Communities pay attention: Hay River Basin Pollution Investigation
The Arctic Ocean Drainage Basin covers one-fifth of Canada's landmass, including parts of the provinces of British Columbia, Alberta, Saskatchewan, Northwest Territories, and the Yukon.
Once a wild and pristine watershed, this Basin is becoming increasingly toxic and depleted as a fresh water resource holding 20% of the world’s fresh water.
In Fall of 2006, a group of concerned citizens met in Liidlii Kui, Denendeh/Fort Simpson, NWT to discuss their growing fears about the waters, producing a water Declaration that placed the needs of all that rely upon the Arctic Basin waters before the ambitions of government and industry.
Keepers of the Water

PAST Keepers of the Water GATHERINGS INCLUDE

- 2005 Akaitcho hosted the Keepers in Weledeh
- 2006 DehCho First Nation hosted Keepers in Fort Simpson, NT
- 2007 Keepers of the Athabasca hosted the Athabasca Regional Gathering, Alberta
- 2007 Moberley Lake First Nation hosted in Fort St. John, British Columbia
- 2008 Mikisew First Nation hosted in Fort Chipewyan, Alberta
- 2010 Hatchet Lake First Nation, and Denesuline First Nation hosted at Wollasten Lake, Saskatchewan
- 2011 Northlands Denesuline Nation and Manitoba Keewatinowi Okimakanak hosted at Lac Brochet, Manitoba
- 2012 Fort Nelson First Nation hosted in Fort Nelson, British Columbia
- 2013 Fort MacMurray First Nation hosted in Anzac, Alberta
- 2014– Keepers of the Beaver Council hosted at Cold Lake First Nation, Alberta
- 2015 Dene Tha First Nation, Beaver First Nation, North Peace Tribal Council, and Treaty 8 Organization hosted at Bushe, High Level, Alberta
- 2016 Fort St. John, British Columbia, alongside Paddle for the Peace event
In 2015, Keepers of the Water held our Annual Gathering at Bushe River, on Dene Tha and Beaver FN Traditional territory in Northwest Alberta
Keepers of the Water

The Simulated Oil Spill and Clean–up workshop took place on Friday, August 28, 2015

Jule Asterisk, Keepers of the Water (workshop facilitator), and Mandy Dumanski (Alberta Energy Regulator Toxicologist) Waste Management by Husky Energy
Materials were suggested for us to try in booms by Traditional Ecological Knowledge holders: Peat Moss, march grass, cat tail tops, poplar chips, and dry grass.
Additionally, the Human Hair boom by Green Circles Salons was tested:

- Thousands of salons across North America contribute hair
- Contract with women’s prison to stuff hair booms
- Research completed on specs, specialized netting, etc.

**Green Circle Salons Hair Fibre Boom**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Hair Fibre Boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorbing Rate:</td>
<td>1 cubic foot : 7.8 US gallons per use (See chart 1.0 below)</td>
</tr>
<tr>
<td>Absorbing Time:</td>
<td>7.8 US gallons : 2.8 minutes (See chart 1.0 below)</td>
</tr>
<tr>
<td>Reusable Time:</td>
<td>More than 100 times for each boom. Absorbing rate increases after many uses. (See ref. A.1)</td>
</tr>
<tr>
<td>Size Available:</td>
<td>Regular and custom sizes available</td>
</tr>
<tr>
<td>Description:</td>
<td>Absorbent organic &amp; synthetic boom.</td>
</tr>
<tr>
<td>Color:</td>
<td>White</td>
</tr>
<tr>
<td>How to use:</td>
<td>See chart 1.2 below.</td>
</tr>
<tr>
<td>Outside Material:</td>
<td>82% polyester / 18% spandex</td>
</tr>
<tr>
<td>Inside Absorbing Material:</td>
<td>100% Organic Human Hair</td>
</tr>
</tbody>
</table>

**Properties:**
- PET, PET and PBT Blends are engineering plastics
- Exceptional low water absorption, in particular comparison to Nylon (polyamides)
- Exceptional dimensional stability, due to the low water absorption
- Excellent electrical properties
- Excellent resistance to chemical attack and high environmental stress crack resistance, in comparison to polycarbonates, due to the semi-crystalline nature of polyesters
- Very good heat and heat ageing resistance
Each boom being tested called for the pollution of 20 litres of fresh water with motor oil

After each test, the contaminated booms and also the oil contaminated water was disposed of by Boss Services, a subcontractor with Husky Energy
Participants kept track of the results of each test on a feedback form.

<table>
<thead>
<tr>
<th>Material</th>
<th>Observations</th>
<th>Score 1 - 10</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat bog moss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Popular saw dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass clippings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marsh grasses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human hair – GC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human hair – Keepers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial boom</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Workshop Evaluation (please circle):

1. I found this workshop interesting (1 = less interesting, 5 = more interesting)
The best performing boom was **Green Circles** human hair boom, by far!

Here are the tabulated totals for performance of each boom (out of a possible 10)

<table>
<thead>
<tr>
<th>Material</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Hair</td>
<td>8.3</td>
</tr>
<tr>
<td>Poplar chips (sawdust)</td>
<td>5.7</td>
</tr>
<tr>
<td>Peat bog moss</td>
<td>5.4</td>
</tr>
<tr>
<td>Cat tail tops</td>
<td>5.3</td>
</tr>
<tr>
<td>Grass clippings</td>
<td>4.3</td>
</tr>
<tr>
<td>Marsh grass</td>
<td>4.1</td>
</tr>
</tbody>
</table>
Also at the Keepers IX we heard in a presentation by Baptiste Metchooyeah, from the Lands Department of Dene Tha First Nation:

- there have been hundreds of local pipeline spills
- many concerns exist about these pipeline spills
- spills are cleaned up by the company that leases the spill location
- the Alberta Energy Regulator is responsible to certify when the spill is ‘cleaned up’
Traditional Knowledge Holders said:

- “We need to look into what’s happening with this pollution.
- It is very, very concerning some of the things that we’ve seen first-hand and what’s going on, and what’s being done with the landscape.
- I don’t really think there is a lot of reclamation that’s going on.
- It’s the land versus industry at this point, they are using the land.”
We decided to make a project together with our partners from the Keepers IX Gathering

- Dene Tha First Nation
- North Peace Tribal Council
- Treaty 8
- Beaver First Nation
The **Hay River Basin Pollution Investigation**: 

Looks for pollution caused by pipeline spills  
- At places identified by our Partners  
- Independent scientists accompany Traditional Knowledge holders  
- Study oil, salt, and other chemicals in the soil  
- Study vegetation  

Provides community water monitoring training toward future potential monitoring programs  
- CABIN Technique, facilitated by Living Lakes Canada  
- Bioassay Technique, facilitated by Dr. Aaron Witham, Environmental Bio-detection Products Inc.
Keepers of the Water

Canadian Aquatic Biomonitoring Network

Join the national aquatic biomonitoring program for assessing the health of Canada’s freshwater ecosystems.

For groups and individuals looking to develop/expand their stream monitoring activities and scientific credibility. Led by Environment Canada to promote data sharing for consistent and comparable collection and reporting on freshwater aquatic ecosystem conditions.

**Aquatic Biomonitoring** examines water quality by looking at the organisms living in the water body, providing an integrated assessment of ecosystem health. CABIN focuses on benthic macroinvertebrate communities, or the bugs that live on the bottom of streams and lakes.

**CABIN training** provides knowledge and develops the necessary skills to successfully conduct biological monitoring assessment to a nationally acceptable standard.

Living Lakes Canada in partnership with the Keepers of the Athabasca will be hosting a 2-day CABIN Field Practicum in the Upper Athabasca watershed October 2015. For more information email: raegan@wildsight.ca
CABIN training was presented on August 17 and 18, 2016 at Boyer and Ponton Rivers (Beaver First Nation).

Twelve community members participated from Dene Tha and Beaver FN’s, ten certifications as ‘Field Assistant’ were issued.
Keepers of the Water
Keepers of the Water
Opportunities

- Enabling scientific questions of citizens to be answered
- Developing and extending monitoring networks – geographic and cross-sector
- Incorporation of Traditional Ecological Knowledge
One drawback to the CABIN technique for the purpose of the Hay River Basin Pollution Investigation is that the wetland protocol is still in development. Could the communities work with Environment Canada to help this process? Many local spill sites are in wetland areas.

Apache Canada,
June 1, 2013
EBPI Products

- 20 years of experience working with environmental organizations, government, academia and industry providing research tools that aid contamination assessment projects
- **Deepwater Horizon** oil spill (April 20, 2010)
- EPA (US Environmental Protection Agency) used **EBPI** products to test toxicity of water samples from spill contamination
- Analyzed genetic effects of dispersant–oil mixtures
EBPI – Environmental Bio-detection Products Inc.

- Develop and sell testing products (kits) to “Measure the health of the environment” (environmental toxicity and bacterial contamination). $2,000 worth of kits were donated to this Investigation.

- Low cost ($5–$60/ sample)

- Kits are mainly Biological assays (bioassays)
  - Use living organisms (Daphnia, small crustaceans, plants, bacteria) to look for acute and chronic toxicity, as well as genotoxicity (cancer-causing compounds)
  - Easy to use, portable to the field, require limited equipment
EBPI Biological Assays

- Training was presented on **September 14 and 15, 2016** at three pipeline spill locations and two controls on Dene Tha FN Traditional territory
- Keepers of the Water was funded for 125 kits ($2,000 value)
- **Endpoints are easy to read, can be immediately interpreted** (colour change, dead vs alive)
- Provide important measures of ecosystem health (direct effects to sensitive animals and plants)
- Mixture effects from chemical “soups” are considered (bigger picture data)
Daphnia Acute Toxicity Test

Organism: DAPHNIA MAGNA
Hatch Test Organisms

Incubate at 22 C for 72 h under continuous illumination

Prepare Test Plate

Add living organisms and samples to appropriate wells in test plate

Prepare Dilution Series

Water Sample

C1, C2, C3, C4, C4

Incubation

Incubate plate in the dark for 24h or 48 h

At each time interval, analyze wells for dead (or immobile) vs live organisms

Results

Record values and calculate EC_{50}
Keepers of the Water
Our samples were analyzed on September 15, 2016 during the training process, with further analysis completed by EBPI.

As a result of this training, 12 community members were certified to use EBPI technology.
Based on concerns relayed to us by Traditional Knowledge Holders in Northwestern Alberta

Keepers of the Water and partners, Dene Tha First Nation, Beaver First Nation, North Peace Tribal Council and Treaty 8 First Nations of Alberta have completed Phase 1 of the:

**Hay River Basin Pollution Investigation**

Regarding pipeline spills and their clean up in Dene Tha Traditional Territory

**Media Conference and Information Session**

February 2, 2017 Lunch at 12 noon

Dr. Kevin Timoney’s Report Presentation at 1:00 pm

Corbett Hall
University of Alberta
8205 114 St. Edmonton

Further presentations:
- Chief Joe Pastion, Dene Tha First Nation
- Caleb Behn, Executive Director KOTW
- Traditional Knowledge Holders
- Environmental Bio-detection Products
- Investigation presentation

For more information, or to register, please call Jule at 780 805-1709
In addition to the two studies and other information provided today, Keepers of the Water has started a FOIP request to the Alberta Energy Regulator.

- This request was initiated on September 10, 2016, after nine months of AER representatives directing us to various colleagues for a period of 9 months.

- As suggested by Dr. Timoney, we have asked for all data, maps, reports, images, correspondence between AER and the licensee (energy company) and Alberta government, third party reports (such as by Matrix, NAIT), and related information that pertain to 9 different sites, as per our investigation.
FOIP: While almost 4,000 pages of information has been found regarding the nine sites:

- 851 pages has been released so far for a reveal rate of 21%
- Three of our requested sites were excluded, as there were ‘open investigations’ when we made our FOIP request, which investigations are now closed
It looks like the FOIP may take years

- We are prepared to follow it through
- We may decide to contest their results
- Keepers of the Water will work with EcoJustice, who have volunteered to contribute their legal expertise
- We don’t need the FOIP information to release our reports, as we collected our own data
Funders for this project, aside from in-kind contributions from our partners:

- LUSH Handmade cosmetics
- Tides Canada
- Keepers of the Athabasca
Thank you for your attendance today

Questions about the

Hay River Basin Pollution Investigation