Draft Meeting Summary

Athabasca River Basin (ARB) Initiative

Working Group meeting #6

Date September 19, 2017

Time 9:00am to 4:00pm

Location Executive Royal Hotel, West Edmonton

Attendees

Alvin Cardinal, Sucker Creek First Nation
Andrew Wilson, Alberta Environment & Parks (AEP)
Axel Anderson, fRI Research/Alberta Agriculture and Forestry (AAF)
Brandi Mogge, Fisheries & Oceans Canada
Brian Yee, AEP
Carmen de la Chevrotiere, AEP
Carol Anderson, Gift Lake Métis Settlement
Carolyn Buffalo, Yellowhead Tribal Council
Carolyn Campbell, AWA (by phone)
Dallas Johnson, Alberta Innovates
Jason Ponto, Athabasca Watershed Council
Jim Sellers, Athabasca University
Lauren Makowecki, AEP
Linda Jefferson, ATCO
Mark Sinclair, Peavine Métis, Consultation
Martin Van Olst, Environment and Climate Change Canada
Meghan Payne, Lesser Slave Watershed Council
Molly Fyten, Lac La Biche County
Murray Tenove, Alberta Agriculture and Forestry
Patrick Marriott, Alberta Energy Regulator
Scott Duguid, Land Use Secretariat
Stephanie Martens, Fisheries and Oceans Canada
Steve Schafer, Town of Athabasca
Velma Whittingham, Fort McMurray 468 FN - IRC
Zahidul Islam, AEP

Claire Jackson, Alberta WaterSMART
Danielle Marcotte, Alberta WaterSMART
Denise Di Santo, Alberta WaterSMART
Matt Chernos, Alberta WaterSMART
Mike Nemeth, Alberta WaterSMART
Ryan MacDonald, Alberta WaterSMART
Kim Sanderson

Meeting objectives

1. Systematically review and assess each water management strategy identified by the Working Group under historic conditions and two stress tests
2. Begin to sort which are the most and/or least promising strategies

Current action items

Action		Responsible	Due	Status
1	Get current information on the status of the South Athabasca sub-regional plan and forward to Mike Nemeth for distribution to the working group.	Scott Duguid and Mike Nemeth	Oct 1.	In progress
2	WaterSMART to look at simulating the mirror site run with a minimum flow of 87 cms, not 170 cms minimum flow as it is now	Modelling team	Oct 19	
3	Put meaning to walleye reduction; i.e., what do a	WaterSMART	Nov 1	

Action		Responsible	Due	Status
	200% decrease and a 10% decrease mean and from what base? (re strategy 3, Grand Rapids reservoir)			
4	Add commentary around a low-head reservoir (strategy 3, Grand Rapids site, no reservoir)	WaterSMART	Nov 1	
5	Look at changes to AXF of 400 cms and possibly increase for quality of navigation (strategy 4).	WaterSMART	Nov 1	

Mike Nemeth convened the meeting at 9:17 a.m. Those present introduced themselves.

Discussion points

1 Opening remarks

Mike reviewed the agenda and objectives for the day as well as the Chatham House Rule. He reminded the group that all the work is publicly available. He reviewed the scope of the work on the Athabasca Basin and the collaborative nature of the process, and presented a table to show the timelines and work plan. Mike briefly described the Athabasca Integrated River Model (AIRM) and how it is being used. This work will result in a roadmap with a set of strategies and practical actions. Today the group will assess the 13 strategies, as developed in previous meetings. The strategies will be examined through by viewing modelling results in detail to see benefits, hear perspectives, and consider trade-offs. The strategies will then be sorted into categories in terms of the benefits they could provide to the basin and their feasibility of implementation: those that are most promising, those with some promise, and those that that are least promising. Strategies will not be ranked or prioritized, rather the group will try to assess what could be done depending on climate, needs of the basin, and other factors.

2 Regional Planning Update

Scott Duguid, Consultation Director with the Land Use Secretariat, provided an update on regional plans with a focus on the Lower Athabasca Regional Plan (LARP) and the North Saskatchewan Regional Plan (NSRP), noting that progress on regional planning has been slow in the last couple of years. The LARP came into effect in September 2012, and a year later six First Nations and one Métis group asked for a review. A Review Panel was struck and it reported in June 2015, finding among other things that the LARP did have an impact on treaty rights. Other areas of concern were also identified, one recommendation was that treaty rights and traditional uses should be reconciled in the plan. This would elevate the status of treaty rights and means moving from “considering” to “protecting” them. In September 2016, the AEP Minister asked the 21 First Nations that participated in the LARP to be part of a LARP First Nations Working Group to revisit the plan’s focus. The original plans were built on environment, economy, and social pillars, and the desire is to see treaty rights and traditional uses placed on equal footing with these three pillars. Other new directions include creating traditional land use frameworks, taking a new look at the conservation approach in the existing LARP, and putting in place a biodiversity management framework. The hope is to begin detailed work in these areas with the goal of amending the LARP by September 2018.

Scott then reviewed work to date on the NSRP. Recommendations from the Regional Advisory Council (RAC) were submitted in 2015 but have not yet been released. Subsequently, a process was undertaken with 32 First Nations and Métis groups to review the work of the RAC; they developed recommendations

based on the same information used by the RAC to see how much common ground there was. The intent is to re-engage them this fall to see where ideas are aligned. Once the draft NSRP is completed and released, the government will hold a series of public consultations prior to completion of the final plan. (Scott's presentation slides are included in the publicly available meeting materials.)

Discussion

In response to a question about the progress on the Moose Lake and South Athabasca sub-regional plans, Scott advised that 44 recommendations for the Moose Lake plan have gone to the ministers who have had discussions with the Fort McKay Chief. One recommendation remains outstanding and negotiations are underway to try and resolve it.

Action 1: Scott Duguid will get current information on the status of the South Athabasca sub-regional plan and forward to Mike Nemeth for distribution to the working group.

Q: I see a gap regarding hydro power. Are there other gaps with respect to water use?
Scott Duguid (SD): Water quantity is one. We have two years of monitoring data and are trying to do some work on marking channels and other pieces.

Q: The original 2012 LARP called for a five-year review. Will this be tied in with the current work?
SD: Yes. The legislation provides that each regional plan should be reviewed at the five-year mark and redone at 10 years. The minister has directed that the five-year review needs to begin this month. We've heard from many sources that we didn't get it right the first time. An audit will be part of this process to determine if we did what we said we would, etc., but the foundation for improvement will be the other approaches we are working on.

Q: How do we factor in forces outside our jurisdiction that might influence a regional plan (e.g., price of oil, climate change)?
SD: A lot is happening in the region—the UN assessment regarding Wood Buffalo Park, Site C, etc. We need to look at where we are to do a refresh. These are intended to be 50-year plans but it's hard to predict where we will be in 50 years. Already things have changed politically, socially, and economically and we are talking about lots of things we didn't contemplate in 2012.

Q: What is the planning horizon and timeframe?
SD: We have the SSRP, Indigenous tables, the NSRP and LARP processes underway. We need to develop a process for the Upper and Lower Peace. That is the focus to March. Then we need something for the Upper Athabasca. We are learning from LARP and SSRP, and heard that the capacity of First Nations and Métis to participate was an issue. For the other plans, we want to provide capacity to help them prepare to participate meaningfully. We would like to hold some meetings with First Nations in the Upper Peace in February.

Comment: We have to respect the environment to ensure our survival. There can only be so much development without causing irreparable damage. We have to do things sensibly and respectfully. We have to be careful what we do and society as a whole needs to figure out how to get what we need renewably.

3 Use of strategies and stress tests

Claire Jackson reminded the group of the work to date and the focus for today. Today the group will look at potential future conditions using the model and stress tests and examine the 13 strategies that have been compiled from previous working group meetings. Stress tests were done to look at the basin in more challenging scenarios, such as changes in climate, landscape, and water demand. Two stress tests were developed that reflect what was heard in previous working group sessions: wetter conditions and drier conditions. The wet condition has a large forest fire in the headwaters, modest glacier retreat, a wetter and warmer climate, and a doubling of water demands, including industrial, agriculture and temporary diversion licence (TDL) uses. The dry condition features a reduction in wetlands, high glacier retreat, more drought years, and the same doubled water demand. These stress tests, along with historical conditions, will be used to see how the various strategies perform

Claire reviewed the changes in streamflow modelled at various locations under wet, dry and historical scenarios. Historical conditions featured land use as of 2015, glacier coverage from 2015, observed climate from 1986-2015, and current-day land usage as of 2015. Claire also reviewed the performance measures, which were used as indicators of the various challenges. We want to look at magnitude and direction of change so they are always compared against the base case.

The following additional information was provided in response to questions:

- In the hydrographs, the extremes are more extreme.
- Agricultural and industrial licences and TDLs were simply doubled across the basin wherever they occurred.

4 Review, assess and sort strategies

A modeller and a facilitator worked at each of three tables to present results and capture comments for a specific group of strategies. Participants rotated through the three tables so they had a chance to see stress test results and provide feedback on each strategy. All strategies and preliminary modelling results were described in more detail in participant handouts. Table discussions are presented below the list of strategies, by table.

<u>Table 1: Danielle and Mike</u>

- Explore new on stream multi-purpose storage options (four options)
- Explore new off stream multi-purpose storage options
- Explore minimum flows for navigation purposes

<u>Table 2: Ryan and Denise</u>

- Explore altering existing water storage infrastructure for multi-purpose storage options
- Explore setting precautionary water withdrawal limits using the Alberta Desktop method for IFNs
- Water conservation, and water efficiency improvements
- Explore treat and release practices and policies to look at impacts on flows

<u>Table 3: Matt and Claire</u>

- Identify areas for conservation and restoration

- Support BMPs within the forestry sector
- Support a wetland policy and implementation approach to all together avoid wetland loss in the system
- Reclaim linear features and reduce future linear disturbances in watersheds
- Impose requirements on mining operations to maintain watershed functions target ranges
- Reuse of industrial or municipal effluent

Table 1: Danielle and Mike

STRATEGY # 3: Explore new onstream multi-purpose storage options

This strategy looks at new on stream multi-purpose storage and evaluates options. Three sites were examined in detail. There is potential to offer storage for flow augmentation, supply for licence use, flood control, and hydropower generation.

a) New onstream storage at McLeod site (694,000 dam^3 on tributary)

Modelling comments: This is one of two onstream tributary storage options that are in the upper region of the ARB. The other site, which was not simulated, was on the Berland River, this site was simulated and showed similar results. The group was reminded that any storage site could be simulated with various operating objectives. This was an example if the priority objective was for augmenting flows and meeting navigational flow requirements in the lower portion of the basin and meeting the IFN on the McLeod River. There was interest in looking at how large a reservoir would need to be to ensure that the Aboriginal Extreme Flow (AXF) threshold is always met.

In general, this strategy has a small negative impact on walleye recruitment, provides an opportunity to reduce flooding, improve ecosystem flows, meet instream flow needs on the McLeod River, and improve navigational flow on the Athabasca River under dry conditions. It could help with flood mitigation. There were no changes in the wet scenario for navigation.

Working Group Comments:

- There is fairly low hydro potential with this site.
- There is only small benefit of increasing AFX vs. economic cost to build.
- The simulation was to show one of many opportunities that an upstream tributary storage structure might be able to provide for water management opportunities and overall basin adaptation/resilience/-management.

Assessment: Low promise with respect to net benefits and feasibility of implementation.

b) New onstream storage at Mirror site (1.9 million dam^3, upstream of the Town of Athabasca on the mainstem)

Modelling comments: There are two potential storage sites, Moose Portage and Mirror, which are in close proximity and would have similar modelling results. This strategy was simulated with hydro power as the priority operating rule. The group was reminded that any storage site could be simulated with various operating objectives. The Mirror Reservoir was simulated using a "natural" rule curve. Low flows are augmented because of a minimum flow downstream of 170 cms at Ft. McMurray. The strategy ensures that minimum flows in the LAR surface water quantity management framework are met.

This strategy, as operated, shows a small decrease in the number of days the navigation flow is met, a small increase in flood days at Fort McMurray, no change in IFN, less summer flow (so more shortages) relative to the historic record but higher winter, fall and spring flows, overall a small decrease in shortages, and a large decrease in walleye recruitment due to filling of reservoir in the summer causing reduced summer flows.

Working Group Comments:

- New licensees need to plan for their own water needs regarding storage and use
- Benefits depend on the project specifics
- Ice jamming at Town of Athabasca could be an issue, but some think if there is a structure upstream, it could help to manage this issue
- It was explained that the min flow was set to 170 cms because the demands had doubled in the system in the stress tests. But there was interest from the group to see how it performed under 87 cms, not changing the simulation, just to do another one at 87 and look at the differences. For example the Historic conditions would preform better since there is no need to raise the flow to 170.

Assessment: Low feasibility of implementation but some benefits, thus has some promise. If not done for hydropower, there could be more benefits.

Action 2: WaterSMART to look at simulating the mirror site run with a minimum flow of 87 cms, not 170 cms minimum flow as it is now.

c) New onstream storage at Grand Rapids site with large reservoir of 407,000 dam^3

This strategy, both with and without a storage reservoir, would operate to achieve four objectives in priority order:

- Release water to meet downstream ecosystem minimum flow
- Release water to meet the AXF below confluence with Firebag River
- Release water to reduce downstream licence shortages
- Operate the reservoir to maximize hydropower generation

Modelling comments: The reservoir was modelled with a rule curve that prioritized hydropower. Minimum flows were set to ensure ecosystem flow and to maintain SWQMF rules and AXF at the Firebag confluence. Shortages were minimized.

Modelling showed an increase in AXF, a small decrease in floods at Fort McMurray, a small decrease in walleye recruitment, a small decrease in shortages due to higher winter flows, and a small decrease in summer flows because of structure refill.

Working Group Comments:

- A dam would not be built to provide environmental benefits.

Assessment: Low feasibility of implementation but moderate or higher benefits.

Action 3: WaterSMART to put meaning to walleye reduction; i.e., what do a 200% decrease and a 10% decrease mean and from what base?

d) New onstream storage at Grand Rapids site with run of river reservoir (2-3 days storage)

Modelling comments: The reservoir was modelled without a rule curve. Minimum flows were set to ensure ecosystem flow and to maintain SWQMF rules and AXF at the Firebag confluence. Modelling showed an increase in AXF days but less relative to the large storage option at Grand rapids, no change in flooding, and smaller negative impacts on walleye.

Working Group Comments:

- The trade-off for a reservoir vs. run of reservoir is from a water management standpoint.
- Having no reservoir reduces hydropower potential. There are more opportunities with a reservoir.

Assessment: With no structure needed, feasibility of implementation is low to moderate and benefits are moderate.

Action 4: WaterSMART to add commentary around a low-head reservoir.

STRATEGY #4: Explore new off stream multi-purpose storage options (McMillan Lake)

Strategy description: This strategy looks at new off stream multi-purpose storage and evaluates options to allow for industrial water supply, flow augmentation and regulation, and possible hydropower. The focus was McMillan Lake.

Modelling comments: Two runs were done, both of which assume a maximum and initial storage of 100,000 dam^3 with no operating rules on the reservoir. Run 1 would use storage to meet downstream licence demand, while Run 2 would release water to meet the AXF below the confluence with Firebag River and to meet downstream ecosystem minimum flow.

Modelling results for Run 1 showed a slight decrease in AXF under dry conditions but a reduction in shortages. Results for Run 2 showed a decrease in walleye due to decreased summer flow related to refilling, an increase in AXF days, and reduced shortages.

Working Group Comments:

- If we can identify offstream storage that doesn't have consequences to nature and that could show a positive cost-benefit, why not look at it?
- Being offstream is a benefit

Assessment: Some groups thought this strategy would be difficult to implement and the benefits would be low to moderate. Others thought implementation was moderately feasible with moderate benefits. The group suggested that if McMillan were of great interest that it would be wise for proponents to hear from elders as to why McMillan Lake is there and what value it might hold beyond just being a closed basin brine lake.

Action 5: WaterSMART to look at changes to AXF of 400 cms and possibly increase this minimum flow for quality of navigation.

STRATEGY #7: Explore minimum flows for navigation purposes
Strategy description: This strategy looks at minimum flows for navigation purposes in the Lower Athabasca River. As a starting point, it is based on the flow and the timing as determined by the suggested AXF (minimum 400 cms in the Athabasca River below the confluence with the Firebag River during open water season – April 16 to October 28 (196 days).

Modelling comments: The model applies a minimum flow target of 400 cms downstream during open water season and shorts upstream users to preferentially keep flow in the Athabasca River and reach the 400 cms target.

By shorting all upstream users (i.e., shutting off licences) six more days over 30 years are available to meet IFNs and AXF with a more natural flow. The strategy assumes no infrastructure will be built. In cutting off licences, TDLs would be first. This is drastic action for a relatively small benefit, but the idea is to show that water can be made available without building infrastructure.

Under historical and dry conditions, modelling showed no changes in flood days, a small increase in AXF, a small increase for IFN, a small benefit to walleye, and an increase in spring and fall shortages (volumes are small, but it simulating cutting off all upstream users, that's a fairly big deal). There were no changes to performance measures under wet conditions.

Comments:

- We need to consider what kind of users are being shut off. There was recognition that this was a simulation to show the extreme end of shut off all licence use in the basin, but in reality that wouldn't happen, and reducing the shut offs would make diminish simulated benefits.
- This strategy could be considered in conjunction with McMillan Lake (offstream storage option).

Assessment: Some participants viewed this strategy as having a lot of promise but being moderately difficult to implement. Others thought it had little promise but implementation would be reasonably feasible.

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Table 2: Ryan and Denise

STRATEGY #5: Explore altering existing water storage infrastructure for multi-purpose storage options

Strategy description: This strategy looks at existing multi-purpose storage infrastructure that could be altered through operational or infrastructure modifications for flexible water management. Two structures were the focus: the Lesser Slave Lake weir and the Paddle River Dam.

Modelling comments: Paddle River Dam operations were altered so that downstream demands can pull water when they otherwise could not in the base case. This was done by altering weights on the reservoir. The Lesser Slave Lake weir was raised by 30 cm and used to meet downstream demands.

Lesser Slave Lake weir

There may be lower low flows during the late summer, fall, and winter and higher high flows during the

spring and early summer. This is due to the fact that the lake level is maintained at a higher elevation from raising the weir at the outlet of Lesser Slave Lake.

Raising the weir results in lower flows during the baseflow period, while meeting downstream demands increases flow sporadically during this same period. This is due to relatively simple operations. It is acknowledged that this would have considerable impact on IFNs as it deviates substantially from a natural streamflow regime.

Lesser Slave Lake was held higher with a raised weir; therefore, under wetter conditions the likelihood of increasing flood hazard is increased, this is noticeable during spring freshet. Higher streamflow may also result in an increase in erosion and sedimentation of the lake and river channel, which is already an issue for the Lesser Slave River channel downstream of the Lake.

There is some benefit toward maintaining flows with operation of the weir, as IFNs and downstream demands may be more able to be managed.

In all scenarios, there would be an increase in potential of land flooding around the lake which is already an issue with the local high water table, and communities that inhabit these areas would be potentially impacted Dissolved oxygen (DO) may be increased on the Athabasca River since flows entering the mainstem from Lesser Slave River increase DO levels. .

Assessment: The effects of raising the weir may not be socially feasible so this strategy may be less likely to be implemented.

Paddle River Dam
This dam is currently purposed as flood control infrastructure and for recreation. It contains a relatively small reservoir with some capacity to capture freshet under current conditions. A small amount of water is stored and the effect on downstream flow is minimal.

Under dry conditions, flows are augmented slightly downstream so the quantity conveyed can meet downstream demands.

Under wet conditions, this infrastructure may potentially be operated more often for flooding events. There also may be some potential of water supply storage for municipal or community use as source water supply, with the dam operating to control outflows. However, this is a local and small effect.

The difference between dry and wet conditions is very small given that there is relatively little storage in this reservoir.

There may be negative social and specifically, recreational impacts with a change in water level, as this area is used currently for recreation. Operational changes may not be feasible or useful for the little benefit incurred.

Assessment: Overall, little net benefit and variable feasibility was identified by the Working Group at this table.

STRATEGY #6: Explore setting precautionary water withdrawal limits using the Alberta Desktop Method for IFNs

Strategy description: This strategy looks at setting precautionary flow targets on tributaries and the mainstem using the Alberta Desktop method for determining Instream Flow Needs (IFN), and could be used to help inform the draft Surface Water Allocation Directive (SWAD). This strategy enables the Working Group assess how often these flow targets would have been violated and the shortages that would result if water licences were not able to be withdrawn under historical and stressed conditions.

Modelling comments: The Alberta Desktop Method has been applied to five tributaries in the model (McLeod, Pembina, Lesser Slave, La Biche, and Clearwater) to set an IFN on the mouth of each tributary. Upstream demands will be shorted to meet that IFN whenever necessary. The Alberta Desktop Method is the greater of either 15% reduction in naturalized flow or the Q80 of weekly naturalized flow. With implementation of this strategy, IFN violations would decrease under all climatic condition scenarios. Where these demands exist in sub-basins, shortages would result so not all areas are affected. The most significant effect on demands would be in the Lesser Slave and McLeod Rivers. In general, flows are increased in the major tributaries, specifically during lower flow times. This increase is achieved by shorting upstream water users.

Ecosystem health and IFNs benefit from this approach. In addition, walleye recruitment and a natural hydrograph are supported under this strategy.

Results are the same under wet and dry conditions, with the greatest benefit shown under dry conditions, where IFNs are met one-third of the time.

Assessment: Overall, this strategy is identified to be effective with the goal to meet IFNs. Overall, this strategy was identified to have positive net benefit and high feasibility by the Working Group at this table. Group felt local effect would be more apparent and should be examined. Would this apply only to new licences or existing ones as well? If all licences are subject to it there would be greater benefit than just new licences.

STRATEGY #2: Water conservation and water efficiency improvements

Strategy description: This strategy looks at how changes in municipal, industrial, and commercial water management practices (e.g., metering, stormwater use, lawn watering, low flush toilets, and general conservation) could impact streamflow.

Modelling comments: This is simulated by reducing the municipal, industrial, and commercial demands by 10%. There are benefits reflected for Performance Measures in some tributaries, although not so for the Athabasca River mainstem, indicating that benefits exist at a smaller scale or community level. For example, IFNs, AFX, and walleye recruitment all show a positive effect under this strategy. Specifically, there is a reduction in IFN violations, AFX are met and walleye recruitment is increased. The amount of conservation of water is proportional to the benefits incurred.

In general, there is less demand on the entire system; therefore, streamflow will increase proportionally. The effect of demands on streamflow is quite small so the increase we see in streamflow is almost undetectable.

This strategy could also be used as a mitigation measure to offset water needs as a function of future human population growth.

Improvement in conservation behaviours may need to be supported through incentives and these could be realized and awarded at the community scale, as exemplified in a community-based waste and recycling initiative.

This strategy is socially feasible and much is already being done toward the goals of water conservation with demonstrated conservation trajectories identified for each of the sectors under this strategy. Some sectors may have greater than ten percent conservation targets. In addition, adopting water conservation as a strategy aligns with values of many communities, the Water for Life Strategy and sector reporting requirements.

Overall, this strategy was noted to be highly feasible and yield moderate net benefit.

STRATEGY #8: Explore treat and release practices and policies to look at impacts on flows

Strategy description: This strategy looks at the treatment and release of tailings water (assumes water quality guidelines are met), to beneficially augment periods of low river flows on the Athabasca River.

Modelling comments: An inflow was added onto the Athabasca River at the confluence with the Muskeg River, which represents treated release of oil sands tailing water. This release is assumed to occur for 3 months (May, June, July) of each year for a total of 5 years, at an average daily rate of 12.2 cms. It is also assumed that oil sands tailings release will occur in the first 5 years of the simulation timeframe.

In general, flows are increased but not to a large effect. We must measure at the scale of the Athabasca and look at the high flow months, which makes it so that the effect of the change on streamflow is small.

Water quality treatment technology is under development and it is assumed that water quality standards would be met for this strategy to be implementable. The choice of flow conditions and therefore months chosen for release, do not reflect low flows and resulting augmentation, which is the stated reason for releasing treated industrial wastewater. Rather, the timing of release proposed (during higher flows) reflects the view that dilution would be required to meet water quality guidelines. If releases take place during high flow (spring-early summer months) as simulated, storage infrastructure may be required to reduce higher flows as these flows could potentially impact aquatic habitat and downstream uses.

Salinity was identified as a challenge in terms of removal of contaminants after reprocessing and treating wastewater from oil sands operations.

Walleye recruitment effects would be positive, noting that this is dependent upon when water is released, as natural variability in flow is necessary for fish habitat and ecosystem health.

The overall effect is the same in wet and dry conditions and some effect is shown in stress tests.

The Working Group majority (2/3) placed this strategy in the least promising quadrant, with less feasibility and less benefit, given the time of year of release chosen to address the potential need to augment low flows in the Athabasca River. The exception was that one group placed this in the upper middle to show that if water quality was met and release timing made sense, it would be more feasible and yield benefits.

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Table 3: Matt and Claire

STRATEGY #1: Reuse of industrial or municipal effluent

Strategy description: This strategy looks at how return flows (treated effluent) from industrial or municipal operations could be repurposed for other industrial use (reuse by industry). This strategy will show how reuse of water could impact downstream flows, or allow for development needs in an area without withdrawing freshwater from a water body, part or all of the time.

Modelling method: Industrial and commercial demands in the upper ARB are not returned to the river, but instead flow to off-stream storage. TDLs in the upper ARB draw from this storage. The maximum storage of the reservoir is set at 100,000 dam^3, volumes in excess of this flow back to mainstem Athabasca. Water is also drawn out of this storage to meet the downstream SWQMF flows.

Summary of working group conversation

- Results:
  - In the historic case, this strategy decreases the number of IFN violations in the McLeod by five days over the 30 year modelling period.
  - There are moderate decreases in IFN violations in other portions of the upper ARB.
  - There are not substantial flow changes on the mainstem of the Athabasca, flow changes are only seen on the tributaries.
- Feasibility:
  - This may be somewhat challenging to implement as it would be a large infrastructure investment, or else it would involve high costs to haul water.
  - The group felt that this strategy may be more feasible in special cases as a local strategy, specifically under dry conditions, it was noted that there are not large benefits to the basin as a whole.
  - The group noted that the water reuse policy is already underway therefore implementation from a policy perspective may be quite easy.
- Potential challenges:
  - There are many challenges regarding water reuse, some of which have to do with water quality trade-offs. For example, is this water of an adequate quality to be used for agriculture?
  - The reuse water is currently modelled as treated water.
  - There may be challenges matching the source location of the water to the location of the water need.
- Benefits:
  - There would be riparian benefits as water users would be trucking water from one central storage facility that has the right infrastructure for track traffic as opposed to pulling truck up to the river, there would be less traffic accessing the river.
  - There is much more of a local benefit than a basin wide benefit.
  - There would likely be a water quality benefit as there would be a decrease in sediment transport with less traffic near the river and fewer outfalls into the river.
  - There may be long term benefits to this strategy, it is sometimes hard to quantify cumulative benefits over time.
- The group noted that this strategy aligns with strategy #8.

STRATEGY #9: Identify areas for conservation and restoration

Strategy description: This strategy looks at quantifying the hydrological change of conserving areas with high biodiversity / hydrological importance (e.g., CPAWS high conservation areas for biodiversity, CPAWS Net Present Value (NPV) model, AWA Areas of Concern, DUC key wetland areas) and conserving these areas as compared to having them developed or managed for other uses.

Modelling method: Any areas in the CPAWS NPV 20 and 50% footprints that are human-made are reclaimed to their natural land cover. Footprints to be restored to natural state would include: agriculture, mines, pipelines, seismic lines, powerlines, and disturbed forest. Features to be excluded from conversion: urban regions, major roads, recreation/trails.

Note about the modelling method: No fires are currently shown in the conserved land.

Summary of working group conversation

- Results:
  - There is less water in the river compared to the base case for the historic, the wet, and the dry conditions.
  - There are increases in IFN violations in all areas of the basin except the Pembina. This is because there are more mature trees in the conserved and restored areas; these trees intercept more water (as well as transpire more), and therefore decrease runoff to the river. The Pembina has a decrease in IFN violations because agricultural land would be reforested. Although agriculture gets more precipitation (less interception) than forested areas, agricultural land generally has shallow soils, which allow soil water to deplete quickly, whereas forested soils are deeper and retain water longer, and therefore supplement late-season streamflow.
  - IFN violations are more reflective of how IFNs are modelled and the assumptions surrounding how IFNs are calculated than they are of overall ecosystem health.
  - The strategy results in fewer flood days in the Lesser Slave; less flooding was seen in general with this strategy.
  - The group noted that although this strategy shows a decrease in streamflow there was no increase in shortages except under the dry condition, in which case the increases in shortages were negligible. This raised the question of whether the decrease in water in the river is substantial or meaningful.
- Benefits:
  - The group noted that this strategy would have many benefits that cannot be seen in the model.
  - Increasing conserved or reclaimed land would decrease sediment transport.
  - There would likely be a benefit of having more naturally regulated flows, therefore a less flashy system.
  - There should be a benefit of additional baseflow in the winter (where wetlands are restored).
  - This strategy may show more benefits in areas other than water quantity.
  - The group felt that this strategy would not have many benefits based on modellable data, however there would likely be an increase in benefits when looking at the larger picture.
- Feasibility:

- The group discussed the feasibility of implementation of this strategy, it was originally noted that any increase in conservation would likely be challenging to implement. However, a member of the group noted that the current LARP has 16% conservation area; this shifted the group's thought to deciding that perhaps the CPAWS 20% conservation areas may be feasible, however the CPAWS 50% may be more challenging to implement.
- This strategy may be politically difficult to implement.
- How were the CPAWs conservation areas found with respect to agriculture? From an agricultural perspective, it would be more beneficial to talk about buffers around agricultural land than to discuss restoration. There would likely be very little political appetite to restore agricultural lands which would make the implementation of this strategy in those areas challenging.

- Potential challenges:
  - The group notes that if large areas of land are conserved or reclaimed it may move the industrial activity from inside the conserved or reclaimed areas to other areas of the ARB, therefore potentially exacerbating industrial activities in other areas of the ARB.
- There would be water quality and quantity trade-offs with this strategy, however the quality trade-offs cannot be quantified with the model.
- What impact would this strategy have on areas that are already developed? Would it decrease or change allowable redevelopment after disasters?
  - Changes in developed areas were not included in the model.
- Were changes in population and projected population growth taken into account?
  - It does not appear that CPAWs has taken any projected growth in population into account while determining the conservation areas.
- The group noted that the language should be very specific – restoration to a natural state is not the same as reclamation. Reclamation does not return the land to its original natural state; restoring land to its natural state is very hard and is currently not done. The challenges regarding restoration should be recognized before development takes place. Only conservation maintains natural or traditional landscape.
  - The discussion surrounding reclamation and restoration led the group to think that perhaps conservation and restoration should be two different strategies.
  - Should be additionally noted that, as currently modelled, conservation scenarios lead to a net zero change in streamflow because, by definition, they have no change in land cover relative to current day. To model the effects of conservation, the run would have to be compared with an estimate of future land cover with and without conservation (i.e., against a Business as Usual scenario).
- Note that the strategy should be reworded – it is currently stated as "identify areas of conservation and restoration," however the areas have already been found. "Implement conservation and restoration" should be added.
- Perhaps there would be benefit in looking at smaller chunks of the CPAWs conservation files. This may be easier to implement.

STRATEGY #10: Support BMPs within the forestry sector

Strategy description: This strategy would be to support continued BMPs in forestry and to maintain or improve hydrological functions in watersheds with forest harvest.

Modelling method: Three forest harvest scenarios are modelled:

1. Annual allowable cut with no forest fires: this leads to a net increase in mature forest over the whole basin, because areas that were previously fire-affected regrow, such as the Clearwater River. Some regions, especially near Hinton, see net increase in disturbed forest due to harvesting
2. Annual allowable cut with forest fires at historical rate: Large disturbance (~14,500 km^2 of new disturbed forest over the ARB).
3. Annual allowable cut with forest fires at increased rate: Fire rate is approximately double the historical rate, which roughly doubles the area of disturbed forest.

Summary of working group conversation

- Results:
  - There is a decrease in the number of IFN violations when there is greater forest harvest or a greater burn event.
  - There is an increase in navigable flow days when there is greater forest harvest or a greater burn event.
  - There is also an increase in flooding when there is a greater forest harvest or a greater burn event.
- It is not realistic to consider a scenario or a strategy where there are no longer fires at all.
- There does not seem to be a large net benefit in the model by supporting Forestry BMPs. The group also noted that it was unclear what forestry BMPs were modelled.
- This strategy may be worded incorrectly; as it is worded right now it is not really a strategy. A suggested revision to the strategy is "Support FMAs (forest management areas) and ensure that these get implemented on the ground."

STRATEGY #11: Support a wetland policy and implementation approach to altogether avoid wetland loss

Strategy description: This strategy would be to support a wetland policy and implementation approach to all together avoid wetland loss in the system. This support is needed to better understand the opportunity around natural water storage and hydrologically significant wetland areas and to develop an understanding regarding how this has changed relative to pre-industrial landscape.

Modelling method: This strategy is modelled as a decrease in wetlands to illustrate the impact of not implementing the strategy. 458 km^2 of wetlands are converted to disturbed. This disturbance is limited to the lower Athabasca River (between Athabasca and Fort McMurray), Lac La Biche basin, House River, and the Christina River.

Note: this strategy is not tested under the dry stress test as wetland disruption is already included in this stress test.

Summary of working group conversation

- Results (reminder – these results are shown for wetland loss):
  - There is much more water in the system when there is wetland loss. This increase is concentrated in the post-snowmelt period. By late fall, differences are small: disturbed areas receive higher precipitation, but it also runs off much quicker, depleting stored soil water

much quicker than wetlands (which attenuate flows, store water, and supplement low flow periods).
    - IFN violations decrease, the group noted that for this strategy this is more reflective of the way that IFNs are calculated rather than being reflective of the overall ecosystem health. The group recommended looking at developing a different PM that indicated ecosystem health for land use scenarios.
    - There is an increase in the level of Lake La Biche when wetlands are removed.
- Benefits:
    - Avoiding wetland loss would have positive water quality impacts.
    - If there are more wetlands there should generally be more flow at low flow times.
    - There would likely be substantial ecological benefits to avoiding wetland loss such as water filtration and water quality impacts.
- Feasibility:
    - The group felt that implementation of this strategy would be easy, however the benefits are not illustrated in the model.
    - If the assumption is that this strategy is not using the current wetland policy, but is instead suggesting that all wetlands were preserved, implementation would be very challenging; however if the strategy is to implement the current wetland policy more rigorously, then the implementation would be easy.
- The group wondered if there was somewhere else that the water would flow instead of being stored in a wetland, if wetlands were removed; would the removal of wetlands destroy aquifers?
    - The removal of wetlands would likely deplete shallow aquifers, the effects of deeper aquifers would be unknown without geological modelling.
- Note regarding Lac La Biche: perhaps the modelling team could obtain a lake level at which lake level increases will cause overland flows.
- The group noted that it is easy to support this policy, despite the fact that changes are not seen in the model.

STRATEGY #12: Reclaim linear features and reduce future linear disturbances in the watershed

Strategy description: This strategy looks at reducing linear fragmentation causing interruptions in hydrological functions on the landscape to determine the hydrologic impact in terms of streamflow changes from linear disturbance in a watershed.

Modelling method: Reclaim 40% of linear features (Trails, Minor Roads, Seismic Lines, Pipelines). This is done in the Christina River (15 km^2 reclaimed), the Hangingstone River (4 km^2 reclaimed), the Muskeg River (20 km^2 reclaimed), and the MacKay River (8 km^2 reclaimed). The model replaces disturbed features (low permeability soils and no vegetation) with forest. In general, this will decrease spring streamflow, as more snow and rain remain in canopy and don't run off quickly to streams and lakes.

Summary of working group conversation

- Results:
    - Not many changes are seen in the model from a water quantity perspective. There are a few additional IFN violations; this is likely because water is being held back on the landscape as the landscape is reclaimed.
- Benefits:
    - It's likely that this strategy would have greater environmental benefits in the reclaimed

areas. Other benefits that are not water quantity related may include: sediment decrease, positive wildlife impacts, positive bird impacts.

- Implementation:
  - This strategy would likely not be too hard to implement as there is already a push for linear reclamation.
- The group noted that this strategy would likely already be part of the conservation and reclamation strategy.

STRATEGY #13: Impose requirement on mining operations to maintain or improve watershed functions.

Strategy description: This strategy looks at requirements for mining operations to maintain or improve watershed functions by reclaiming lands in the Muskeg River Basin.

This strategy was not modelled, it was felt that there were not enough assumptions to accurately represent how water is managed on oil sands mine sites; if this strategy were to be modelled it would need to be modelled at a much more local scale.

Summary of working group conversation

- Reclamation plans should already be in place for mines.
- From a basin-wide perspective there would be social benefits and potentially water quality impacts, however there may be no water quantity increases.
- If this strategy is to be discussed it should be reframed and modelled.

5 Breakout Session 4: Revisit and confirm group sorting of strategies

Participants worked in three small groups to sort the strategies and place each one on the matrix. Mike Nemeth highlighted the most promising strategies (those that are most feasible and provide the most benefits to the watershed), which will be the starting point for the next meeting. The sorted strategies are noted below from each of the tables.

Table 1	Table 2	Table 3
Most promising	**Most promising**	**Most promising**
Support a wetland policy and implementation approach to all together avoid wetland loss in the system*	Explore setting precautionary water withdrawal limits using the Alberta Desktop method for IFNs	Explore setting precautionary water withdrawal limits using the Alberta Desktop method for IFNs
Support BMPs within the forestry sector*	**Some Promise**	Water conservation, and water efficiency improvements
Explore setting precautionary water withdrawal limits using the Alberta Desktop method for IFNs	Reclaim linear features and reduce future linear disturbances in watersheds	Reuse of industrial or municipal effluent
Reuse of industrial or municipal effluent (higher benefits than more than just modelling can show)	Explore treat and release practices and policies to look at impacts on flows	Reclaim linear features and reduce future linear disturbances in watersheds

Some Promise	Water conservation, and water efficiency improvements	Explore minimum flows for navigation purposes
Explore new on stream multi-purpose storage options	Identify areas for conservation and restoration	**Some Promise**
Identify areas for conservation and restoration (more value than can be shown in the modelling results)	**Least Promising**	Support a wetland policy and implementation approach to all together avoid wetland loss in the system
Water conservation, and water efficiency improvements*	Support a wetland policy and implementation approach to all together avoid wetland loss in the system	Explore altering existing water storage infrastructure for multi-purpose storage options
Impose requirements on mining operations to maintain or improve watershed functions target ranges	Explore altering existing water storage infrastructure for multi-purpose storage options	Identify areas for conservation and restoration (more value than can be shown in the modelling results)
Reclaim linear features and reduce future linear disturbances in watersheds	Explore new off stream multi-purpose storage options	Support BMPs within the forestry sector
Explore treat and release practices and policies to look at impacts on flows	Explore new on stream multi-purpose storage options	**Least Promising**
Least Promising	Reuse of industrial or municipal effluent	Explore new on stream multi-purpose storage options
Explore minimum flows for navigation purposes	**Group was unsure on the following because one was not modelled, and two were in question due to the group informing that they were not evaluated fully:** 7: Explore minimum flows for navigation purposes 10: Support BMPs within the forestry sector 13: Impose requirements on mining operations to maintain or improve watershed functions target ranges	Explore new off stream multi-purpose storage options
Explore altering existing water storage infrastructure for multi-purpose storage options (Paddle River Dam is easier to do, but has less benefit)		Explore treat and release practices and policies to look at impacts on flows
Explore new off stream multi-purpose storage options		**Group was unsure on the following because one was not modelled:** 13: Impose requirements on mining operations to maintain or improve watershed functions target ranges

*Table suggested that these should be combined.

6 Next Steps and Close

The next meeting was going to be November 29, 2017 in the same location, however the date needed to be moved after the meeting, so Mike sent out a new meeting invite for January 25, 2018 for the next meeting. The group will look more closely at the strategies and simulate them more robustly and also start to combine strategies to see if combinations could provide more benefits. This now moves the last

meeting to early in March 2018.

The record from this meeting will be prepared and circulated along with the presentation slides to participants.

The meeting adjourned at 3:52 p.m.

ALBERTA
waterSMART
Water Management Solutions

Sustainable Water Management in the Athabasca River Basin Initiative (ARB Initiative)

Working Group meeting #6
September 19, 2017

Welcome and introductions

Today's discussion

9:00	**Welcome, introductions, and opening remarks**	**Mike**
9:25	Regional Planning Update	Scott Duguid
9:35	Reminder: strategies and stress tests- how they will be used in today's meeting	Claire
10:00	Breakout groups: review, assess and sort strategies at each table	All
11:30	Sharing Sessions update: key messages that we heard and information to help our thinking on today's discussions	Denise/Mike
11:50	Lunch	-
12:40	Breakout groups: review, assess and sort strategies at each table	All
1:55	Breakout groups: review, assess and sort strategies at each table	All
	Informal break during sessions with refreshments	
3:10	Breakout groups: Revisit and confirm group sorting of strategies using the strategies matrix	All
3:40	Next steps, and close	Mike

Chatham House Rule

"When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed."

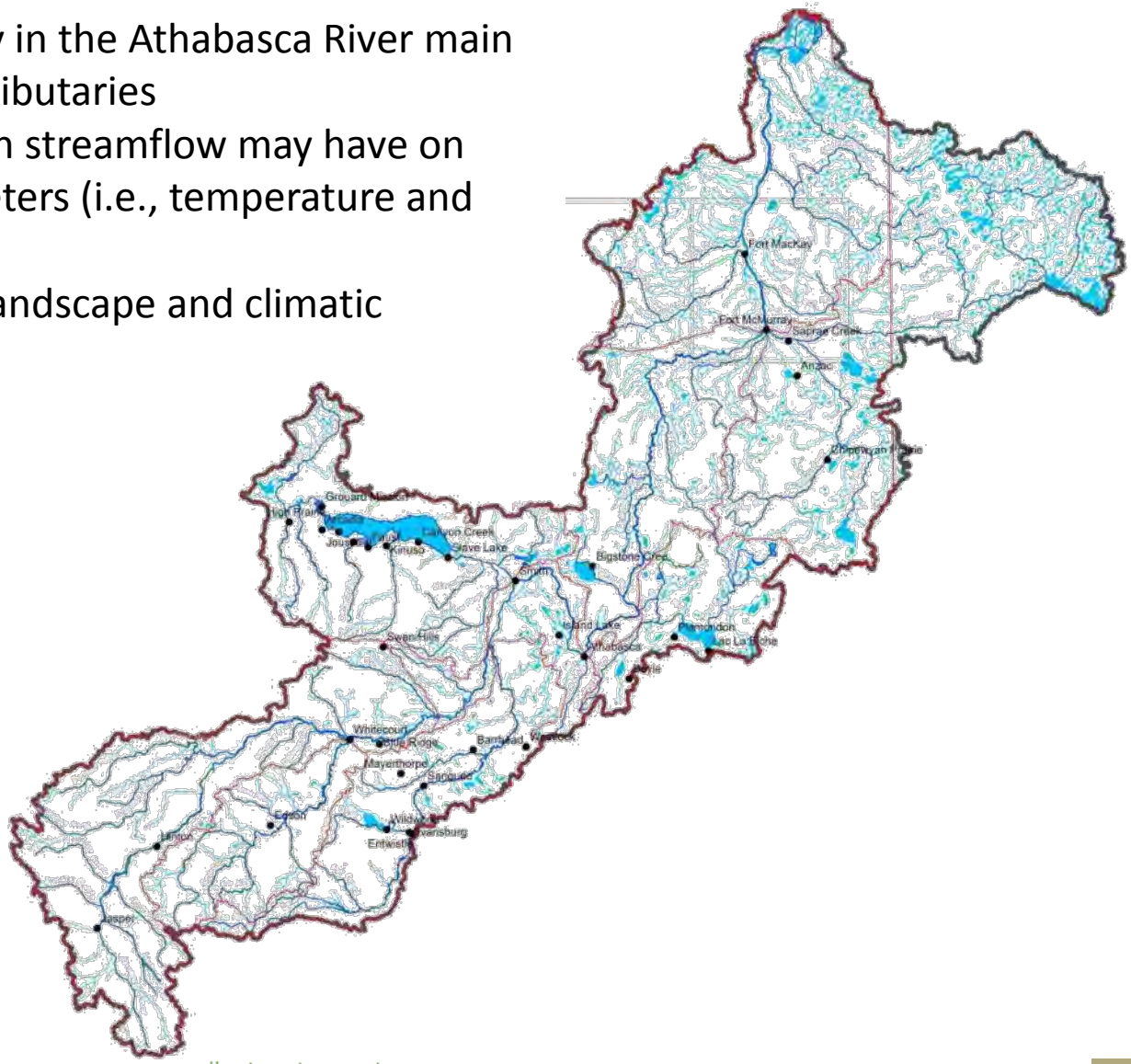
Be bold, be innovative, speak openly……focus on addressing the challenge, not the blame

Keep in mind…

- Slides and meeting summary will be sent out after today's meeting.
- Materials and information presented can be shared publically- all meeting material available on the project website (visit www.albertawatersmart.com or Google "ARB Initiative")
- Please ask questions as we go through the slides and during the working sessions.
- Some of the material will be reviewed again in future meetings.
- This process is iterative - it is on-going work.

Current scope

- Surface water quantity in the Athabasca River main stem, and the major tributaries
- Implications changes in streamflow may have on certain quality parameters (i.e., temperature and dissolved oxygen)
- Implications of basin landscape and climatic change on streamflow

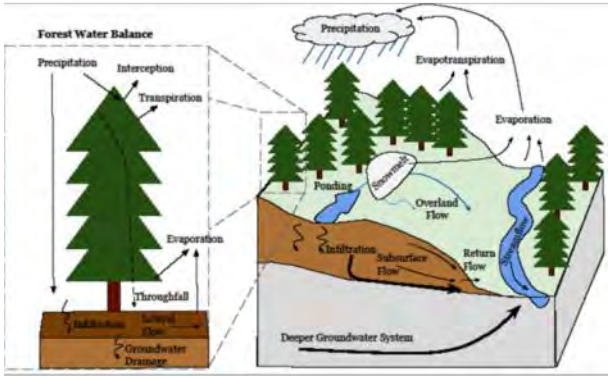


Collaborative water management creates informed discussions that can move toward action

1. Bring together an inclusive basin-wide working group

First Nations, Métis Regions, Métis Locals, and Métis Settlements

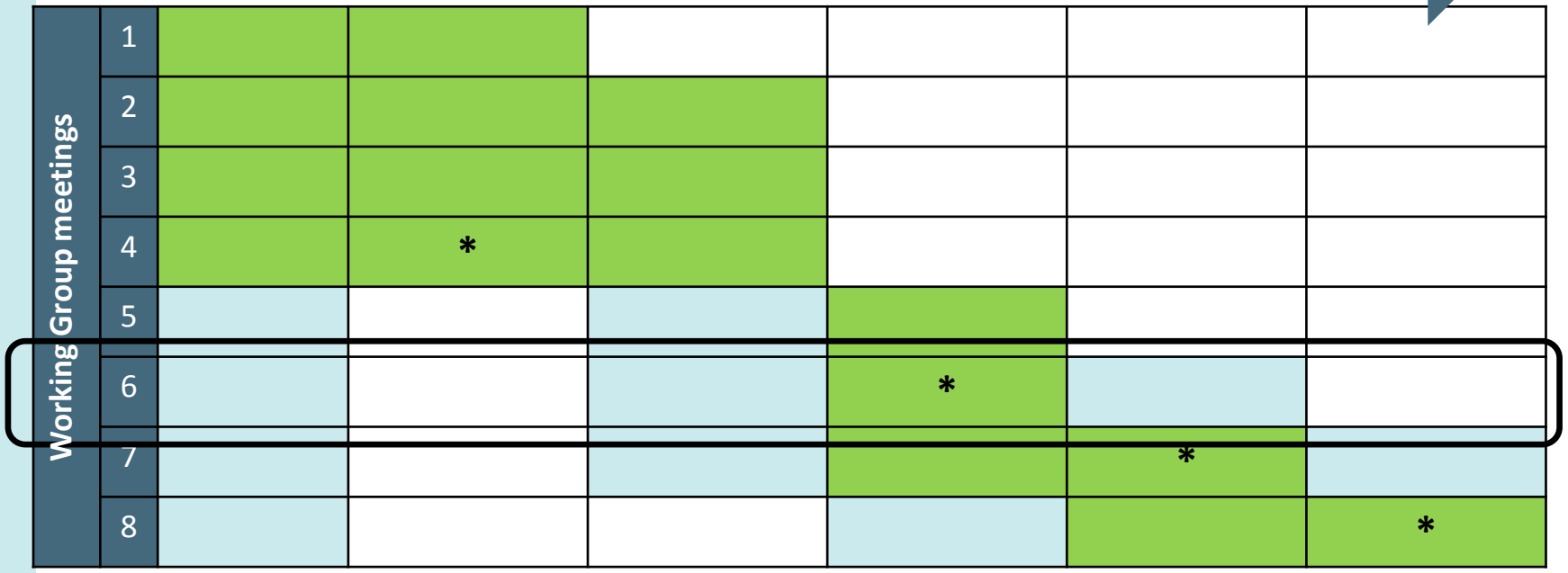
2. Provide a strong base of data and tools



3. Work collaboratively to identify challenges and opportunities

Collaborative process to develop the ARB Roadmap

Understand the current state of the basin	**Define** the problem or improvement	**Identify & refine** potential strategies	**Assess & sort** which are the better strategies	**Combine** the better strategies to fix / improve	**Recommend** what should be done next
WG expertise & AIRM	*Working list of issues*	*Working list of opportunities*	*AIRM & PMs*	*Roadmap*	*Next steps*

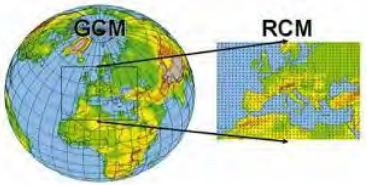


Reminders about the Athabasca Integrated River Model (AIRM)

- AIRM represents the basin today, based on available data and information to date.
- "All models are wrong, some are useful."
    - We believe the integrated model is a useful representation of the ARB watershed.
- AIRM and the PMs show direction and amount of hydrologic change within the basin.
- Expect small refinements in the model as we work with it; however, AIRM is built and ready for use.

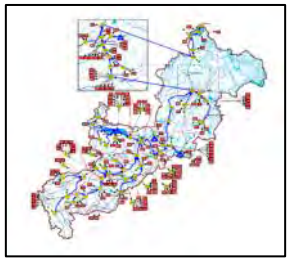
Athabasca Integrated River Model (AIRM)

Input: opportunities (e.g., changes in demand/water use, flow targets, infrastructure changes, land use and landscape change, changes in climate, etc.) and expertise.



Output: future daily precipitation and air temperature

Outputs: changes to streamflow based on changes to climate and landscape, changes in snowpack, soil moisture, etc.



ALCES

Outputs: changes in landscape composition from various scenarios

Outputs: Changes to streamflow and PMs that show effects of strategies on the system

Goal for this work is an ARB Roadmap

A Roadmap is:

- a set of strategies with practical actions
- developed by an inclusive basin-wide working group using collaborative modelling and dialogue
- a recommended or potential path toward sustainable water management in a basin
- intended to inform future planning and management efforts as they relate to water

- **Screens** and **sorts** strategies; does not prioritize projects
- Identifies **gaps** and **recommends next steps**; does not layout an Implementation Plan
- Reflective of **collaborative findings**; not Consultation or a decision making body
- A **guiding** document; not a basin Plan

Today's discussion

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Regional Planning Update

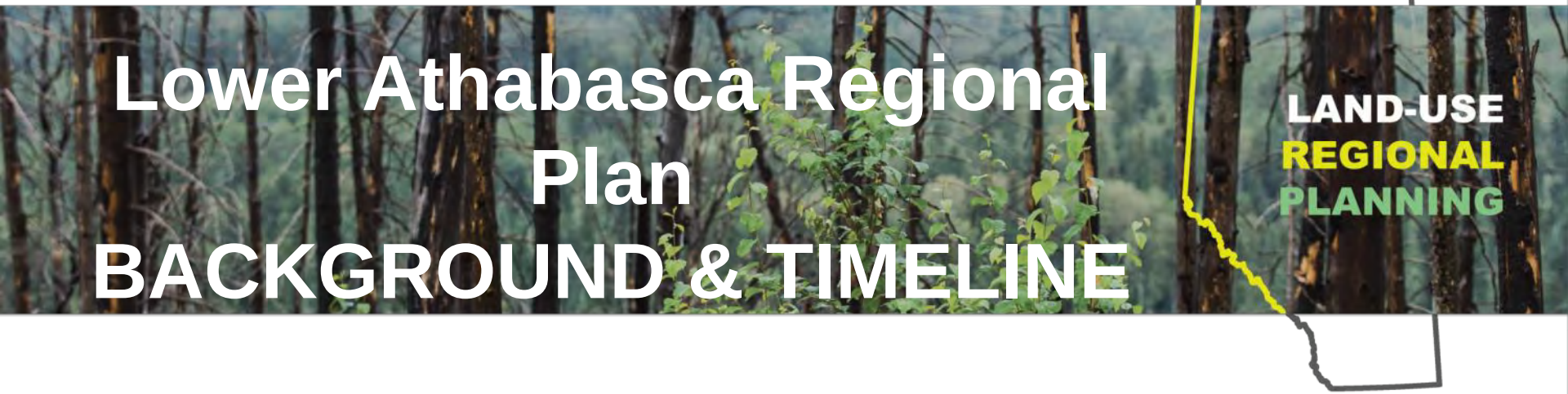
Alberta Government
Land Use Secretariat

Lower Athabasca & North Saskatchewan Regional Plans

September 19, 2017

Outline

- Lower Athabasca Regional Plan
  - Background and Timeline
  - Lower Athabasca Regional Plan First Nations Working Group Update
  - Next Steps
- North Saskatchewan Regional Plan
  - Background and Timeline
  - First Nation North Saskatchewan Regional Plan Table Update
  - Next Steps



Lower Athabasca Regional Plan
BACKGROUND & TIMELINE

- Approved by Cabinet on August 2012
- It became effective on September 2012
- September 2013 a LARP review was requested by six First Nations.
- June 2014 a LARP Review Panel was appointed
- June 2015 the Review Panel submitted its report

LARP Review Panel Areas of Concern

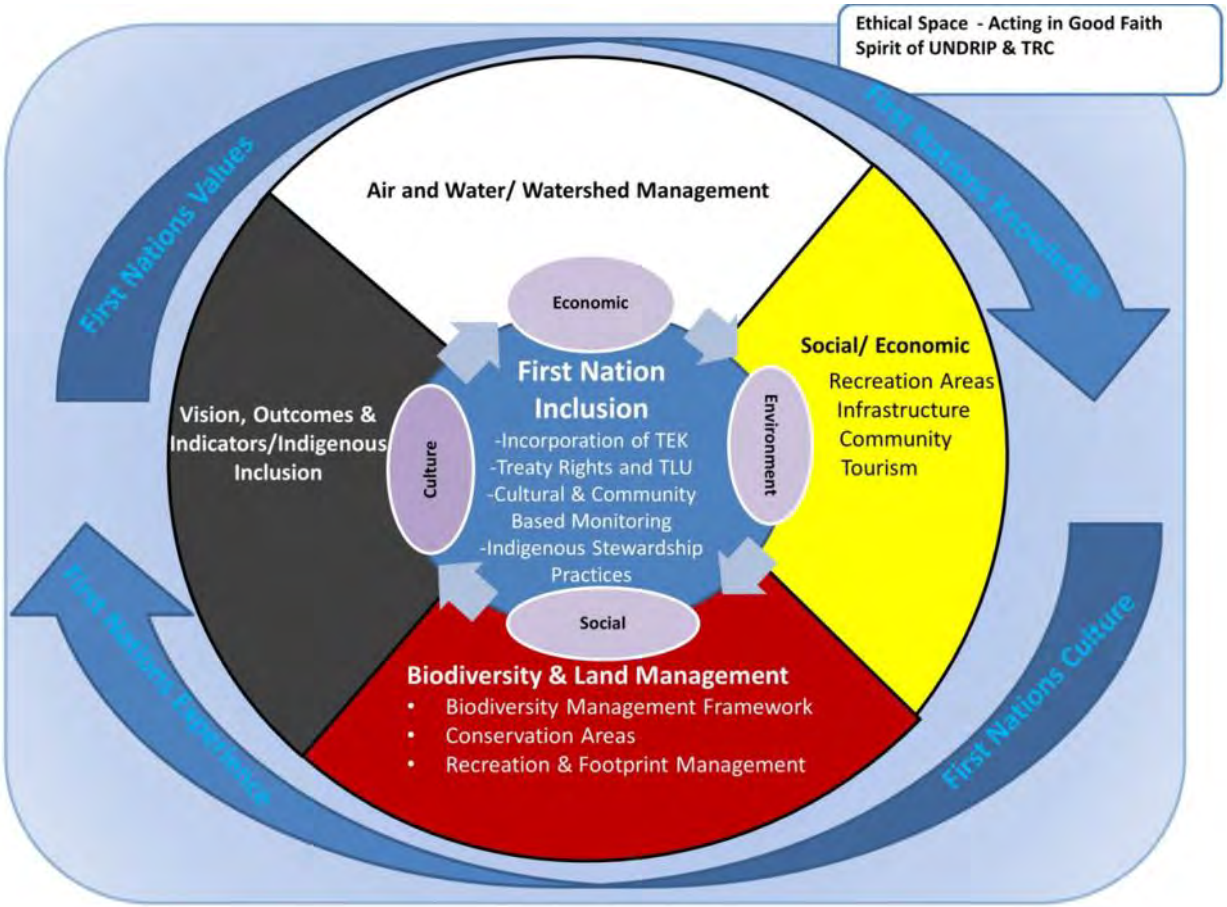
- Areas of Concern
  - Consultation, treaty rights, and Traditional Use
  - Strategic timelines and Monitoring initiatives
  - LARP environmental management frameworks lack thresholds and triggers relating to Treaty Rights
  - Cumulative Effects Management
  - Shell Jackpine Report

LARP FIRST NATIONS WORKING GROUP

- September 2016 Alberta Environment and Parks Minister, sent a letter to all 21 First Nations who participated in the LARP inviting them to participate in a LARP First Nations Working Group (the Working Group).

- December 2016, the Land-use Secretariat, and ministry partners met with representatives from First Nations communities to discuss building a collaborative process (referred to as a Working Group) between government and First Nations to review and enhance the LARP

Opportunity to Work Better Together



Next Steps on LARP Amendment Process

- Government Staff are waiting on direction to discuss indigenous interests:
  - Indigenous Pillar in the Land Use Framework
  - Traditional Land Use Plan/Framework
  - Biodiversity Management Frameworks
  - Cumulative Effects Management
- Engagement will happen through:
  - Set up LARP First Nations Working Group and Metis Workshop Sessions
  - Set up a Multi-Stakeholder session
- Enhanced collaboration is required from government, industry, and Indigenous communities to ensure that all interests can be more equitably considered on private and public lands land-use decision making

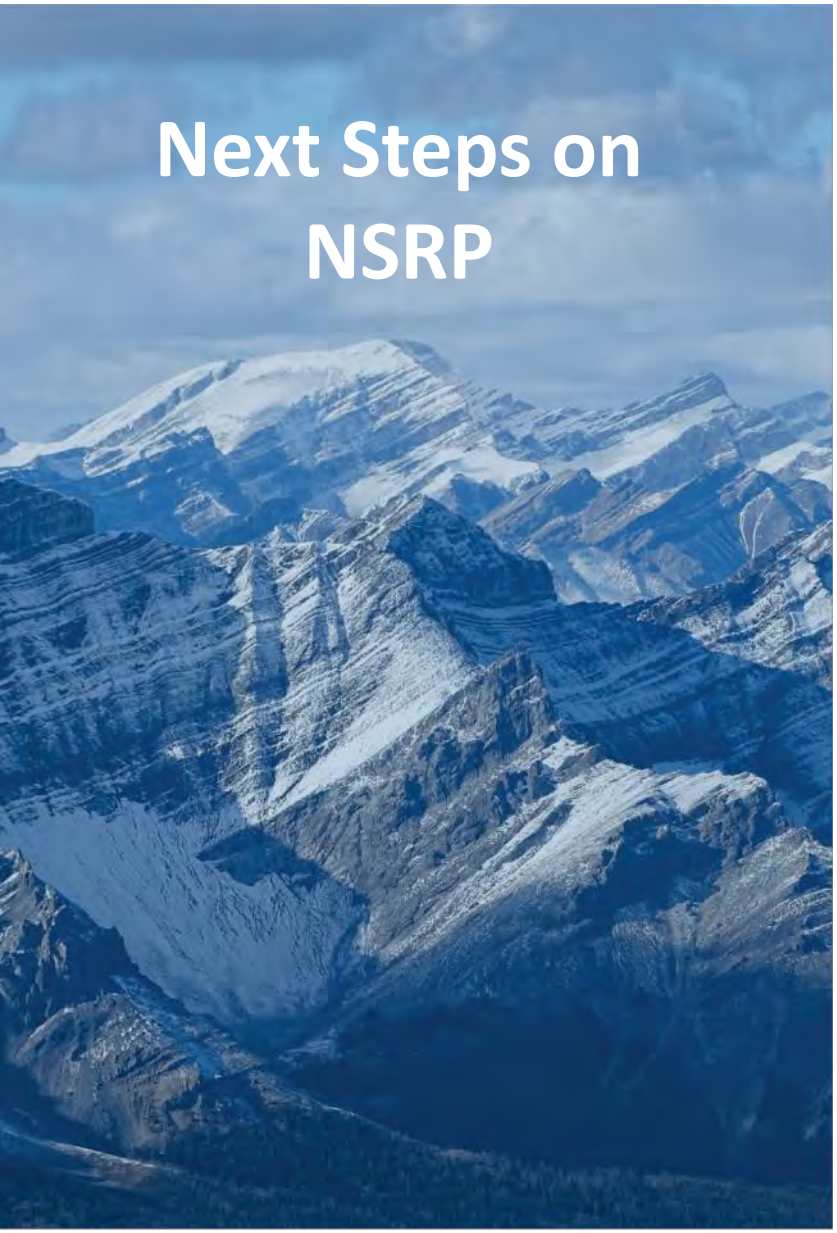
North Saskatchewan Regional Plan BACKGROUND & TIMELINE

- 2013-14: Phase 1 consultation took place on the Terms of Reference for Developing the North Saskatchewan Regional Plan.
- 2014: The North Saskatchewan Regional Advisory Council (RAC) was appointed
- 2015: North Saskatchewan Region RAC submitted its recommendations report

FIRST NATION NORTH SASKATCHEWAN REGIONAL PLAN TABLE

- Established in 2016
- Undertook a similar process to the Regional Advisory Council
- May 2017 a cultural workshop took place to educate government staff

Next Steps on NSRP



- The Government of Alberta continues to work on developing the NSRP.
  - Once the draft NSRP has been completed and publically released, a series of public consultations will be undertaken prior to the completion of the final plan.

Today's discussion

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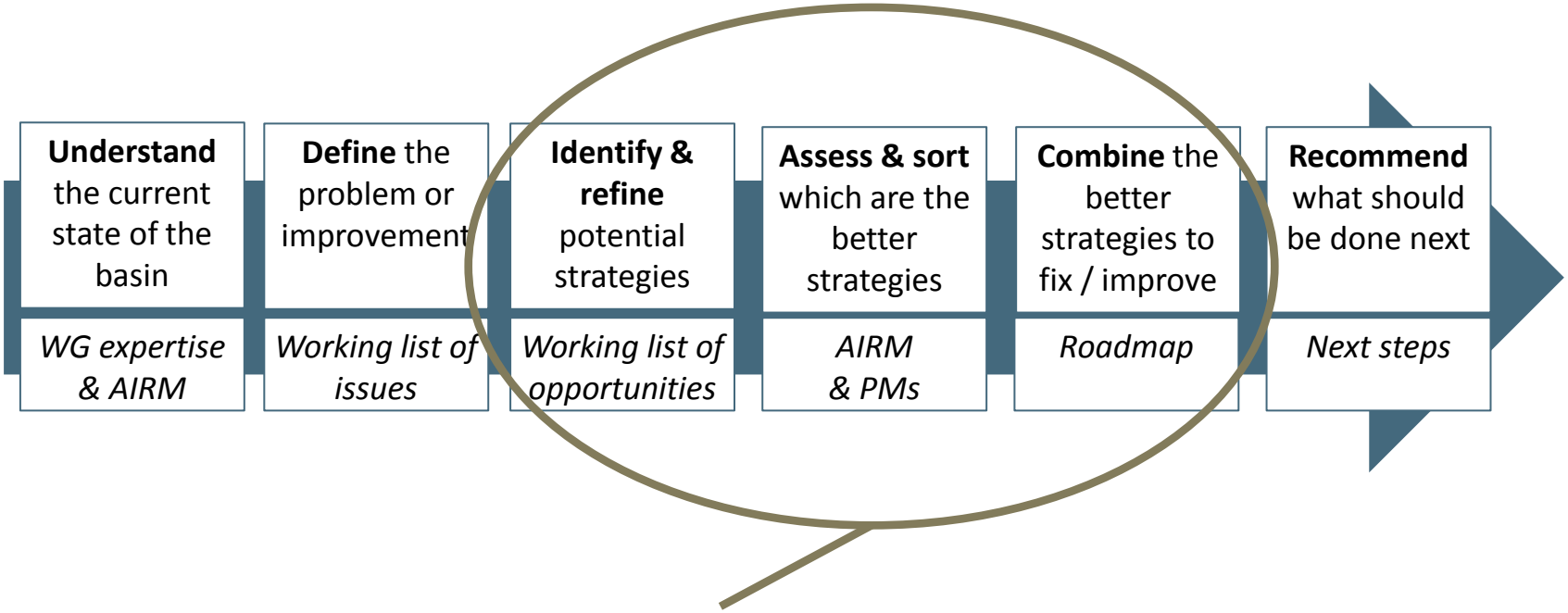
Collaborative process to develop the ARB Roadmap



Identify, refine, assess and sort strategies:

Under current basin conditions

+

Under potential basin conditions ("stress tests")

- More challenging conditions than today
- Based on plausible science and/or projections
- Useful for assessing performance of strategies

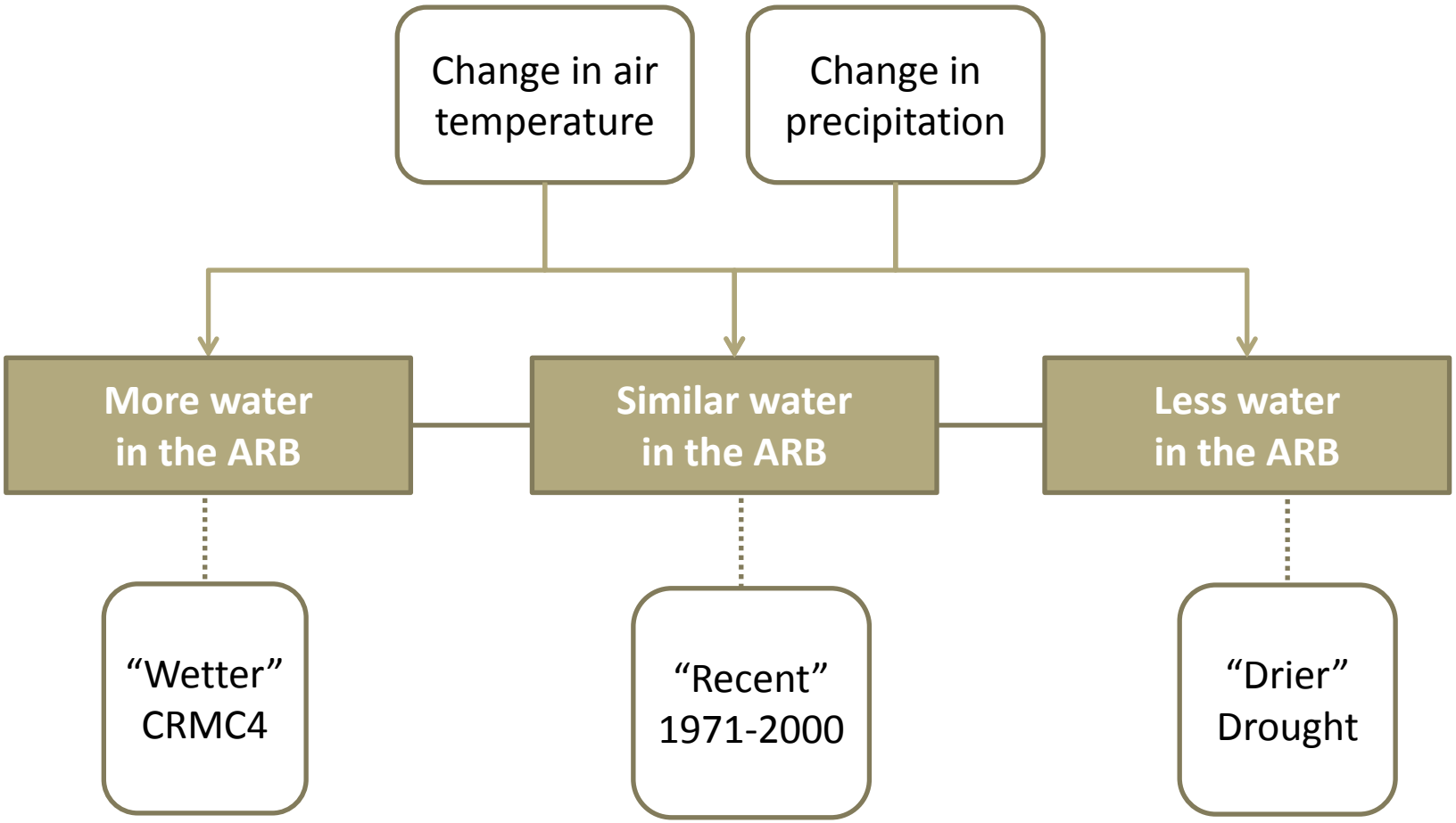
Strategies refined to date


DRAFT ARB Initiative: Working List of Strategies

Strategies documented in handouts for use today!

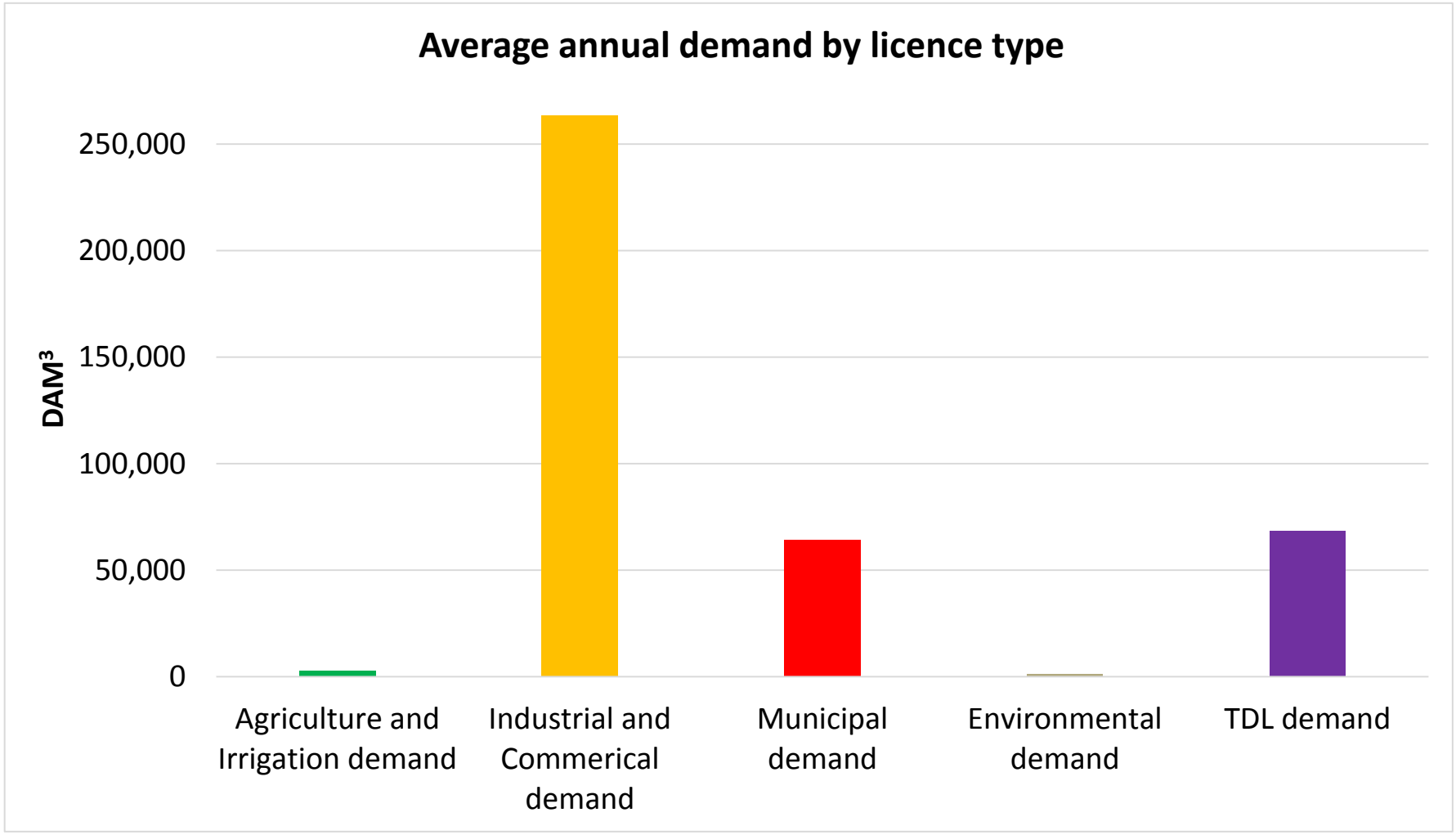
1. Reuse of industrial or municipal effluent
2. Water conservation, and water efficiency improvements
3. Explore new on stream multi-purpose storage options
4. Explore new off stream multi-purpose storage options
5. Explore altering existing water storage infrastructure for multi-purpose storage options
6. Explore setting precautionary water withdrawal limits using the Alberta Desktop method for IFNs
7. Explore minimum flows for navigation purposes
8. Explore treat and release practices and policies to look at impacts on flows
9. Identify areas for conservation and restoration
10. Support BMPs within the forestry sector
11. Support a wetland policy and implementation approach to all together avoid wetland loss in the system
12. Reclaim linear features and reduce future linear disturbances in watersheds
13. Impose requirements on mining operations to maintain or improve watershed functions target ranges

Potential stress tests: changes in climate



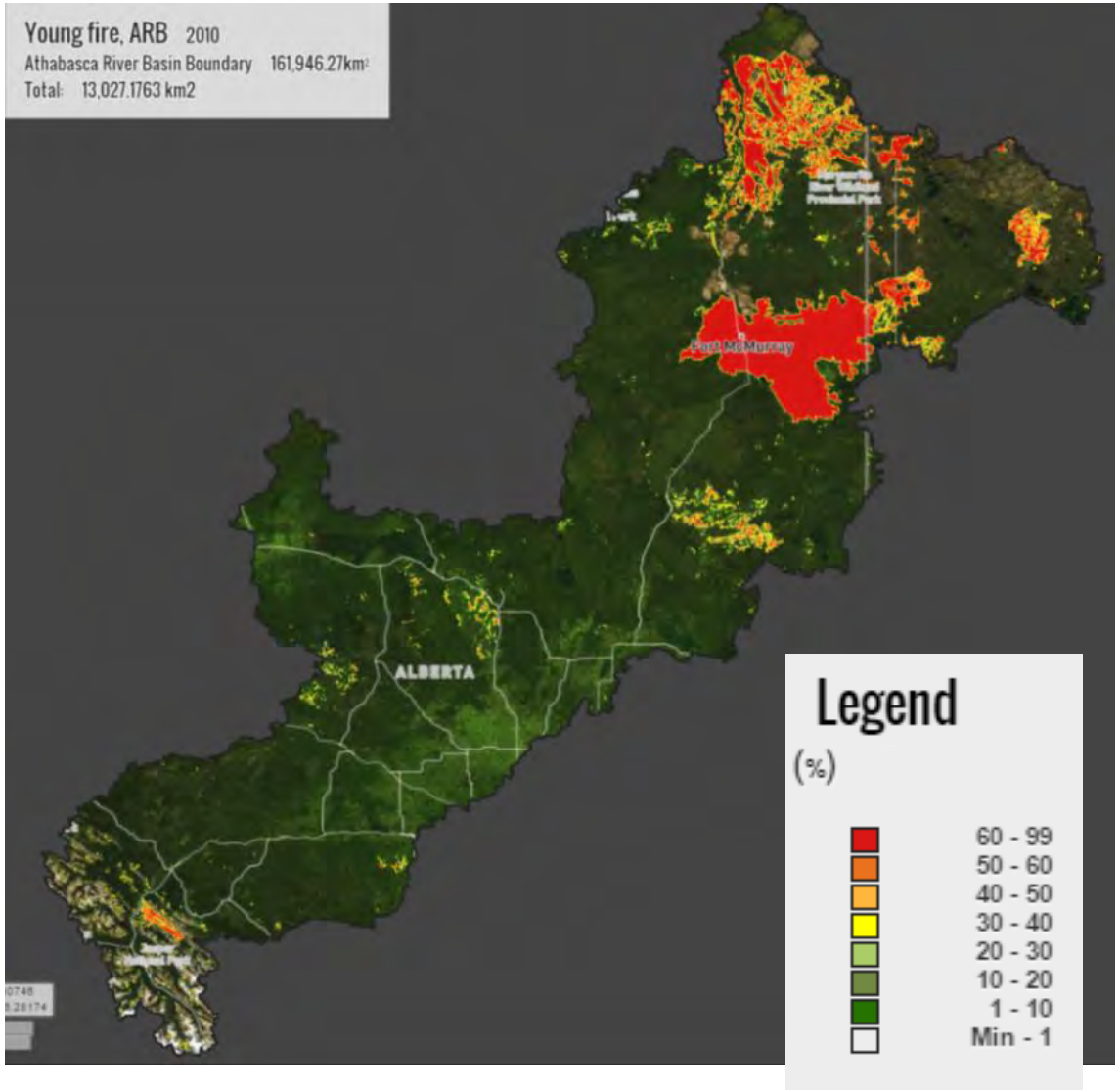
Stress tests: (1) "Wetter" and (2) "Drier"

Potential stress tests: increase in demand



Stress test: doubling of agriculture, industrial, and TDL demands

Potential stress tests: large event-based landscape change

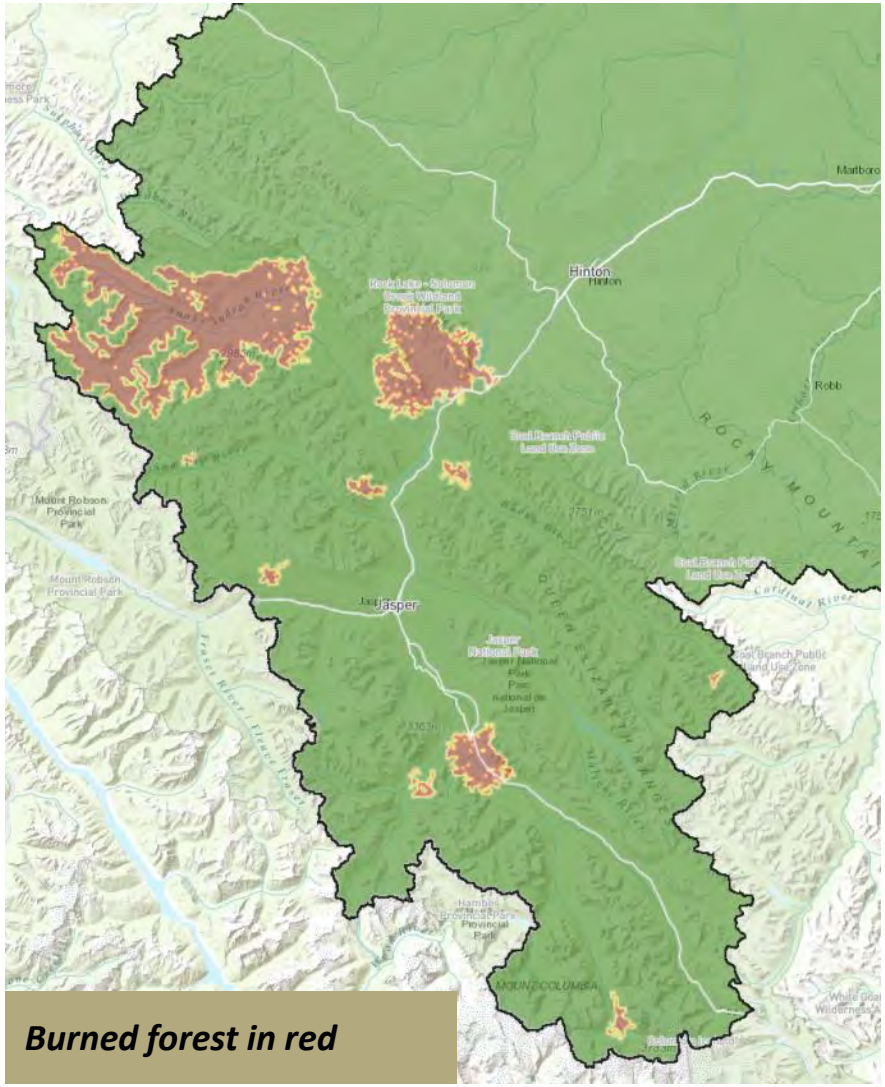


Large forest fire in headwaters that is roughly half the size of the 2016 fire

Reduction (428 km^2) in wetlands in Lac La Biche region

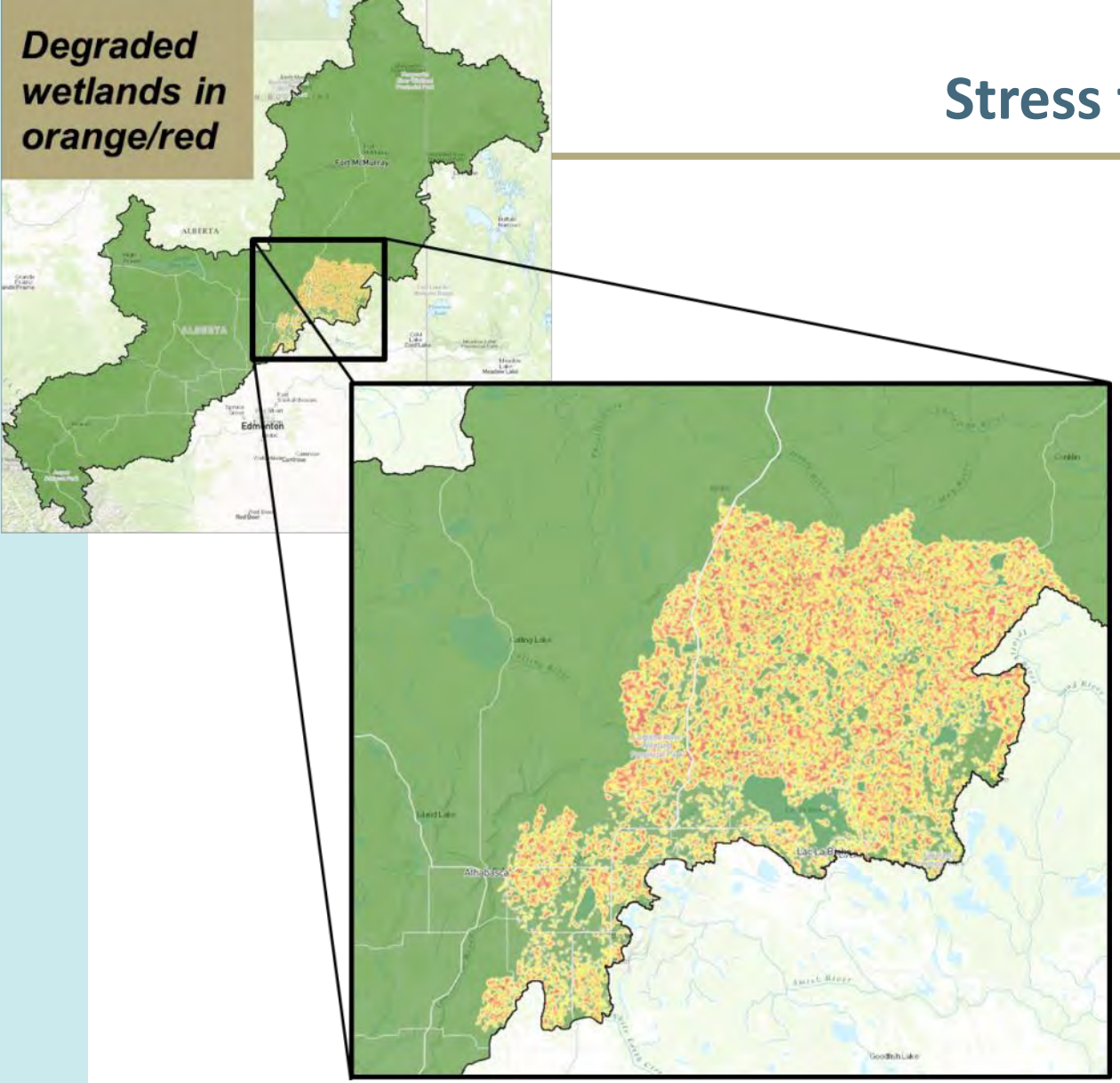
Stress test: wet condition

- **Large forest fire in headwaters**
  - Roughly half the size of the 2016 fire
- **Modest glacier retreat**
  - CanESM rcp 4.5 2010 – 2040 (future climate projections from climate models)
- **Wetter and warmer climate scenario**
  - CRCM4 Climate Scenario
- **Water Demands: Double demands**
  - Demands include – industrial, agricultural, TDLs



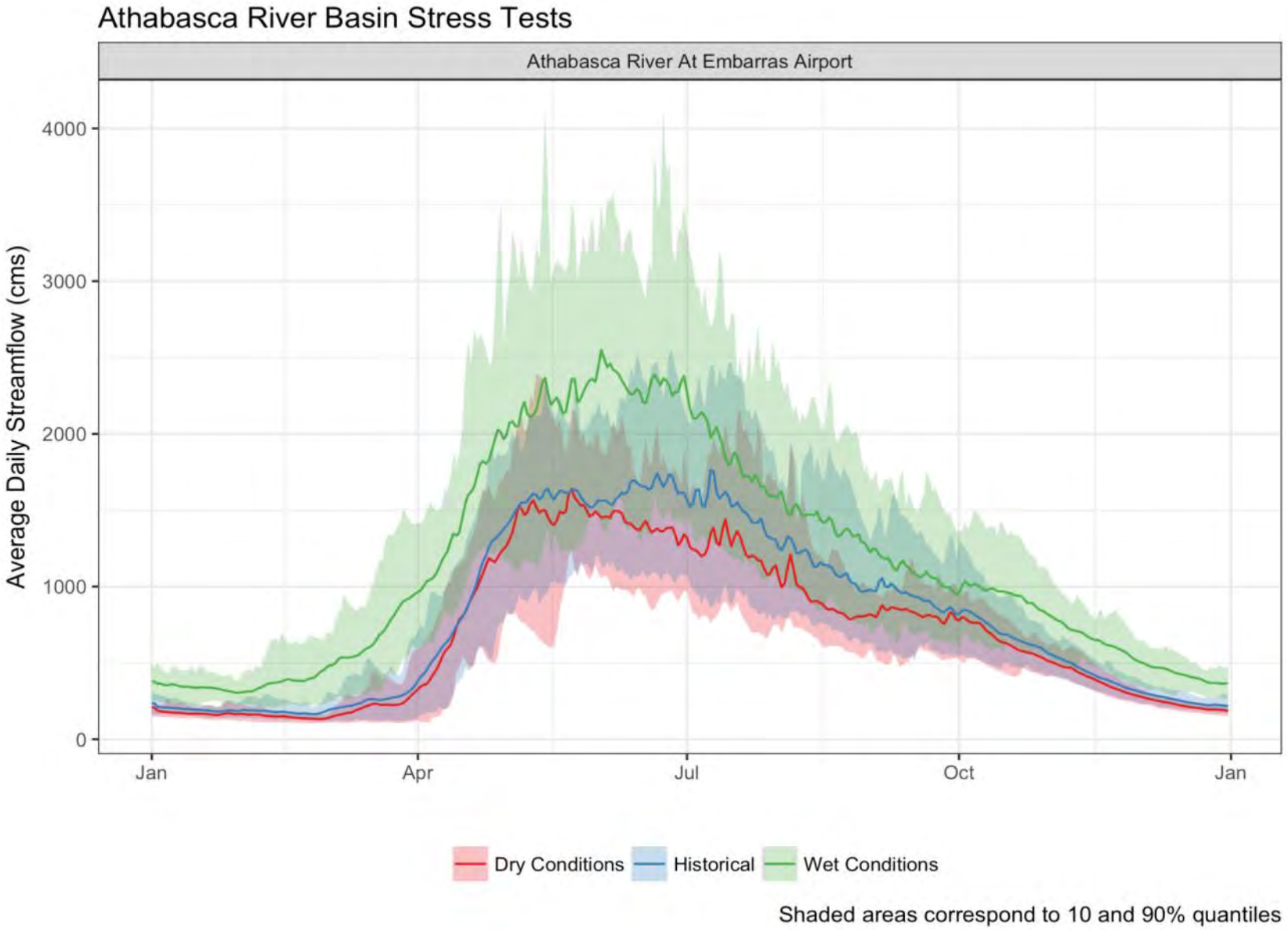
Burned forest in red

Stress test: dry condition

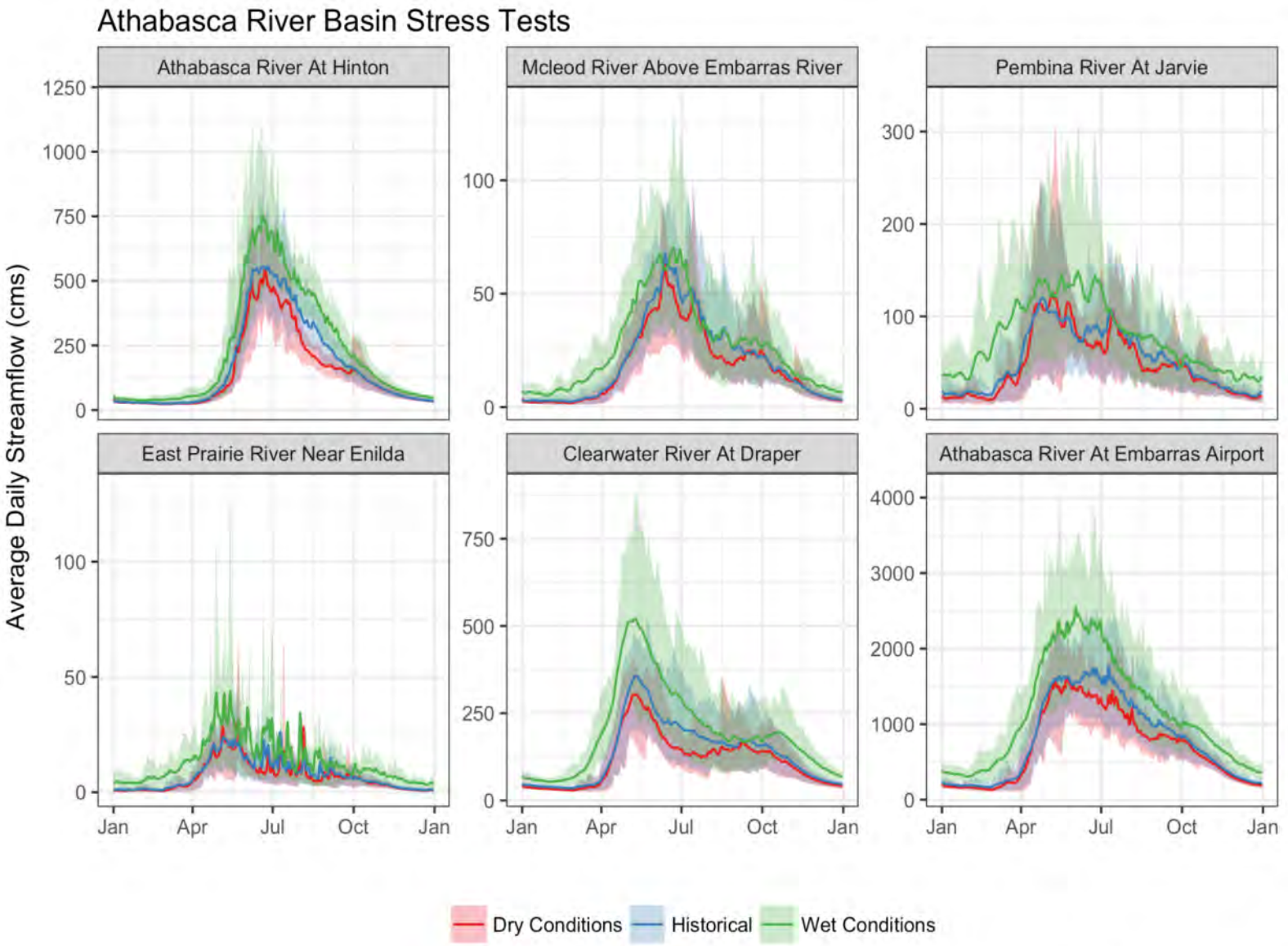


- **Reduction in Wetlands**
  - 15% disturbed by 2060
  - 458 km^2 disturbed in Lac La Biche region
- **High glacier retreat**
  - CanESM rcp 8.5 2040 - 2070(future climate projections from climate models)
- **More drought years**
  - Low flow years replacing average or high years from 1986 – 1999
- **Water Demands: Double demands**
  - Demands include – industrial, agricultural, TDLs

Stress tests change conditions in the basin: streamflow



Stress tests change streamflow at different locations



Stress tests: summary

Historic
- Land use as of 2015
- Glacial coverage from 2015
- Observed climate from 1986 – 2015
- Current day usage as of 2015

Dry condition
- Reduction in wetlands
- High glacier retreat
- More drought years
- Doubled water demands

Wet condition
- Large forest fire in headwaters
- Modest glacier retreat
- Wetter and warmer climate scenario
- Doubled water demands

Performance measures (PMs)

Performance Measure	Challenge	Interpretation
Annual instream flow needs violations	*Maintain or improve ecosystem health*	Number of violations over 30 yr period (negative = less water
Number of days meeting Aboriginal Extreme Flow	*Ensure sufficient flow for navigation*	Number of days, out of 196 AXF met (positive = more often met)
Number of days over 1:100 flood thresholds	*Limit damage from floods*	Number of days over flood threshold (positive = more flood risk)
Seasonal streamflow as a percentage of naturalized streamflow	*Minimise the effect of development footprint on basin hydrology*	Percent change in seasonal flow (positive = more water)
Seasonal system shortages	*Provide water supply certainty for municipalities and development*	Annual average cms of shortage (positive = more shortage)
Walleye recruitment reduction	*Maintain or improve ecosystem health*	Percent change (positive = higher reduction in fish)

PMs – summary table

Period & Location	_Hist_ExistingInfrastructure	_Wet_ExistingInfrastructure	_Dry_ExistingInfrastructure
Number of days meeting Aboriginal Extreme Flow. *Challenge: Ensure sufficient flow for navigation*			
Annual - below Firebag confluence	-4.0 Days	0.0 Days	-9.0 Days
Number of days over 1:100 flood thresholds. *Challenge: Limit damage from floods*			
Annual - Ath. Riv. at Athabasca	0.0 Days	0.0 Days	0.0 Days
Annual - McLeod River	0.0 Days	0.0 Days	0.0 Days
Annual - Ath. upstr. of Whitecourt	0.0 Days	0.0 Days	0.0 Days
Annual - Ath. Riv. at Hinton	0.0 Days	0.0 Days	0.0 Days
Annual - Lr. Slave Riv.	137.0 Days	502.0 Days	2.0 Days
Annual - Pembina Riv. at Sangudo	0.0 Days	0.0 Days	0.0 Days
Annual - Ft. McMurray	0.0 Days	-8.0 Days	0.0 Days
Annual instream flow needs violations. *Challenge: Maintain or improve ecosystem health*			
Annual - Mouth of the Lac La Biche river	0.0 Days	0.0 Days	0.0 Days
Annual - Mouth of the McLeod	0.0 Days	0.0 Days	0.0 Days
Annual - Mouth of the Clearwater	0.0 Days	0.0 Days	0.0 Days
Annual - Mouth of the Lesser Slave river	3327.0 Days	1315.0 Days	-606.0 Days
Annual - Mouth of the Pembina	30.0 Days	3.0 Days	55.0 Days
Walleye recruitment reduction. *Challenge: Maintain or improve ecosystem health*			
Annual - below Ft. McMurray	0.0 %	0.0 %	0.0 %
Seasonal streamflow as a percentage of naturalized streamflow. *Challenge: Minimise the effect of development footprint on basin hydrology*			
Summer - At the Delta	0.06 %	0.03 %	-0.74 %
Spring - At the Delta	-0.14 %	-0.18 %	-1.02 %
Fall - At the Delta	-0.23 %	-0.16 %	-0.68 %
Winter - At the Delta	-0.4 %	-0.62 %	0.08 %
Seasonal system shortages (cms). *Challenge: Provide water supply certainty for municipalities and development*			
Spring - whole system	-0.01 cms	-0.0 cms	-0.8 cms
Winter - whole system	0.0 cms	-0.02 cms	-2.93 cms
Fall - whole system	0.0 cms	0.0 cms	0.0 cms
Summer - whole system	0.0 cms	0.0 cms	0.0 cms

PMs – summary table

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Seasonal system shortages (cms). *Challenge: Provide water supply certainty for municipalities and development*
Fall - whole system
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Spring - whole system
Summer - whole system
Annual instream flow needs violations. *Challenge: Provide water supply certainty* *Maintain or improve ecosystem health* *Minimise the effect of development footprint on basin hydrology*
Annual - Mouth of the Lesser Slave river
Annual - Mouth of the Clearwater
Annual - Mouth of the McLeod
Annual - Mouth of the Lac La Biche river
Annual - Mouth of the Pembina
Seasonal streamflow as a percentage of naturalized streamflow. *Challenge: Provide water supply certainty* *Maintain or improve ecosystem health* *Minimise the effect of development footprint on basin hydrology* *Maintaining or improving the health of PAD*
Fall - At the Delta
Summer - At the Delta
Spring - At the Delta
Winter - At the Delta

PMs – summary table

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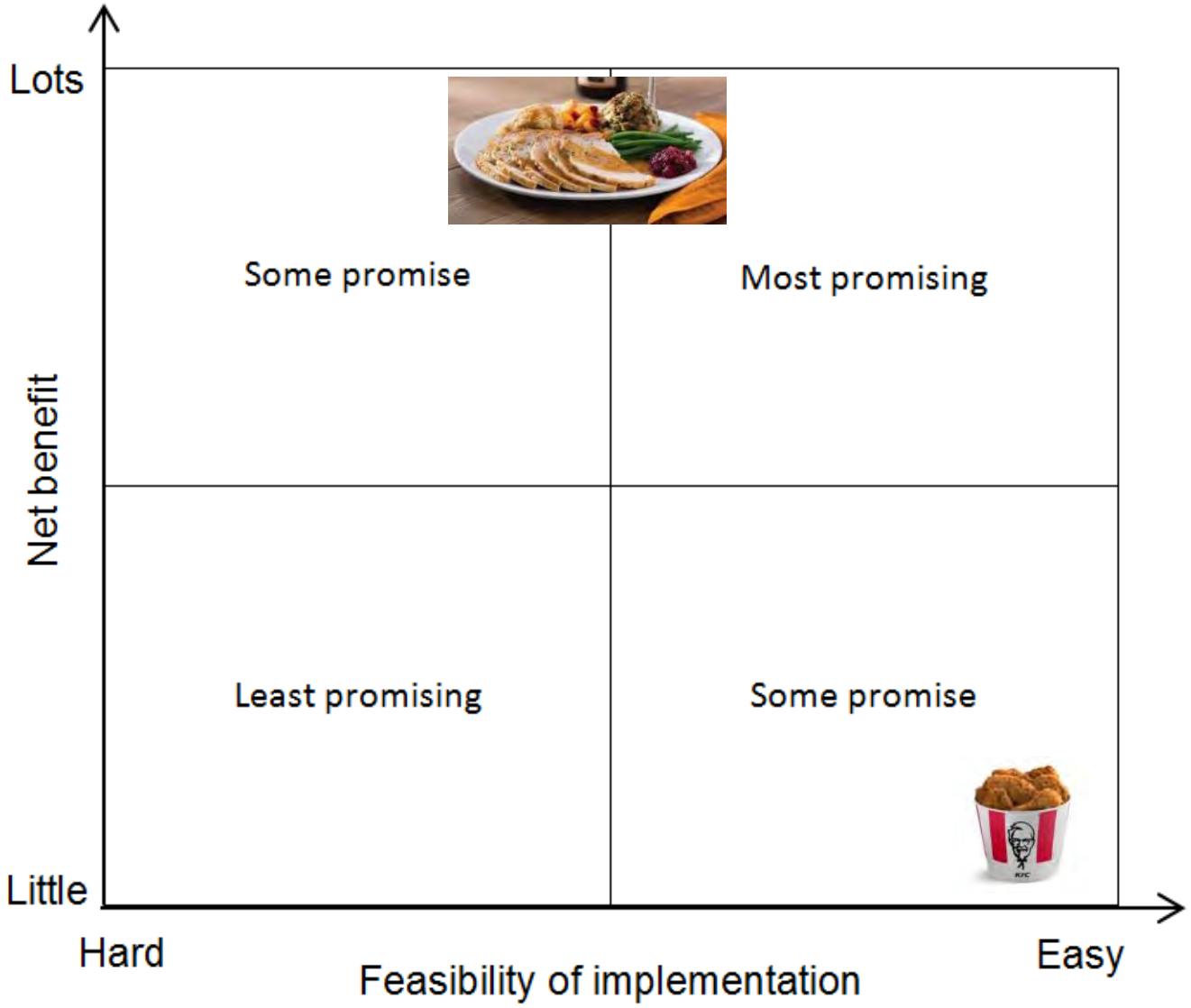
Matrix – most promising, some promise, least promising



Today's discussion

9:00	Welcome, introductions, and opening remarks	Mike
9:25	Regional Planning Update	Scott Duguid
9:35	Reminder: strategies and stress tests- how they will be used in today's meeting	Claire
10:00	**Breakout groups: review, assess and sort strategies at each table**	**All**
11:30	Sharing Sessions update: key messages that we heard and information to help our thinking on today's discussions	Denise/Mike
11:50	Lunch	-
12:40	Breakout groups: review, assess and sort strategies at each table	All
1:55	Breakout groups: review, assess and sort strategies at each table	All
	Informal break during sessions with refreshments	
3:10	Breakout groups: Revisit and confirm group sorting of strategies using the strategies matrix	All
3:40	Next steps, and close	Mike

Breakout Groups

Pick a table to start. Each participant will visit each table and review and assess all strategies over the course of the day.

Systematically review and assess current list of strategies taking ~20 minutes per strategy.

Discussion focus for each strategy:

- Review how the strategy is modelled (basecase and the stress tests)
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- Sort the strategy using the strategies matrix into most promising/some promise/least promising
    - Provide 1-2 points of rational for sorting

Table 1: Mike and Danielle

Table 2: Denise and Ryan

Table 3: Claire and Matt

Notes will be captured on the flip charts today and there will be no read outs

Strategies at each table

Table 1 Danielle and Mike

- Explore new on stream multi-purpose storage options (four options)
- Explore new off stream multi-purpose storage options
- Explore minimum flows for navigation purposes

Table 2 Ryan and Denise

- Explore altering existing water storage infrastructure for multi-purpose storage options
- Explore setting precautionary water withdrawal limits using the Alberta Desktop method for IFNs
- Water conservation, and water efficiency improvements
- Explore treat and release practices and policies to look at impacts on flows

Table 3 Matt and Claire

- Identify areas for conservation and restoration
- Support BMPs within the forestry sector
- Support a wetland policy and implementation approach to all together avoid wetland loss in the system
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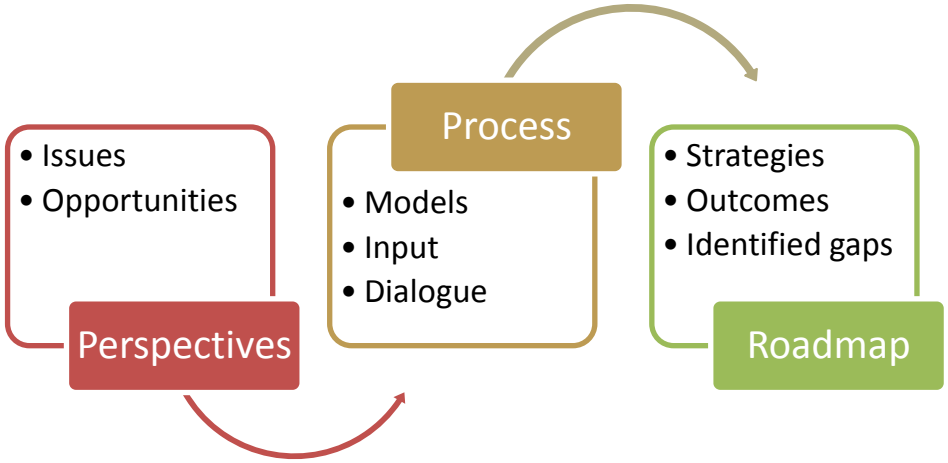
Sharing sessions: summer 2017

Context

- In-community meetings at the outset of the ARB Initiative
- Sharing sessions build on past and WG conversations
- Communities visited during summer 2017, as invited:
  - Fort McMurray First Nation #468
  - Wood Buffalo Métis (Conklin)
  - Fort Chipewyan Métis Local



Sharing sessions: purpose

- Create dialogue to share perspectives on water challenges and concerns
- Supplement information gathered on water-related issues
- Increase ability to formulate strategies that align with working group and reflect community-scale interests
- Identify gaps for Roadmap outcomes and recommendations, and inform future and potential water and watershed planning approaches

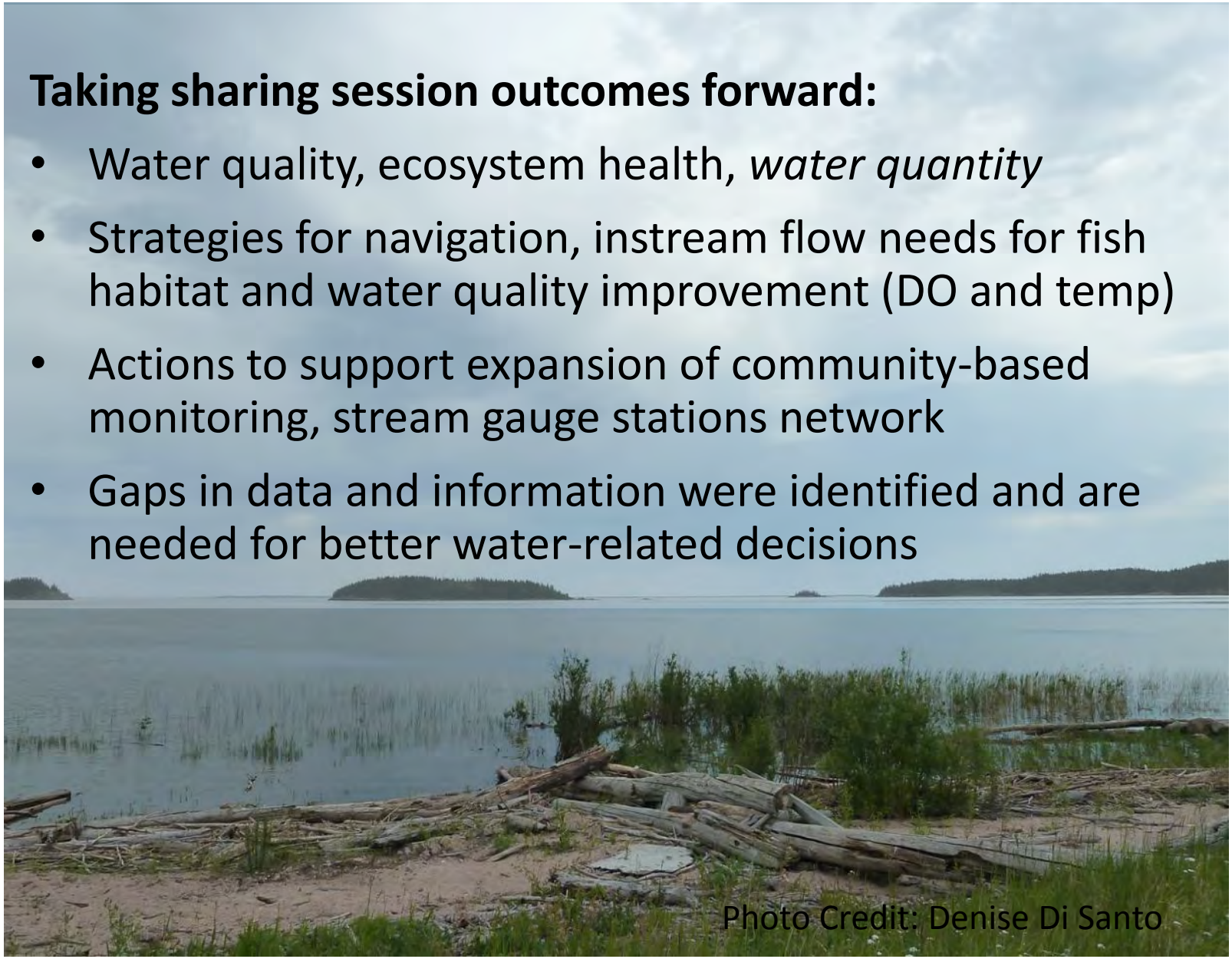
Sharing sessions: what we heard and learned

- Our observations suggest that greatest concerns are water quality, ecosystem health, water quantity
- Gaps in information regarding
  - changes in water and land environment
  - changes in lake levels
  - fishery and wildlife health
- Some community-based monitoring currently in place
  - in partnership with private companies (e.g., consulting firms and oil and gas companies)
  - creates more trust in data and information sharing

Sharing sessions: concerns

- Navigation and transportation disruption
  - adequate water levels for water course transportation
  - winter road disruption (flooded/melted) due to released reservoir water –and potentially under warmer, wetter conditions
- Access to clean drinking water (quality and supply)
  - external source water supply transported into communities
  - lack of trust in water supply for consumption
- Fishing and trapping losses
  - species loss or absence of insects, birds, fish
  - commercial fishery closure
  - game organ meats unsafe for consumption
- Community health
  - e.g., rare bile duct cancer amongst community members perceived to be linked to water

Sharing sessions: informing strategies



Taking sharing session outcomes forward:

- Water quality, ecosystem health, *water quantity*
- Strategies for navigation, instream flow needs for fish habitat and water quality improvement (DO and temp)
- Actions to support expansion of community-based monitoring, stream gauge stations network
- Gaps in data and information were identified and are needed for better water-related decisions

Photo Credit: Denise Di Santo

Fort Chipewyan on Lake Athabasca

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Breakout Groups

Please move to one of the other tables you were not at this morning. Each participant will visit each table and review and assess all strategies over the course of the day.

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Breakout Groups

Facilitated activity to sort strategies based on the work done by all tables over the course of the day

- Divide up equally into 3 tables
- Each table has the same set of index cards with each strategy written on a separate card.
- Take 15 minutes using what you have heard during the day to sort the cards on the table into three piles: most promising, least promising, unsure
- Write a note on the card as to why a strategy was considered most promising, least promising, unsure
- Write any additional questions you have for each strategy
- Stick the cards up on your flip chart matrix charts (most/some/least)

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Mike will do a plenary readout to highlight what each group came up with

Today's discussion

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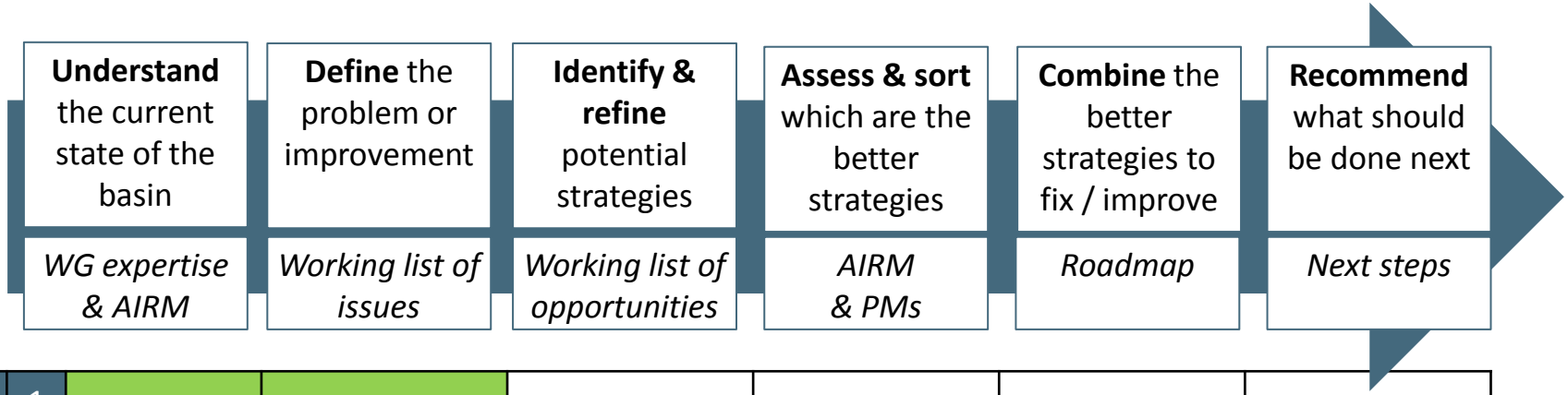
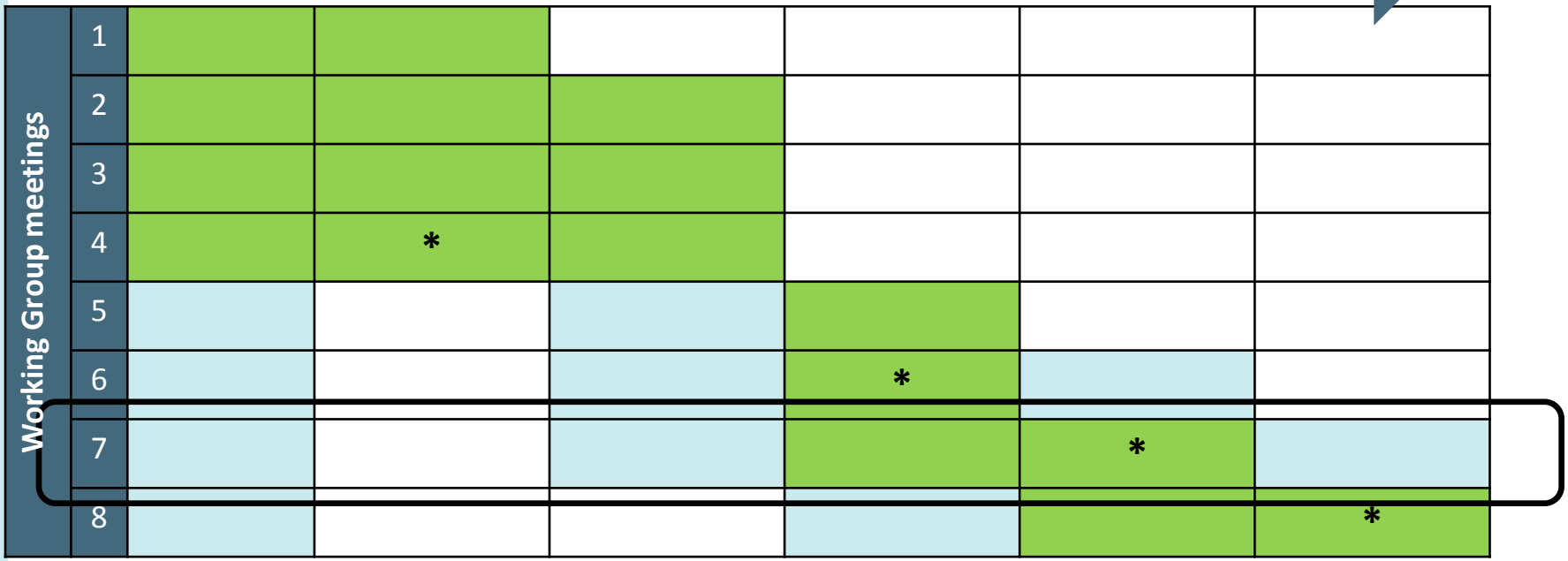
3:40	**Next steps, and close**	**Mike**

Collaborative process to develop the ARB Roadmap





Final Reminders

- WaterSMART will draft meeting summary and distribute to Working Group members for review. Meeting materials are also posted on the ARB Initiative website.
- **Next meeting (#7): November 29th – Edmonton**
  - Confirm most promising strategies
  - Combine the most promising strategies to build the Roadmap
  - Begin the discussions of recommendations
- **Meeting (#8): Proposed date for Final meeting is Feb 28th 2018- any potential conflicts?**
  - Please contact us if you have any thoughts, questions, comments!

Thank you for all your support and participation

Thank you

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For more information:

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Reference slides