined at www.friendsofadmirty.org]

Who Will Speak *...continued from page 3*

Greens Creek Hecla mine is allowed to discharge into the inlet.

I grieve with all to see yet another part of our earth, and the health of the people who subsist on its bounty, sacrificed for corporate profit and convenience. Meanwhile the government agencies tasked with protecting this precious resource turn a blind eye. It should have never happened. It cannot be allowed to continue.

Hecla should live up to its claim as a cutting edge, environmentally responsible mine operator with science-based engineering innovations of tailings storage and wastewater treatment. And the rest of us must play our part. We can listen as Tlingit Elder David Katzeek and Angoon Cultural Leader Joey Zuboff look at the science and hear the creatures of the sea calling. For they ask of us all, "Who will speak for them?"

Tailings Treatment Alternative - An Upland Mixing Zone

Flow augmentation (FA) is a system of diluting and processing wastewater on land (a mixing zone in a tank), which replaces the need for a marine mixing zone, as Hecla now has in Hawk Inlet. Such a system allows the operator to regulate and monitor the quality of the discharge water. An FA system has been permitted at the Pogo mine (north of Delta Junction), and from reports is working well.

Friends of Admiralty and others have urged Alaska's Department of Environmental Conservation (DEC) to consider FA for Greens Creek, which could substantially lower the toxins released into the marine ecosystem. If it would work at Greens Creek, it would be a significant step toward reducing the current level of pollution.

When we and others made our requests, the state essentially said, NO - too costly, too

much energy and why do it, since the effluent is already clean and carries no contaminants. In DEC's own words:

“The Department considered the flow augmentation approach for this facility. DEC considered the costs and benefits of installing massive tanks, pumps, mixers, and pipes onshore and the continuous expenditure of a considerable amount of electrical energy for diluting treated effluent before discharge. The permittee uses ferric co-precipitation producing a high quality effluent, which consistently exceeds the highest statutory and regulatory requirements by a large margin, and it was determined to be the most effective and reasonable treatment technology....”

One more reason for us to undertake our Hawk Inlet Legacy study.



The crew found that 8-10 eagles had been feeding on this recently hunter-killed bear in Piledriver Cove. Lab results of tissue samples indicate the presence of chromium, copper, manganese, mercury, nickel and zinc. Further research of existing bear data will help put our data in context. Metals the bear accumulated have been passed onto eagles and intertidal organisms.

Fundraising

This newsletter summarizes some of the year's findings. When you read this you will understand why we are so alarmed. This study took hundreds of hours of talented, dedicated and passionate volunteers working with the professional help of marine scientist, chemists and others.

I ask for your understanding in considering making a tax deductible financial donation to wrap this study up. If you have already donated, thank you. We have needed every dollar raised to pay for over 1,000 lab tests, vessels, travel, scientific equipment and services. Believe me, to have reliable scientific data to make our case and work towards a solution is a game-changer. Thank you all for making this possible.

K.J. Metcalf, President

Click on “**Donate**” button on our web site www.admiraltyfriends.org or mail your check to Friends of Admiralty, P.O. Box 20791, Juneau, AK 99802.

Highlights from Our Hawk Inlet Study

Seals...from page 8

Weeks later when the lab results were received and the amount of toxins in the seal were apparent we called Edward Kookesh, the hunter and learned the seal had already been shared and eaten. That seal was now a very real part of the Angoon community.

Further tests should better determine the amount of methylmercury (the very toxic component of mercury) in this seal. We also hope to discover from additional tests what this seal was feeding on and better understand the food web in Hawk Inlet.

We acknowledge this is just one seal and hardly a definitive conclusion can be reached

on the mine and toxins in the higher trophic feeders. Yet this seal had the suite of Greens Creek metals - much like fingerprints. It is our opinion that this seal's load of toxins is most likely a result of the mine's operation, but as alarming as this is, a more definitive and immediate study is called for to determine where and how this seal accumulated such a significant load of toxins. If this seal is not an anomaly and it is a result of bioaccumulation from preying on resident species, there will need to be significant changes in mine operation and monitoring.

Until this is known, the state has responsibilities to consider

regarding the harvesting and eating of food from and adjacent to Hawk Inlet.

This must also be of concern to the U.S. Forest Service, as primary permitting agency for the mine and the agency responsible for maintaining a high standard to protect the National Monument and fish habitat. Additionally Forest Supervisor Cole, in approving the 2013 mine tailings expansion, concluded that there would be no reduction in subsistence opportunities as a result of the mine expansion. The Forest Service has an obligation to demonstrate that is the case.



K.J. Metcalf discusses with Edward Kookesh and Ben Joseph, Angoon subsistence gatherers, their request to sample their seal, shrimp and crab for metal analysis.



Friends of Admiralty Island
 PO Box 20791
 Juneau, AK 99802
 (907) 586-6738
 www.friendsofadmirty.org

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Winter 2016 Newsletter

Join Friends of Admiralty Today!

Friends of Admiralty is a tax-exempt, non-profit organization. This newsletter is provided free to those who care about Admiralty Island-Kootznoowoo, "Fortress of the Bears." To become a member of Friends of Admiralty, just e-mail your contact information and we'll sign you up free of charge.

Donations are welcome and greatly appreciated. To support our work, please go to www.friendsofadmirty.org and click on "donate."

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Yes! I want to join Friends of Admiralty Island. *Membership is free.*

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 PO Box 20791
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www.friendsofadmirty.org
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