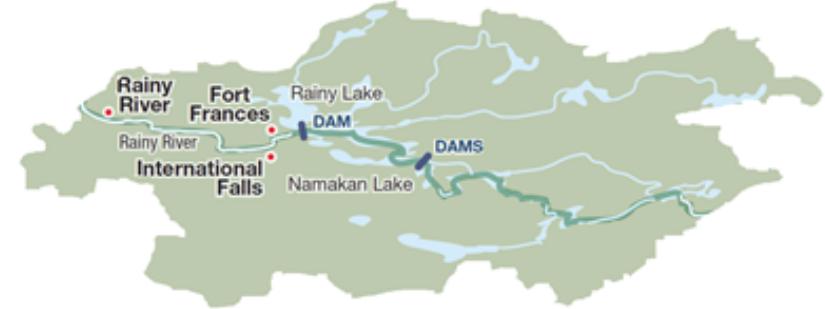




International Rainy and Namakan Lakes Rule Curves Study Board

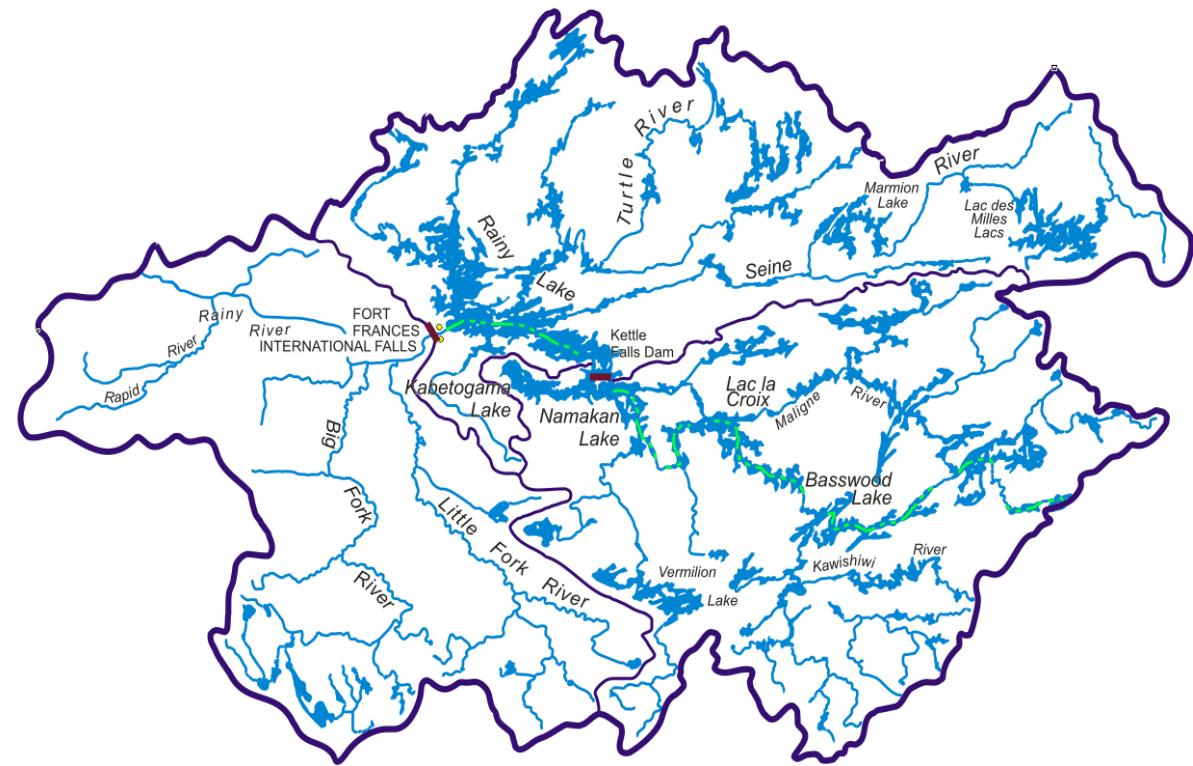


Public Meeting 8 March 2016



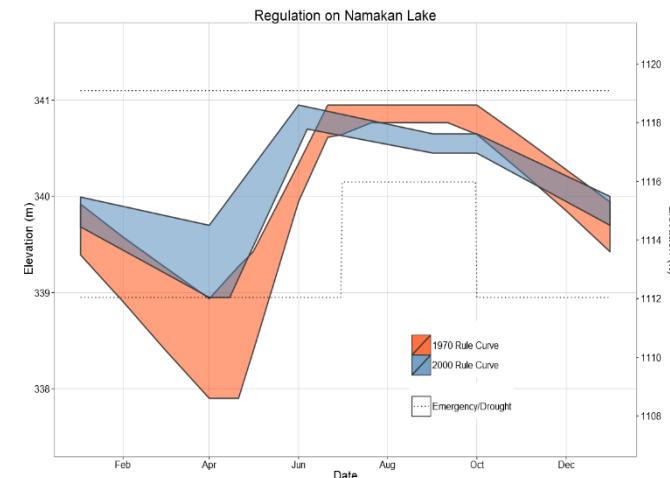
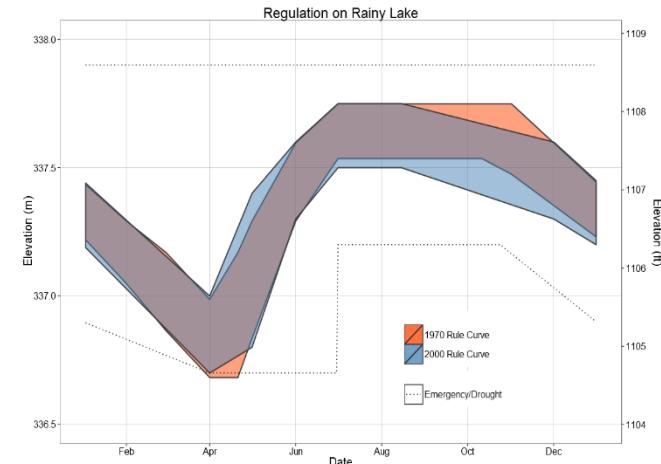
Outline

- IJC Review of 2000 Rule Curves and Timeline
- Rule Curve Review and Governance
- Approach for Review and Studies to Date
- Weight of Evidence and Shared Vision Model Approaches
- Key Elements of Strategy
- Schedule and Deliverables
- Public Comment Period
- March 2016 Meetings

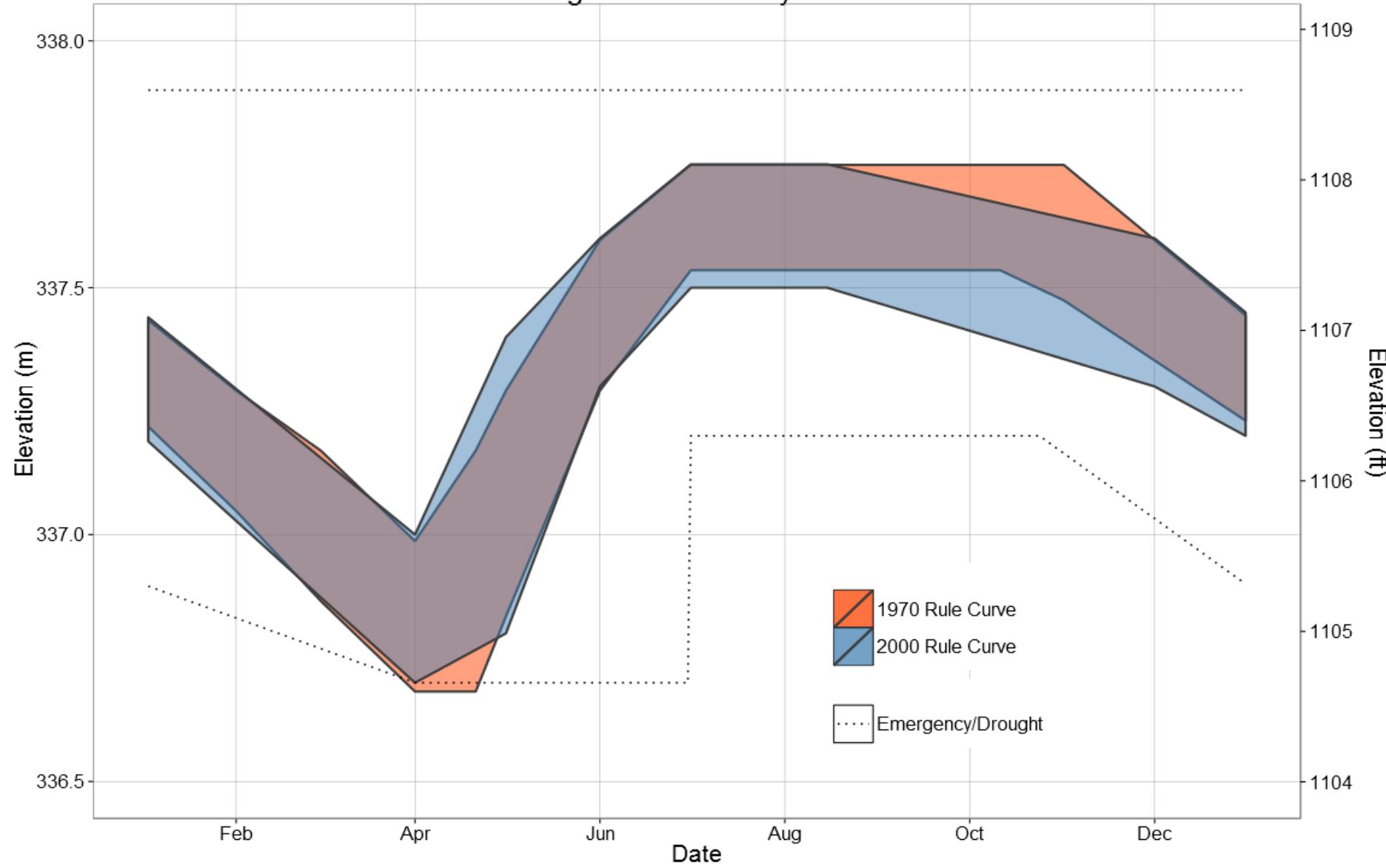


1970 and 2000 Rainy and Namakan Lake Rule Curves

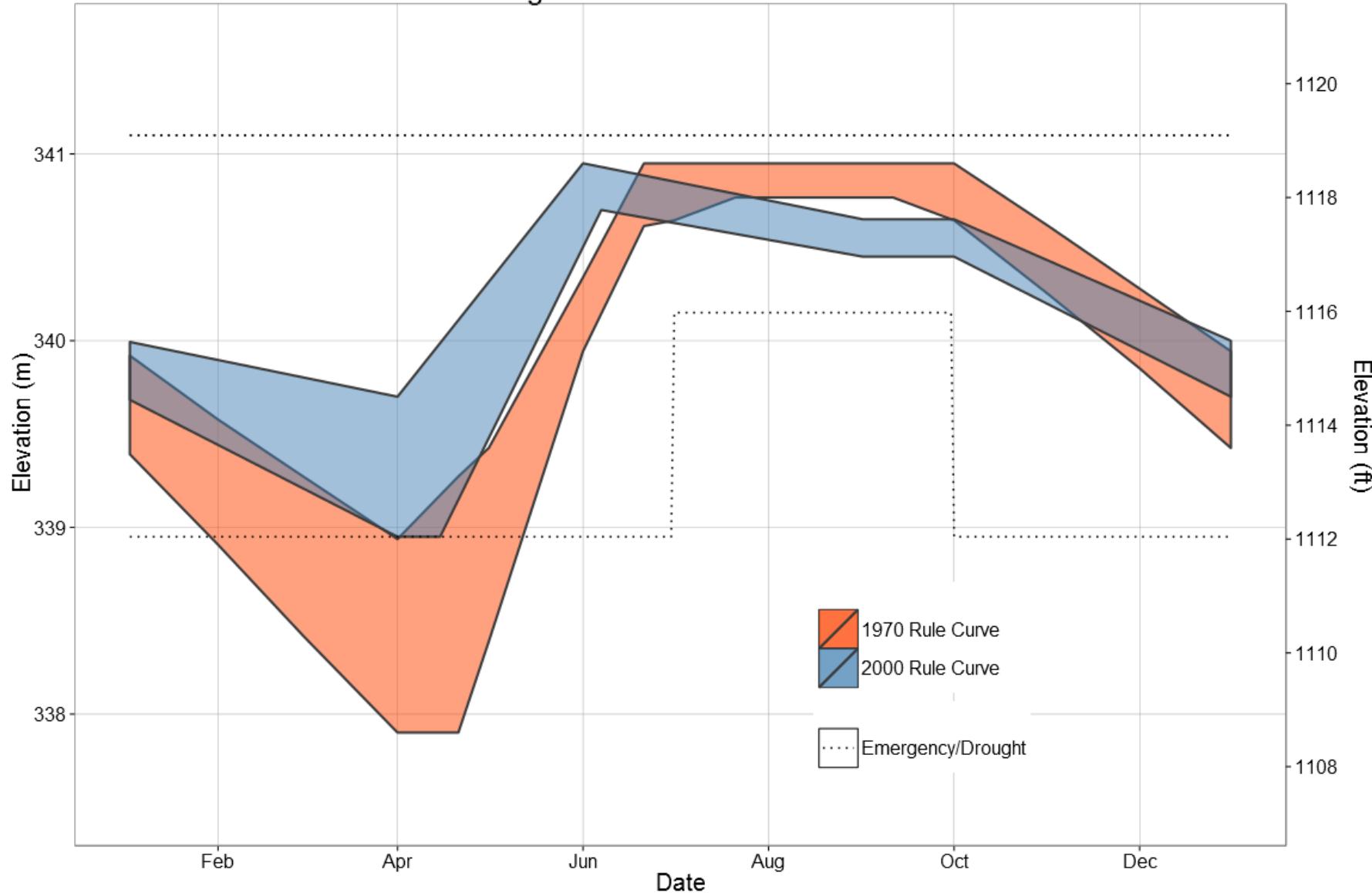
- **A Rule Curve:** limits or guidelines (rules) on how water levels should be maintained in a lake or reservoir throughout a year.
- **1949 Order** directed the Companies, insofar as possible, to keep the level of Rainy and Namakan lakes precisely on a single rule curve (which varied seasonally) defined for each lake.
- **1957 Supplementary Order** made no change in Rainy Lake rule curve but defined both an upper and lower rule curve for most of the year on Namakan Lake with the level to be maintained between these limits at the discretion of the Companies and a single rule curve remaining only for the summer months.
- **1970 Supplementary Order** defined an upper and lower rule curve for both lakes, with operation between these curves at the discretion of the Companies, and prescribed minimum outflows from the lakes.
- **2000 Supplementary Order** revised the 1970 upper and lower rule curves for both lakes, required that the Companies target the middle portion of the rule curve band subject to other direction from the International Rainy Lake Board of Control, and revised the prescribed minimum outflows. The Order also stipulated a review in 15 years (2015).



Regulation on Rainy Lake



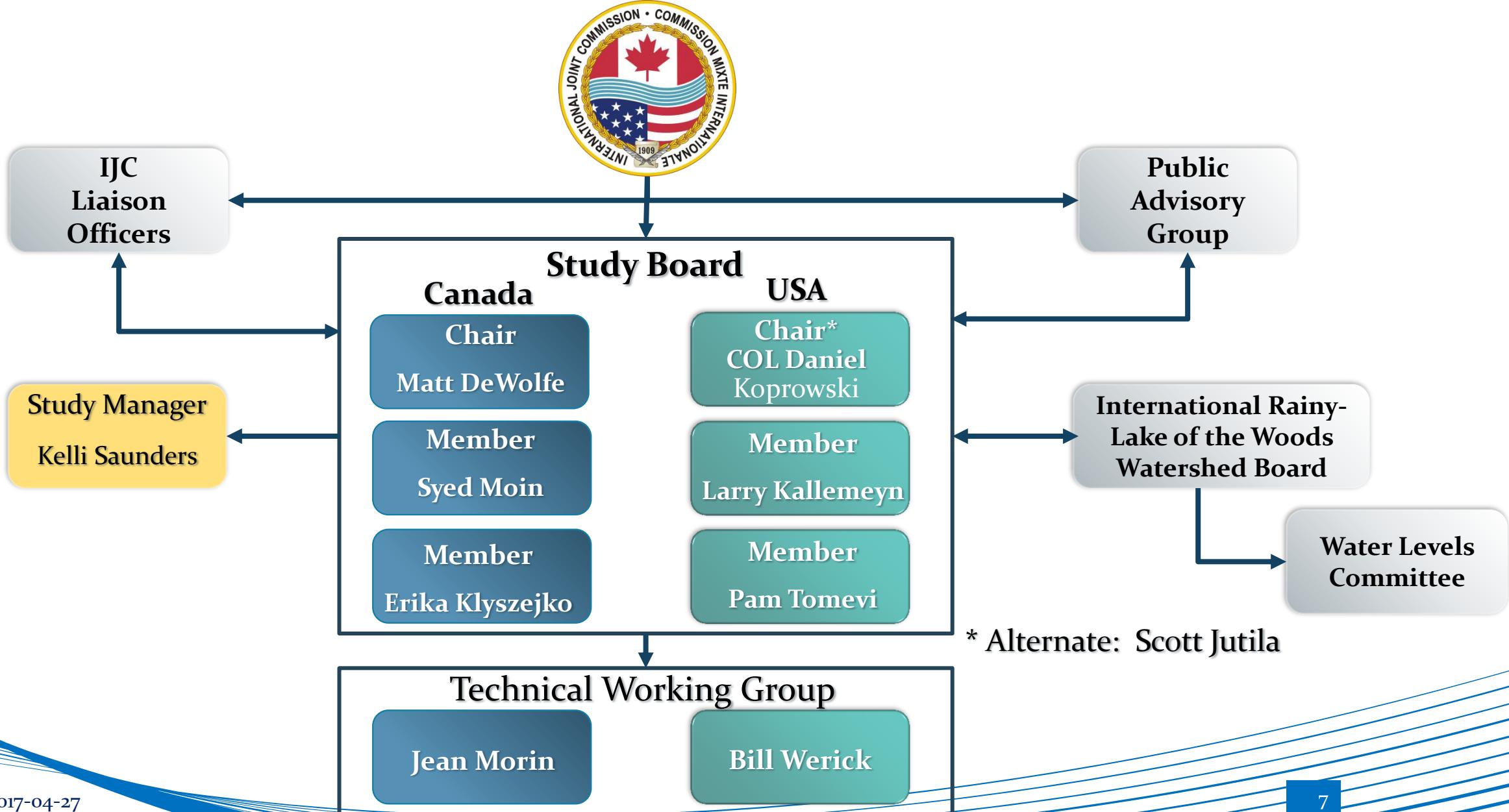
Regulation on Namakan Lake



IJC Review of 2000 Rule Curves

- Studies supporting the scheduled rule curve review began in 2010 (based on government funding procured in 2009 for this purpose)
- Studies looked at a wide range of potential impacts to the watershed due to the rule curve (flooding damage, wildlife habitat, cultural resources, fish spawning, etc.)
- Review of effects of 2000 Rule Curves begins now – your input is key throughout the process
- Will consider the information collected through the previous studies
- Study Board to deliver a comprehensive set of study results to the IJC so that they may make an informed decision
- Ultimately, the IJC will decide whether to maintain the 2000 Rule Curves or alter the rules governing dam operation once again

Rule Curve Review Governance



Key Elements of Study Strategy

1. Supporting Studies
2. Weight of Evidence Analysis
3. Shared Vision Planning
4. Integrated Environmental Response Model
5. Shared Vision Model
6. Regulation and Water Supply Alternatives
7. Decision Workshops
8. Peaking and Ponding

Supporting Studies

“The objective of this rule curve evaluation study is to provide to the IJC with scientifically supported recommendations for the modification or retention of the 2000 Rainy and Namakan Lakes Rule curves.”

- **2009 Plan of Study** – addressed gaps in knowledge on particular ‘risk factors’: hydraulics, environmental, cultural
 - 21 Studies funded. Final reports on website, several nearing end
- **International Watersheds Initiative (IWI)**-funded studies
 - 4 studies
- Non-IJC studies
 - 14 studies, many by USGS/ NPS/ Universities
- **Total to Date: 39 Studies**

Categories of Supporting Studies

Categories of Study:

- Fish spawning and habitat
- Hydraulics and hydrology
- Bird, herpetile and mammal habitat and breeding
- Macroinvertebrates and Mussels
- Flooding and Ice damage
- Tourist resorts
- Cultural Resources
- Water Quality, temperature

Weight of Evidence Approach

- Original approach considered for Rule Curve Review
- Matrix of results from all studies gives an overall view of the changes since 2000.
- **Benefit:**
 - Relies on actual data from studies
- **Drawbacks:**
 - Not all studies consider pre- and post-2000
 - Not all studies separate out hydrology
 - Does not allow consideration of other options

Weight of Evidence Approach Example

Weight of Evidence Study Issue	Namakan Reservoir			Rainy Lake			Rainy River		
	Better	Neutral	Worse	Better	Neutral	Worse	Better	Neutral	Worse
1. Fish									
Northern Pike Population	●				●				
Walleye Population		●				●			
Lake Sturgeon Population		●				●			
Walleye Spawning	●			●					
Whitefish Population		●			●				
Mercury Availability		●			●				
2. Wildlife									●
Beaver Population									●
Common Loon Population									●
3. Economy									●
Power Production									●
Flooding and Ice Damage		●		●		●			
Resort Industry	●					●			
4. Cultural Resources									●
Condition of Resources			●			●			●
5. Vegetation									
Cattail Invasion		●				●			
Wetland Monitoring	●					●			
6. Invertebrates									
Invertebrate Community	●			●				●	
Mussels							●	●	
7. Water Quality									
Trophic State			●	●					
Municipal & Fish Hatchery Water Use							●		

EXAMPLE ONLY

Shared Vision Planning

- Approach added by IJC in Directive to expand on WOE
- Allows consideration of 1970, 2000 Rule Curves in comparison to other alternatives for a range of basin water supply conditions
- Relies on many of the same studies as WOE, but not limited to historic data
- Is the basis for a comprehensive, participatory and transparent evaluation process

Integrated Environmental Response Model

- Able to model the spatially distributed physical variables of the system (e.g., water levels and waves for main lakes, flows in the Rainy River, currents, water level, depth, etc.)
- Able to simulate over period of years at a quarter-month timestep under various rule curve alternatives and water supplies
- Models the response of a number of ecological variables to these hydraulic conditions to build habitat models.
- Allows for a ranking of rule curves in terms of their impacts on the different components of the ecosystem.

Shared Vision Model

- Designed to:
 - Interpret results from the IERM
 - Integrate results from other studies
 - Develop evaluation metrics that can be used to compare rule curve alternatives
- Each Model Simulation will:
 - Produce water levels and flows for specific water supply and rule curve alternative
 - Automatically interpret water levels and flows against a set of pre-defined **Performance Indicators** and **Hydrologic Metrics**

Shared Vision Model

- **Performance Indicators and Hydrologic Metrics**
 - Pre-defined, based on studies, IERM output
 - Represent a quantitative, science-based understanding of the study and model subjects
 - Will form the basis for comparison of different rule curve alternatives under the SVP approach.
 - The Study Board and TWG will examine the results of all supporting studies for possible PIs that are amenable to being integrated into the SVM or the IERM, including those used in the WOE analysis.
 - In cases where there are no existing studies to support the development of needed PIs, the Study Board will attempt to develop the required information.

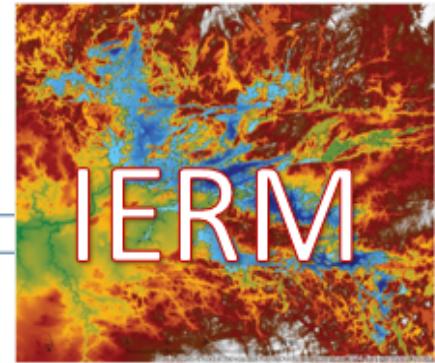
Regulation and Water Supply Alternatives

- SVM will allow for choice of Regulation Alternative and Water Supply set for each model run.
- Regulation Alternatives:
 - 1970 RC, 2000 RC
 - State of Nature
 - At least 3 other alternatives
- Water Supply Alternatives:
 - Historic, simulated current, possible future climate

Weight of evidence results

	Wabanee Reservoir	Rainy Lake	Rainy River
B. Fish	Wetter, heavier flows	Wetter, heavier flows	Wetter, heavier flows
Northern Pike Population			
Walleye Population			
Lake Sturgeon Population			
Whitefish Population			
Minnow Population			
Whitefish Quality			
C. Wildlife			
Bear Population			
Common Loon Reproductive Success			
D. Economic Impacts			
Power Production			
Shipping and Ice Damage			
Resort			
E. Cultural Resources			
Canoe Resources			
F. Vegetation			
Capital Investment			
Wetland Monitoring			
G. Human Health			
Indigenous Community			
Health			
H. Water Quality			
Trophic State			
I. Unique & High Priority Water Use			

Performance Indicator Algorithms



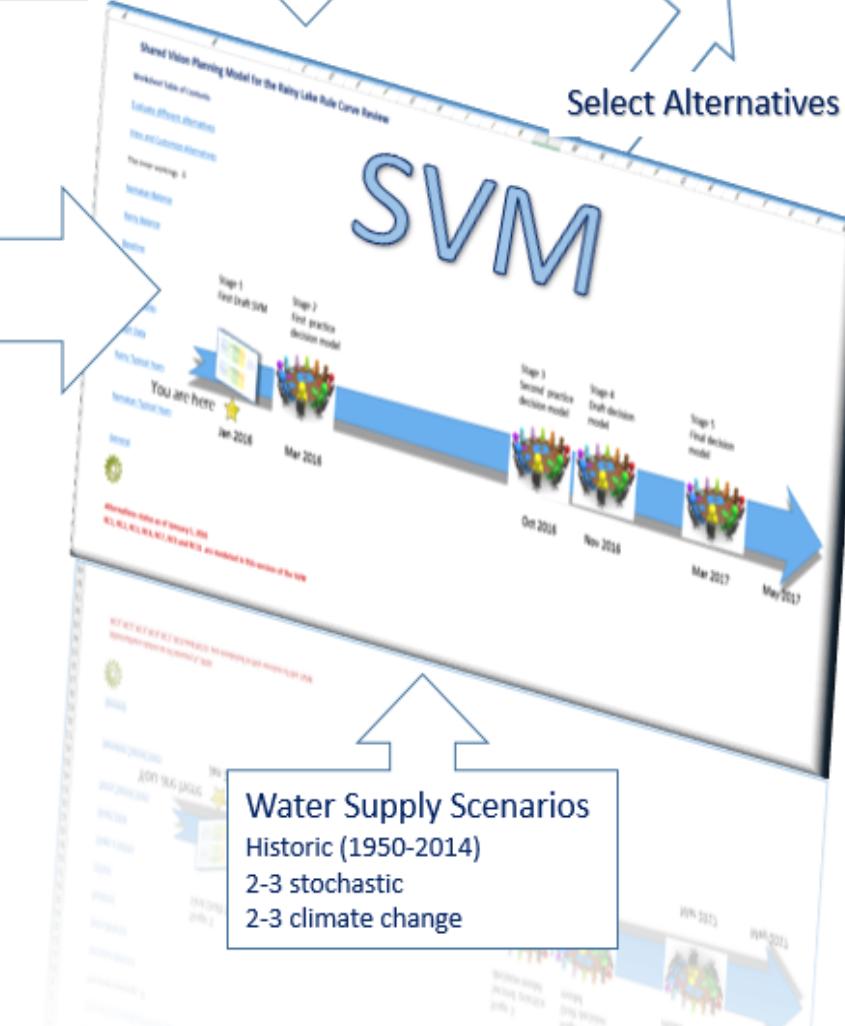
2D Performance indicators

Select Alternatives

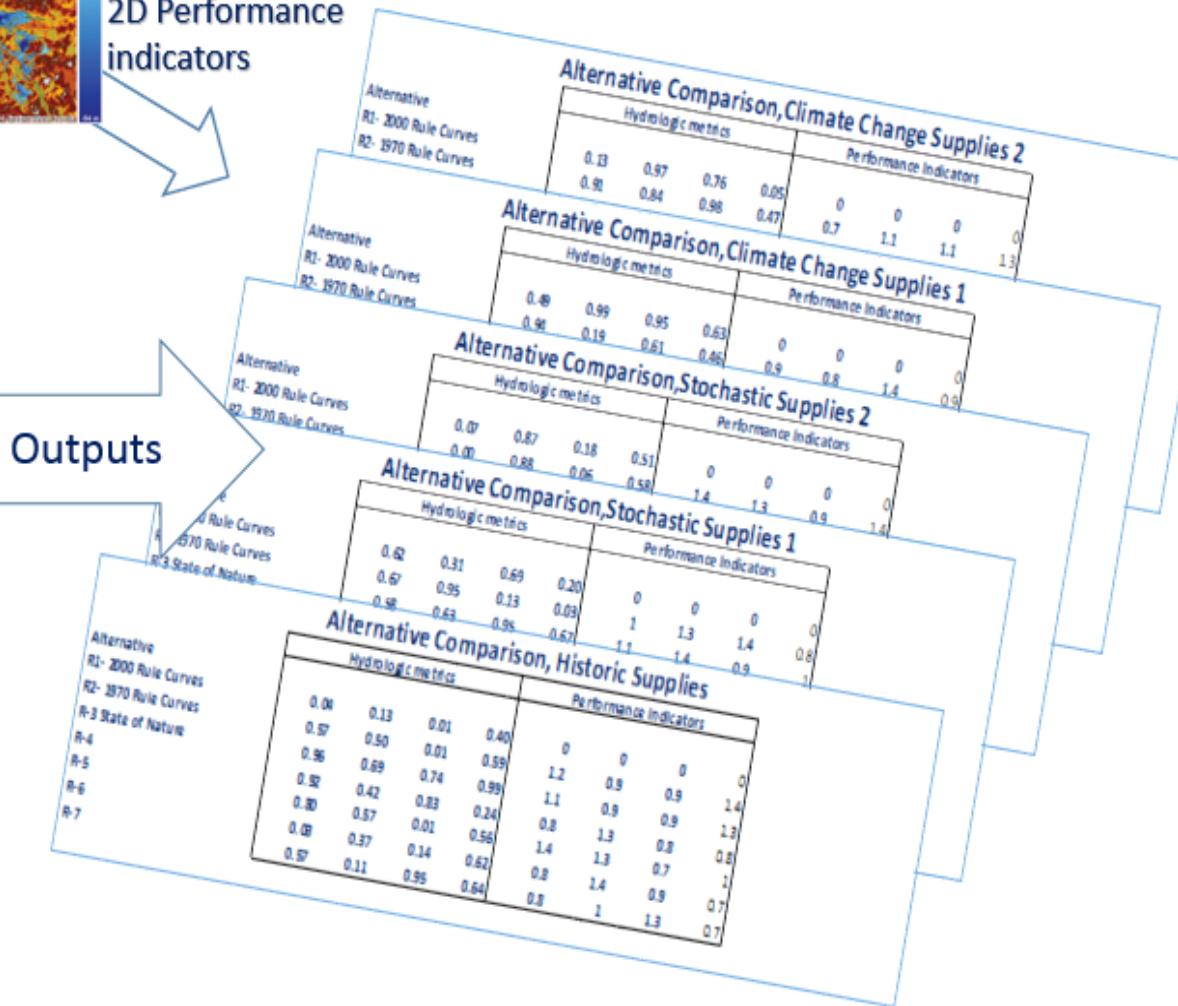
SVM

Outputs

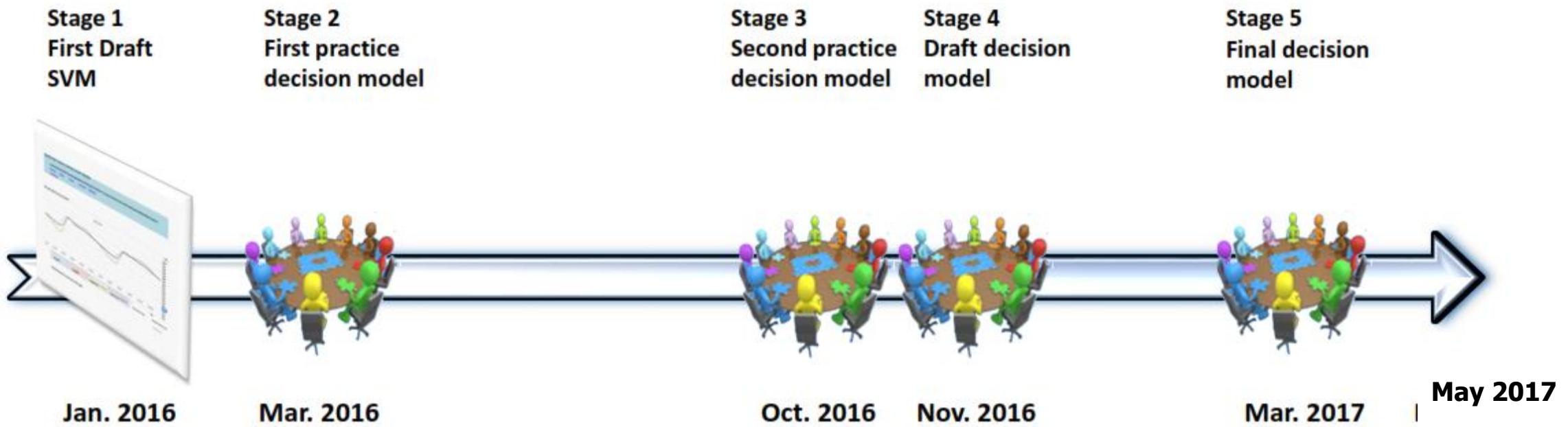
Regulation
Alternatives
Scenarios
2000 Rule Curves
1970 Rule Curves
State of Nature
3 other alternatives



Study Board will rank alternatives in practice, draft and final decisions



Decision Workshops



Peaking and Ponding

- Intra-day fluctuations in outflow from powerhouses in Fort Frances/I. Falls to maximize value of energy generated
- Generally not a concern for Rainy Lake levels, but may have impact on ecological and property interests along lower Rainy River
- Sub-committee examining

Study Milestones

- **February, 2016** – Start of Public Comment Period for Draft Study Strategy
- **March 2016** – International Rainy-Lake of the Woods Watershed Forum – Study Board public information meetings, Practice Decision Workshop
- **Summer 2016** – Public Meetings throughout basin
- **Late 2016** – Further Practice Decision Workshops, updates
- **March 21, 2017** – Draft report submitted to the IJC
- **May 31, 2017** – Final draft report submitted to the IJC; Public hearings to be held as required

Study Strategy Public Comment Period

- Draft Strategy was publically released by IJC, available on website
- Will be a public comment period, normally 30-days



March 2016 Meetings in International Falls

Tuesday March 8

- 1:00-2:00: RCPAG – Study Board meeting, R.R. Community College
- 2:00-4:30 Practice Decision Workshop:
 - Study Board, TWG, RCPAG, RAG, IRLWWB, also by webinar
 - Evening – IJC Public Open House, 6:30-8:00 pm

Wednesday March 9

Watershed Forum - Side meetings for Study Board with stakeholders

Thursday March 10

Watershed Forum – 1pm: Water Level Regulation Session,
Study Board Presentation

Public Engagement

- IJC outlines clear commitment to an open, inclusive and fair process in the Directive
- Study Board expects multiple opportunities for general public input and feedback during the review process
- IJC will appoint Rule Curve Public Advisory Group (RCPAG)

Rule Curve Public Advisory Group

Membership consisting of public, industry and stakeholder groups as well as First Nations, Métis and Tribes with the following roles:

- Review and provide comment on Study Board reports and products as requested;
- Advise the Study Board on the responsiveness of the study process to public concerns;
- Advise the Study Board on public consultation, involvement and information exchange; and
- Serve as a conduit for public input to the study process, and for public dissemination of study outcomes.

Interested individuals or organizations should contact the IJC to get involved.

Commission@ottawa.ijc.org or Commission@Washington.ijc.org

Further Information

<http://ijc.org/en/RNLRCSB>

Questions



Key Characteristics of Rainy River Watershed

