Nicola Millions-Hollamby June 16, 2021

On the land

The land was the home, the grocery store, the pharmacy, the source of clothing, the religious base, the social base and the political base, and the economic base of the first peoples that lived and travelled in this area we now call Alberta. Many of the indigneous and Metis peoples relied heavily on the buffalo to meet all their needs especially in the south and central parts of the area and then in the north the Cree and Metis were were involved in the trapping economy which started with the harvest of beaver originally but also included other animals as time went on. Today I have the privilege to speak to you from the agriculturally rich area of Olds, Alberta which is in Treaty 7 territory and Metis Nation Region #3.

Indigenous peoples are pushed aside

So the bison were wiped out and the indigenous peoples (especially in the south) were starving and struggling as the european settlers came in greater numbers. Indigenous peoples are moved to reserves with the signing of Treaty 7 in 1877 and Treaty 6 in 1876 and the government takes control of the lands. With the lands secured, the railroad expanded across the prairies and the government advertised “free” land to draw the settlers to the west.

Dividing up the land

So with the province now available (nobody resisting your arrival), the european settlers started to come into the area in huge numbers. The government provided incentives for these new arrivals ... “free” land for farming. Land was surveyed using the DLS and there are now legal boundaries in place and certificates of title issued to show ownership of the land. This is where we see the dividing of surface rights from mineral rights which is important when we look at oil and gas and other minerals being developed. In 1905, the province of Alberta came to be and by that time, two thirds of Albertans were farmers and between 1906 and 1914 they increased the province’s cultivated farmland by 400%.

Gas Development

So the CPR not only brought settlers to Alberta to practice agriculture but they were also key in the discovery of natural gas. The CPR, while drilling for water for their locomotives, found shallow gas near Medicine Hat and the locally discovered natural gas supply was fueling homes and factories as early as the 1890s early 1900s in Medicine Hat. The gas was piped and in 1912 the longest pipeline of the day (168 miles long) was built to carry Bow Island gas to Lethbridge and Calgary.

Gas and Pipelines

1914 Gas was found in Viking, AB and by 1923 Edmonton was receiving gas from this field and in 1914 the Turner Valley Natural Gas Field was being developed and that lasted till 1946. WWII in 1939 really spurred on the need for gas and in the 50s following WWII, the market for gas really picked up and we see Alberta producing and exporting gas and also sulphur as they pull it out of the hydrogen sulfide gas being extracted and by the 1970s, Canada becomes the

largest sulfur exporter in the world. Sulphur is needed in various forms in the agricultural field ... in fertilizers and insecticides and fungicides.

In 1958, TransCanada Pipeline exported the first gas piped to eastern Canada over a single pipeline, longer than any other single length of pipeline in North America at that time. Within the province, in 1962 First Gas Co-operative (Meota Gas Cooperative)was formed to provide gas service in rural Alberta. This was the beginning of a wave to provide gas service throughout Alberta's rural areas.
For additional information on Canadian pipelines: https://www.aboutpipelines.com/en/
ALBERTA Regulatory Pipeline information: https://www.aer.ca/providing-information/by-topic/pipelines

Oil Development
1880-1946 Waterton & Turner Valley Oil Production-Large oil field found under the gas

1947-1970s: Leduc Field (February 13, 1947 Imperial Oil's Leduc No. 1)...Alberta's economy was hugely impacted after this time...oil and gas became the primary industry in AB surpassing farming.

Natural Resources Act-1930
In 1930, the Canadian federal government transferred control of natural gas and other natural resources to the provincial Government of Alberta through the Natural Resources Transfer Act. Depending on your perspective this was a gift, a curse, or not theirs to give in the first place! Historically, the development of the natural resources in the province has created many jobs and oil and gas in particular has been credited with making Alberta wealthy. In current times, we are seeing a new trend to move away from traditional oil and gas extraction and more focus on the oil sands and alternative energies.

Regulations
Shortly after the Alberta government took control of the natural resources in the province, the need to regulate the oil & gas industry became front and centre. Hell's Half Acre picture -glow from Turner Valley Field seen from Calgary and the waste of natural gas (it was being burned off thus creating "the glow") needed to be stopped and so in 1938, the Oil and Gas Resources Conservation Act became law, and the Petroleum and Natural Gas Conservation Board (later known as the ERCB & EUB) was formed as the regulatory authority for all gas and oil operations. Then, more recently in 2013, the AER (Alberta Energy Regulator) was created under the Responsible Energy Development Act to regulate the industry.

1940, 50, 60, 70s in AB = Oil Boom
1967 The Great Canadian Oil Sands project – Suncor was the first commercial development of the oil sands. The technology had been developed on a small scale back in 1929 by Dr. Karl Clark who patented the hot water separation technique that was used on a large scale years later.

The more oil & gas resources were developed the more the transportation network expanded so roads and trucking increased. The number of pipelines grew both in the province and out of the province.
We see more power lines and gas lines servicing oil and gas infrastructure and new towns and larger cities.

We see Calgary and Edmonton established as major urban centres in the province.

We see workers flood into and out of the province depending on how the industry is doing.

1980 to today
Early 80s PM Trudeau launched the National Energy Program (NEP), which sets prices for oil and gas well below international prices creating more tension between eastern and western Canada. We end up having a slowdown in the industry and a large number of wells become inactive.
1982 Amoco has a sour gas blowout near Lodgepole AB ...smells up the air for weeks, highlighting a growing conflict between the desire for economic development and the need to safeguard the public. Regulator has an increased focus on sour gas and sourgas safety.

1990s and into current times the focus has been on developing unconventional resources such as shale gas, tight gas and coal bed methane. Unconventional resources have required improving technologies and strategies. We've seen a move to multi-well pads...footprint...hydraulic fracturing….

For more historical information on Coal, Conventional Oil and Gas, Oilsands, Electricity & Alternative Energy in Alberta this is a good resource with a visual timeline of events.
http://history.alberta.ca/energyheritage/oil/default.aspx

Modelling the Changes on the Land
So when I think about farmland I think mostly about water and soil and the growing season…. I find the modelling used by Brad Stelfox helpful. Recommend you watch his TEDxCalgary called The Energy of Land Use.
https://www.youtube.com/watch?v=upjwsf2FnG0

- Expansion of agricultural land use and energy land use in AB (start at 4:11-end at 5:43)
- Water & soils (start at 7:10) end at 8:40

So we aren't growing any more land and we can see the best farmland is under pressure as are the resources of soil and water that are needed by the agricultural industry in particular so this obviously impacts land values. The demand for land and usable land just keeps increasing as the population continues to increase. So this TED Talk was in 2013 so where are we today?

In 2008-09, ALSA (Alberta Land Stewardship Act) and the Land Use Framework were released with the goal to create 7 regional land use areas in the province (based on watersheds) :

- Lower Peace
- Upper Peace
- Lower Athabasca
- Upper Athabasca
- North Saskatchewan
- South Saskatchewan
- Red Deer

This legislation was to plan for the future needs of Albertans and manage growth, while respecting existing property rights. Each region was to develop their regional plan with input from a wide variety of stakeholders and then it would become the guiding plan for any other plans in the area including plans made under the MGA (Municipal Government Act). The different regional plans are in various stages of completion and under this government it appears that the focus is now on cumulative impacts on the environment. Lower Athabasca enacted their regional plan in 2012 and South Saskatchewan's plan was in effect in 2014. The other 5 regions are still being developed.

What we see today on the land through an oil and gas lens

- Innovative solutions to reduce greenhouse gas emissions, minimize land impact, reduce water use and improve the management of tailings,Innovative pipeline techniques, water course crossings(directionally drilling greater distances), monitoring with drones and remote sensing
- Economic driver to get product to tide water to access international markets
- Volatile price fluctuations
- More regulatory requirements
- More demand for carbon capture and storage areas and technologies
- More demand to reduce greenhouse gases
- More of the larger companies are selling off assets and focusing on oil sands. (Shell, Exxon, BP..)
- More new development on Crown lands in the Boreal Forest region of the province and less on agricultural land.
    - Increased ventures and agreements with First Nations and Metis communities
- More public participation in resource development by NGOs and ENGOs
- Bankruptcies & orphan well numbers are increasing
- Aging pipelines

End of life cycle terminology

So one of the biggest impacts to the agriculture sector from oil and gas today in Alberta is the bankruptcy of an increasing number of oil and gas companies.

Landowners get annual rentals for surface leases until a reclamation certificate is issued on the site. However when a company goes bankrupt there are no more surface rentals coming in but the structures are still in place and there MAY be safety issues in how the well was left in place.

SUSPENDED WELL: AER Directive 013 guides regulates the Suspension process. For critically sour wells a suspended well has been inactive for 6 months and for a non critical well it has been inactive for 12 months. Wellheads can not be leaking and the wellhead must be secured/locked. Appropriate signage with emergency contact information must be on the site etc.

INACTIVE WELL: Public felt this was unsafe and the AER reacted in 1997 with a rule that required companies to close a well after ten years of inactivity. However, the industry pushed back and, in 2000, the AER allowed wells to be indefinitely suspended instead. The concern is around inactive wells having leaking issues. Between 2009 and 2014, the Alberta Energy Regulator measured leaks in 7.7 percent of wells that were already closed and sealed were leaking.

ABANDONED WELL: **Directive 020-Well abandonment** **I**ays out how wells are to be abandoned which includes the well being properly cut and capped with cement. Landowners should be notified by the company that the well is being abandoned. The goal in the abandonment process is to cover all non-saline groundwater (water with total dissolved solids less than 4000 milligrams per litre [mg/l]) and to isolate or cover all porous zones so the well is safe. The well bore owner is responsible for the well even after it is abandoned.

Abandoned pipelines must be purged, sealed, cut off and each end tagged and they are typically left in place in the ground. Alberta's *Pipeline Regulations* outline the requirements for abandoning a pipeline.

2019 stats say 167,000 inactive and abandoned wells in Alberta with less than 1% of these wells are ever reactivated. There are currently no legislated timelines mandating when an oil and gas company reclaims a wellsite. So many wells just get left sitting there for years. Mark Voss, VP of MAGA(Make AB Great Again), " You're looking at $100,000 dollars expenditure for cleanup but the surface lease and the taxes in the meantime might be $3,000 or $3500 dollars."

The AER's ABANDONED WELL MAP VIEWER allows you to search by legal land description to find out details about abandoned wells. Information such as date of abandonment, whether the site is RECCERTIFIED (meaning it has received its reclamation certificate), the Licensee's name. You can search the map using the Well License Number or the Legal land description.

Orphans

Orphan WELLS: If the company responsible for the well/pipeline/facility goes bankrupt**,** the Orphan Well Association (OWA) is responsible for these "orphans". OWA has the legal right to access and work on any well, facility or pipeline that has been declared an orphan. OWA does NOT hold surface leases or regulatory licenses. Landowners can request their annual rentals through the Surface Rights Board process. The OWA is funded by an annual levy paid by energy companies in Alberta. The Surface Rights Board (SRB) is an independent, quasi-judicial tribunal that helps landowners, occupants and operators resolve surface access and compensation disputes.

Wells/pipelines/ facilities may be suspended, inactive or abandoned depending on how they were left.

The OWA uses the term “decommissioning” meaning the removal of all surface complete abandonment procedures so everything above the surface and below the surface (downhole) is safe to work on.

To pursue annual rental payments landowners can go to: www.surfacerights.gov.ab.ca and look up application types and then rental recovery. It takes some time for landowners to get their money but they can now track the progress of their application through the Surface Rights E-filing portal. The Surface Rights Board is governed by the *Surface Rights Act.*

Reclamation

Site assessments will be done on the site (ESAs) and contaminants will be identified (if applicable) and removed. Vegetation will be established, and a number of growing seasons will go by to determine everything is working and then the reclamation team will apply for a reclamation certificate on the site and a professional sign off will be part of that submission to the AER. Operators must ensure that all landowners, interest holders, and occupants have been sent an identical copy of the application package the same day the application is submitted to the AER. Operators must also ensure that information regarding the procedure for submitting a statement of concern (SOC) and a copy of the public notice of application from the AER website are provided to the landowner, interest holder, and occupant within the application package.

There is a 30-day window from the time the AER receives the application wherein concerns about the reclamation of the site may be submitted in writing to the AER. The AER reviews the application, any statements of concern and may visit the site and will issue the reclamation certificate if there are no deficiencies. They field check less than 3% of reclaimed sites.

The goal of reclamation is to get the site back to a similar production or to a state that the landowner agrees to. Infrastructure like roads and fences MAY be left on site IF the landowner signs a release basically stating that they will take over the ownership of that infrastructure as is.

When the reclamation certificate is granted then the company can remove the caveat from the land title.

Impacts on the land continue as municipalities require setbacks from the wellbore for developments to occur.

For more information on Reclamation Process and Criteria.

PEMBINA Institute publication: *LANDOWNERS’ PRIMER: WHAT YOU NEED TO KNOW ABOUT UNRECLAIMED OIL AND GAS WELLS*

Farmer’s Advocate Office (FAO): https://www.alberta.ca/about-the-farmers-advocate-office.aspx

Their mandate: *"The FAO is a resource for farmers and ranchers who are affected by energy and utility developments. The FAO helps empower Alberta landowners with knowledge by providing information and advice on legislation and policy, and landowner rights and responsibilities. When disputes arise between landowners and industry, the FAO can assist with mediation and dispute resolution services."*
(FAO website June 3, 2021)

Purchasing Agricultural Land with Oil and Gas on it

In addition to knowing the status of any wells, facilities or pipelines on the land as discussed in previous slides you typically start your land research by looking at the Certificate of Title/Land Title and seeing if there are any caveats related to oil and gas or power on it. If you can, go out and look at the sites, are the signs and the surface equipment in good shape or is it messy, weedy and looking uncared for? Ask for records /all paperwork/contracts/releases on those facilities and pipelines. Make sure you are clear where the boundaries of the access roads and wellsites and pipelines are. If it is a sour site how sour is it? What is the EPZ and the ERP? How does the location and functioning of the facility impact your proposed agricultural activities? Is the site fenced? Does it need to be fenced? IF it's a pipeline ROW how many pipes are in the ROW? How old are those lines? How sour are the lines? Are the lines carrying something other than oil or gas? Has integrity work been conducted recently? Is there underground power to the site? How well does the site drain when it is a wet year? Call the company operator and land agent and ask questions if the landowner isn't sure or can't provide the answers you are looking for. Investigate the spill history. What was spilled, when, volumes?

The AER Release Reporting Requirements read "**Any substance release that may cause, is causing, or has caused an adverse effect*.** The AER further defines Adverse effect as *"impairment of or damage to the environment, human health, or safety or property." Adverse effect may be determined by any number of factors, including the following: the chemical and physical characteristics of substance released, the receiving media, the location of the release, and the risk to the environment.* The onus is on the person who causes, permits, or has control of the release to determine whether there is a potential adverse effect. That being said, the landowner can always contact the AER directly at the AER's 24-Hour Energy & Environmental Response Line at 1-800-222-6514 and/or notify the company. IT DOES NOT MATTER IF THE SPILL IS ON OR OFF THE LEASE NOR WHAT PRODUCT IS BEING RELEASED. Salt water sprays, although not hydrocarbon, are very detrimental to vegetation for decades and can grow in size in wet years.

The AER compliance dashboard is a good place to look for incidents, investigations and noncompliance and enforcement events with the AER. Spills and other non compliance events are registered here.

Another important consideration if it's a pipeline is whether it is a CER (formerly known as NEB) pipeline.These are the big transmission lines that carry oil and gas or electric power across the provinces and into the USA. CER regulated pipelines have their own processes and rules.

First, detailed route hearings must be held to determine the route of the proposed pipelines and you landowners will meet with the land agents numerous times before signing any ROW documents. These lines have weight restrictions on vehicles crossing the ROW, so this can be a concern for landowners with large heavy farm equipment. The width of the right of way is much bigger as there is a safety zone on either side of the ROW and this can impact farming activities and the placement of permanent structures. Even the right of way is measured differently than provincial pipelines, CER pipelines are measured from the centre of the ROW. Compensation on CER pipelines is typically much higher and based on appraisal values and sometimes signing bonuses. Payments may be periodic or in a lump sum. Landowner associations often negotiate on behalf of their members. There is typically a non-disclosure agreement signed by the landowner as well on these lines. The ROW agreements are different from the typical Alberta Pipeline ROW agreement.
Pipelines in Alberta What Landowners Need to Know (2021 Government of Alberta)

Land Rights
When it comes to actual land contracts some of the basic starting points are looking at the Land Title or Certificate of title. In Alberta, there are surface rights owners and mineral rights owners and some people own both the surface and mineral rights. The rights are identified on Certificates of title, Mineral Titles will have a "M" in the top left corner and surface titles will have an "S". Surface titles will also include the wording *"excepting thereout all mines and minerals…"* in the description. Surface rights owners own the surface and substances such as sand and gravel, but not the minerals.

"Early grants from the Dominion to the settlers of what is now Alberta included the mines and minerals. But once the nature and value of the resources underlying Alberta's fields and forests (especially, coal, oil, and gas) became understood, new grants began to except or reserve some or all of the mineral rights. The same became true for grants of land made by the Hudson's Bay Company and the Railway companies, who had acquired extensive land holdings from the government. For example, between 1904 and 1912, the Canadian Pacific Railway (CPR) reserved "coal" or "coal and petroleum" or "coal, petroleum and other valuable stone", before finally reserving all mines and minerals in the transfer of its lands. The unique distribution of mines and minerals rights in Alberta today, reflects these early grants and reservations." (http://propertyrightsguide.ca/assets/a-guide-to-property-rights-in-alberta.pdf)
The provincial crown owns over 80% of the minerals in the province the rest are owned by the federal government (National Parks, Indian Reserves), Companies such as CP Rail, CN Rail and HBC and private individuals. When it comes to rights, the mineral owner has the right to explore for and recover the minerals but at the same time must do this in a reasonable manner so as to not significantly affect use of the surface.

Good sources of information:

- Property Rights Advocate Office: https://www.alberta.ca/property-rights-advocate.aspx
- A Guide to Property Rights in Alberta by the Alberta Land Institute (ALI) of the University of Alberta http://propertyrightsguide.ca/assets/a-guide-to-property-rights-in-alberta.pdf

Mineral Rights

The *Mines and Minerals Act, RSA 2000* defines what constitutes a mineral. From an oil and gas perspective all the resources we extract are considered minerals. On the mineral title it will define what mineral(s) are owned and by whom. In the majority of cases the minerals are owned by the provincial crown and leased by the various companies via a bid system. You will find companies will lease large tracts of land and then choose a surface location depending on the advice of their geological team who helped select the mineral area in the first place. With current technologies companies can access great depths and also direct their drilling horizontally as well to pinpoint their downhole desired location.

Surface Materials

The Mines and Minerals Act and the *Law of Property Act* also define/ clarify what is not a mineral and therefore, not owned by the mineral owner. We tend to refer to these non minerals as surface materials and they include sand, gravel, clay and marl and peat. These materials need to be extractable from surface operations like a pit to be considered non minerals. A pit site will likely include roads, facilities and stockpiles. IF these materials need to be mined at deeper depths then they would be considered a mineral.

Surface landowners may develop these resources on their own, or lease them out or develop them on a share basis so, if purchasing land with active sand or gravel pits, you need to know the actual development and yield details and where they are in the process. These operations are also regulated and so you need to understand where in the regulatory process they currently are. All sand and gravel pits on private land – regardless of their size or class – are required to abide by the *Conservation and Reclamation Regulation* and require a Reclamation Certificate from Alberta Environment and Parks (AEP).

Peat moss, also known as sphagnum peat moss, is a natural, organic soil conditioner. It absorbs high amounts of moisture, acting as a sponge to release water as plants need it. It can be used to prevent leaching, aerate heavy clay soil or bind sandy soil. It is found mostly on Public Lands governed under *EPEA* and *Public Lands Act*. The process of harvesting peat involves drainage and drying and vacuuming up the peat. 4000-5000 ha have been harvested in AB Most is exported to US and some to Japan. Doesn't affect farmland so much it is more of an issue in pasture and crown grazing leases. Annual reports on quantities must be submitted until reclamation certification is received (applies to public & private lands).

Landowners who have plans to extract these surface materials must communicate that to the oil and gas companies. The resource company will be most concerned with the integrity of their well (s) as well as setbacks from their sites and the landowner will be concerned about loss of potential revenue. Typically to receive compensation for loss of surface materials such as sand and gravel the extraction must actually be occurring or be in the process of being pursued. Example a landowner has done sand sampling in one area of their quarter and has quality and

quantity data results provided by experts so if a company wanted to actually put the surface lease in that part of the quarter that has sand then they would have to negotiate land value based on that higher land use.

With technology today many wells can be located elsewhere and directionally drilled under these surface material deposits. It becomes more challenging when it's an older well and the landowner decides they want to excavate for sand or gravel.

It should be noted that there are no standardized agreements for surface material extraction and the Farmers Advocate Office (FAO) highly recommends getting legal advice before entering into any contracts. The *Surface Rights Act* does not apply to surface materials development and consequently, there is no Right of Entry onto lands in these cases.

This is a good site to learn more about developing surface materials in Alberta:
https://www.alberta.ca/rural-disputes-surface-material-extraction-pits.aspx

Surface Rights Act

For oil and gas exploration *The Surface Rights Act* requires "operators" (resource companies) to get the surface owner's consent prior to entering on the surface of the land. If consent cannot be negotiated, then to avoid the risk of sterilization, the resource company can apply to the Surface Rights Board(SRB) for a right of entry order(ROE) and the SRB will determine the compensation payable to the surface owner based on criteria laid out in Section 25 of the *Surface Rights Act.* This Act is the primary piece of legislation directing the dealings with landowners in regards to the development by oil and gas on private agricultural lands in Alberta. The act requires land contracts like leases and pipeline right of way agreements to include clauses that cover the lifecycle of the facility from drilling to reclamation. It's important that a survey plan clearly showing the location of the facility be attached to any lease or right-of-way agreement. Surface leases will include an annual rental payment whereas pipelines typically do not. There are standardized documents in the industry but landowners should go through each clause to ensure they understand what they are agreeing to. Once a legal contract is agreed to and signed it can be registered at the Land Titles office and is registered on the certificate of title for that parcel(s) of land.

Land Agents must hold an Alberta land agent license under the *Land Agent Licensing Act* in order to negotiate these land contracts. The Act lays out the process a land agent must follow when negotiating with interest holders. Some requirements include: the land agent must present their license to the landowner(s), give a landowner a minimum of 48 hours to consider any written deal and leave a copy of any offer (signed or not) with the landowner. Land agents will also consult and negotiate with occupants (like renters) that live on the land or farm the land however compensation paid is at the direction of the landowner. Some landowners will adjust their rental rates on the land or they will have all damages paid to the renter by the operator. As a land agent you are responsible for documenting these arrangements. Sometimes a bank or credit company may have a registered interest on title and may direct that all payments from

the oil and gas company go directly towards debt owing with them and the land agent will ensure the appropriate paperwork is completed to have this happen.

Annual rental payments on surface leases will be paid yearly at the agreed upon rate and in the fourth year the parties can begin renegotiating the annual rental payment to be determined by year 5 and then implemented in the next cycle of 5 years. Annual rental payments continue until a reclamation certificate is issued. Sometimes, if a lease is partially reclaimed, a company may approach a landowner to have surface annual rental payments reduced to represent the actual losses based on the smaller acreage.

Other considerations when oil and gas applies to develop on agricultural land: water, historical resources, species at risk.

Water

Quick Fact: 80% of Alberta's water **supply** in Alberta is found in the northern part of the province and 80% of the **demand** is in the southern part of the province...where most of the agricultural lands are found.

Surface water is the non-saline water that is mostly used coming from rivers and lakes, runoff, and shallow groundwater. Water in the province is allocated by user type. In 2019, according to the AER, the energy industry only used about 20 per cent (just over 266 million cubic metres) of what was allocated to them, or 0.19 percent of ALL non-saline water available in Alberta. Companies must apply for a *Water Act* licence from the AER before using nonsaline water in their operations. Most of the non-saline water is used for oil sands mining, oil recovery, hydraulic fracturing and in situ recovery developments. The industry is also allocated a small amount of groundwater to use in addition to surface water.

There is a focused effort to reduce the use of non saline water in the oil and gas industry. In 2019, 18% of the water needed for energy developments was non saline, 81% was recycled water (from the same energy activity) and 1% was alternative water (includes saline groundwater, wastewater, flowback water, produced oilfield water)

The biggest water allocations are for agriculture and specifically irrigation. Oil and gas operations must be careful not to damage water aquifers nor damage irrigation systems and canal systems. Setbacks from existing infrastructure exist to protect surface infrastructure and low profile wellheads have been developed specifically to allow pivot irrigation to function without difficulty.

Hydraulic Fracturing is a technology that has been around since the sixties but we are using more these days in "tight" formations. Fracking is concerning to agricultural landowners in particular because it uses non saline water and it uses underground explosives to help release hydrocarbons trapped in these tight formations. There is also concern about the chemical

makeup of those frac fluids and if they can migrate into underground water reservoirs. For livestock producers this is critical that their wells not be damaged. Residents that live in these areas that have experienced fracking also have concerns about their personal wells and the safety of their potable water supply. Many companies will offer to test your water well prior to fracking operations as a good neighbor action, this provides you with a baseline should you notice anything strange with your water after a fracking operation.

The other concern for agricultural producers is the risk of spills contaminating especially surface water supplies. Concern with pipelines in particular slowly leaking large quantities over time before they are detected. Many of the operators will be members of a spill response cooperative and will share resources like absorbent buoys and expertise in the event of a spill. They have yearly training sessions to practice their response time and processes in an effort to mitigate the migration of spilled hydrocarbons efficiently.

Wetlands are another critical water based ecosystem that more and more farmers are working to preserve rather than fill in and farm. Spills into wetlands can be very difficult to clean up as well.

Resources:
Facts About Water in Alberta (Govt. of Alberta-Water for Life)
About Water Use (AER)
Hydraulic Fracturing (AER)

Historical Resources

As part of the licensing process in Alberta, resource companies must at minimum do a scan of their proposed site or pipeline route to determine the possibility of discovering a Historical Resource. A Historical resource may be deemed archaeological, indigenous traditional use, historic structure or paleontological. Land in Alberta can be searched using legal land descriptions to determine the HRV (Historical Resource Value) factor of any piece of land using an online tool called The Listing of Historic Resources. The HRV factors found in the Listing include:

HRV 1: contains a World Heritage site or a site designated under the HRA as a Provincial Historic Resource

HRV 2: deactivated (formerly used to designate a Registered Historic Resource1)

HRV 3: contains a significant historic resource that will likely require avoidance

HRV 4: contains a historic resource that may require avoidance

HRV 5: high potential to contain a historic resource

Each entry in the Listing also includes a letter that describes the primary historic resource category of concern, as follows:

- a archaeological

- c cultural
- gl geological
- h historic period
- n natural
- p palaeontological

EX. Sites in the Listing that are HRV 4c would indicate that there is likely a cultural/indigenous resource that will need to be avoided and in this case a HR (historical review) would be required.

Paleontologists and archaeologists do the necessary Historical Resources Act clearance requirements and MUST be contacted if any discoveries are made during construction. Entire projects will come to a standstill if a cat or backhoe unearths anything. Road crews finding dinosaur skeletons especially at bridge crossing sites has happened a few times.

The *Historical Resources Act* governs all Historical resources in the province and you can be charged for removing or disrupting or destroying historical resources.All discoveries must be reported to the Minister.

The slide I'm showing here relates to Ammolite or Ammolite shell which is unique to Alberta and the official gemstone of Lethbridge since 2009. Under the Historical Resources Act- fossils including ammolite are protected and can't leave the province. This was probably one of my most interesting learnings when I was a land agent.

Ammolite is only found in the Bearspaw formation in southern AB near St. Mary River and Oldman River. it's not possible anymore for a non-First Nations individual to collect ammonites for commercial purposes." A small group (35) of indigenous people have permits to collect the ammonites on First Nations land to sell them to whomever they choose. Those who buy the products should also get a receipt with the permit number on it.

Ammolite is a relatively new gem, recognized by the Gemological Institute of America in 1981, and is cut from the shells of ammonites (extinct mollusks that had flat spiral shells) Colours span the rainbow and can appear in various patterns. The gem and the intact ammonite shells found in southern Alberta are in particularly high demand throughout Asia, where Feng-Shui masters believe the shape of the fossil and the colours absorb the knowledge of the universe, while each colour represents everything from health and wealth, to love and power.

Blackfoot Legend of the First Buffalo Stone

How to use The Historical Resources Listing

Wildlife

Goals of the province include maintaining biodiversity, preserving habitat and decreasing the numbers of species at risk. The Oil and gas industry must identify any wildlife concerns on their license application. If any areas are identified as having species at risk then a wildlife biologist will have to come in and evaluate the site and suggest possible mitigation measures or restricted activity periods.

Alberta Species at Risk include these categories;

- Amphibians

- Birds
- Fish
- Mammals
- Reptiles

The federal government also has a *Species at Risk Act* that identifies both plants and animals at risk of extinction. Plants and Animals at risk will have dedicated recovery plans. Protection Orders are basically emergency orders issued under SARA to protect desperately small remaining populations that are at risk of being exterminated in a few years.

Images in presentation:

Source of image (facility in canola field): https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2017-naturalgas/index.htmlSource of image(beaver): https://www.thecanadianencyclopedia.ca/en/article/fur-trade
Source of image (landscape): https://www.albertaparks.ca/albertaparksca/visit-our-parks/road-trips/canadian-badlands/ Source of image (bison): https://en.wikipedia.org/wiki/Bison

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