Moving Forward: Board Recommendations for future projects
Keepers of the Athabasca Watershed Society formed in 2006 at the first Gathering of Keepers of the Water

Mission: Guided by both Indigenous Elders’ Traditional Knowledge and western science, the Keepers of the Athabasca are First Nations, Métis, Inuit, environmental groups, and watershed citizens working together for the protection of water, land, air, and all living things today and tomorrow in the Athabasca River watershed.

Vision: Guided by both indigenous Elders’ Traditional Knowledge and western science, Keepers of the Athabasca (2006) are First Nations, Métis, Inuit, environmental groups, and watershed citizens working together for the protection of water, land, air, and all living things today and tomorrow in the Athabasca River watershed.
Our work is directed by concerns expressed by Traditional Knowledge holders in this region:

- “We don’t eat the fish; who would want to eat the fish with lesions and crooked backs?”
- “They call it land capability because they can’t reclaim the land to the way it was. They have admitted they can’t do it.”
- “We worry about surface water, yet nobody thinks about our aquifer water. The fact that the caprock that is protecting it, but it has so many holes from where we extracted oil.”
- “Just look at our cemetery and you can see the effects. Cancers, lupus on the rise, diabetes, we never had these before.”
Keepers takes part in many projects to express these concerns and work towards ways of preserving the land and water

- Annual Gatherings
- We are The Land Conference 2015
- Oil from Water workshop 2016
- People on the Path project 2018
- Participation in multi-stakeholder committees (IWMWG, TMF MFSP, LARP, etc.)
- Formal request to Canada for naphthenic acids to be regulated
- Submission to: Committee for Environmental Cooperation 2018 on tailings management
- Teck/Frontier hearing 2018 and 2019
- Request to appear for the ‘UN Special Rapporteur on Toxics, re: Tailings, Swan Hills

Violet Cheechum is a member of Fort McMurray First Nation, and Keepers of the Athabasca’s Elders Council
In the interests of increasing sustainability, Keepers of the Athabasca Board has suggestions for future projects:

- Tools for community based water monitoring programs
  - Data visualization tool
  - CABIN – Canadian Aquatic Bio-monitoring Network
  - Bio-assay technology for water monitoring
- Human Hair booms – removing oil from water
- Full containment for tailings
- Ideas for future Remediation planning
  - Pilot projects with Traditional medicine plants
  - AOSTRA green chemistry
  - Using compost to augment top soil
  - Elders and Traditional Knowledge holders are experts
Data visualization tool

CABIN - Canadian Aquatic Bio-monitoring Network

- The Canadian program for measuring pollution by counting river bugs is based on work by international scientists that started in 1909.
- Teams of citizens and scientists work in this method around the world.

Canadian Aquatic Biomonitoring Network

Measure freshwater ecosystem health with standardized methods, database, activities map, training.
Keepers of the Athabasca did a three year CABIN monitoring program for the Upper Athabasca River

- Volunteers performed CABIN research at 14 different stations
- Monitoring took place in 2015, 2016, and 2017
- 23 data sets are publicly available on the Mackenzie Datastream website
Keepers provided CABIN training for First Nations around Alberta through Living Lakes Canada:

- Alexander First Nation
- Beaver First Nation
- Dene Tha First Nation
Bio-Assay Technology for Water Monitoring

**EBPI** – Environmental Bio-detection Products Inc.

- Canadian biotechnology company based out of Mississauga, Ontario
- “Measure the health of the environment”
- Develop and sell testing products (kits) to assess environmental toxicity and bacterial contamination
- Kits are mainly **Biological** assays (**bioassays**)
  - Use living organisms (Daphnia, small crustaceans, plants, and bacteria) to look for acute and chronic toxicity, as well as **gentotoxicity** (**cancer-causing compounds**)
  - **Easy to use, portable to the field, require limited equipment**
EBPI representative Dr. Aaron Witham

- Came to Alberta to provide training in 2016
- EBPI has 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
Keepers provided bio-assay training as part of the **Hay River Basin Pollution Investigation** in 2016.
Human Hair Booms – for removing oil from water

- This unique concept was brought to our attention by Elder Nancy Scanie (Clan Grandmother, Cold Lake First Nation)
- She asked that we do a workshop to test them
- The ‘Oil from Water’ workshop was born
Green Circles Salons

- Recycling of salon waste, including hair
- Over 2,077 salons across North America
Oil from Water workshop

This workshop took place at Keepers of the Water IX in Bushe River hosted by Beaver First Nation and Dene Tha First Nation.

We tested many absorbent materials as well as hair, as suggested by Traditional Knowledge holders from these two Nations.
These are the materials suggested for us to try in booms by Traditional Ecological Knowledge holders: Peat Moss, march grass, cat tail tops, poplar chips, and dry grass.
The results of this workshop showed us how well the human hair booms work.

<table>
<thead>
<tr>
<th>Material</th>
<th>Observations: Absorbs?</th>
<th>Score</th>
<th>Recommendation</th>
<th>Oil released?</th>
<th>Saturation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat bog moss</td>
<td>Absorbs well</td>
<td>5.4</td>
<td>No (all agree): Boom becomes a source</td>
<td>Yes</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Gets saturated</td>
<td></td>
<td>too destructive to mine for this purpose²</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Well absorbed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Well absorbed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16” x 3” x 2 booms⁴</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Popular sawdust</td>
<td>Absorbs well</td>
<td>5.7</td>
<td>No</td>
<td>Yes</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Traps some oil</td>
<td></td>
<td>Drips oil (boom becomes source)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bad</td>
<td></td>
<td>Not good</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not much</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not much</td>
<td></td>
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<tr>
<td></td>
<td>Absorbs, but let it go</td>
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</tr>
<tr>
<td></td>
<td>16” x 3” x 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass clippings</td>
<td>Does not absorb well</td>
<td>4.3</td>
<td>No (all agree)</td>
<td>Yes</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>Bad</td>
<td></td>
<td>Boom becomes source</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Bad, very oily</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>24” x 4” x 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marsh grasses</td>
<td>Not very well</td>
<td>4.1</td>
<td>No (all agree)</td>
<td>Yes</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td></td>
<td>Boom becomes source</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Cat Tail tops (seeds) | Not good | Not good | Not the best | Still full of oil 16” x 3” x 2 | 5.3 | Maybe (received no other comments, neither yes or no) | No⁸ | 100% |
| Human hair – GC      | Absorbed all (except residues on container) | Fair | Good | Picked up oil better | Works better | Only water drips out isolated droplets when squeezed 16” x 6” x 1 | 8.3 | Yes | The best – recyclable | Yes | No⁹ | 60% (still has lots of capacity) |
| Human hair – (hand made) | Absorbed all oil | Fair | Picks up oil | Got a lot out, but still have residues | Absorbed oil up to its saturation point 16” x 3” x 2 | 7.7 | Yes | Need a second boom | Yes | No | Yes – recyclable | Boom becomes source | Yes | 100% |
| Commercial boom      | Absorbed all but residues | Fair | Picks up oil | Oil still evident | Mostly absorbed | Floats then sinks – looks pretty dirty + BTEX 4” x 3” x 1 | 7.8 | GC Hair boom is better | Yes | Need a second boom | Yes | No | Yes | 100% |
Pilot projects including medicine plants

- We developed a pilot project with Dene Tha First Nation
- Funding was not achieved, and so the project wasn’t either
- Traditional Knowledge holders felt that observing how these medicine plants grew on remediation sites would help to evaluate the site
- This project was based on choosing different medicine plants to correspond with different types of land reclamation areas
AOSTRA – Alberta Oil Sands Technology and Research Authority – Green Chemistry

- Initiated in 1974 by Premier Lougheed (in operation until 2000)
- Billions of dollars in research and development spending, matched by industry partners: original idea was to ‘lease’ new technologies
- Developed many products, including SAGD
- Keepers’ Co-chair, Paul Belanger worked as part of an AOSTRA team to develop green chemistry for the tailings ponds to make them non-toxic
- These were priced between $1.50 and $3.00/m³
- Hundreds of good ideas that never saw light
Oilsands Extraction and Tailings Waste Management

- Decades of missed opportunity -

The history of oil sands technology development demonstrates a reluctance to adopt modernized and greener methods.

**WHY?**

- **Weak regulations** did not promote higher process standards.

- Short term profits by industry trumped capital investment for **cleaner technologies** even if they were more profitable 1 or 2 years later.

- Government closure of **AOSTRA** in 2000 terminated a strong scientific and research organization. AOSTRA was replaced with AERI and later Alberta Innovates. Research quality and **integrity** was lost.

- Superior chemistry and physics developments were shunned by referred

  and just wait for something cheaper.

  to delay progress, for example, with tailings pond treatment.
Missed technology breakthroughs in the oil sands:

A REVIEW of PROPERTIES and TREATMENT of OIL SANDS TAILINGS

This review critically examined many methods to treat tailing waste, some of them very affordable at the time. Industry rejected all options. The AB government regulator did not apply any regulations based on this and other research which demonstrated feasible treatment of the tailings ponds at the time.

**AOSTRA SCIENTISTS** in **1994**, Loren Hepler and Russell Smith recommend further testing of known alternate extraction methods which could minimize the tailing waste problem. Nothing came of these recommendations described in detail in a 245 page book.

After AOSTRA was dismantled the goal of a tailings free process was forgotten.

Full containment for tailings

- Tailings come in various forms, with different toxicity levels

- “The solution to pollution is (NOT) dilution”

- This concept is presented order to prevent the contaminants from the most toxic of tailings from escaping into the environment
Evaporation Tanks not tailings ponds - the solution to pollution is containment

**Solar panels** on top of the roof run fans on the interior of the roof for increased evaporation.

Tailings ponds have not successfully evaporated toxic liquid tailings in Alberta during the past 60 years. Open to the air, tailings ponds have provided a source of air, water, and land pollution.

In order to prevent more aerial pollution, wildlife death, land use issues, and leaks into surface water, specialized storage tanks may be used for the evaporation of liquid tailings.

*Scrubbers line the 'evaporation panel' between liquid tailings and the roof, preventing emissions from escaping.*

When tailings have settled out and been completely evaporated using evaporation tanks, the tanks may be disassembled, the contaminated waste sand disposed of, and the tank re-assembled and re-used for further liquid tailings.

Concept by: Jule Asterisk
Keepers of the Athabasca
keepers.communications@gmail.com
Compost to topsoil

- In Northern Alberta, we have a very shallow topsoil layer.
- Topsoil that is piled for years, during resource extraction loses important nutrients and structure.
Compost in remediation

- Compost provides excellent nutrients and could be used in reclamation and remediation
- Compost reduces organic waste
Clean It Green It (Edmonton)

- They currently have 80,000 tonnes of compost they are willing to give away for reclamation/remediation efforts
- Shipping would be the only cost to utilize this material
Northern Roots Compost (RMWB) 18,000 tonne/y
http://www.rmwb.ca/living/Services-and-Utilities/Water/Northern-Roots-Compost.htm
Elders and Traditional Knowledge holders are experts
Thank you for your attention

Questions?