

# Water Use Planning

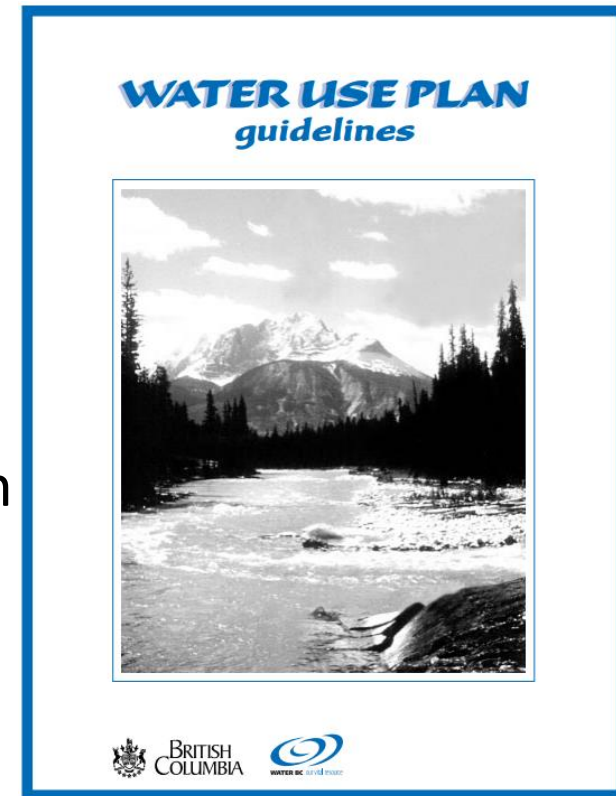


Prepared for the Columbia Basin Regional Advisory Committee  
February 17, 2016

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# Overview:

- Background of Water Use Planning
- What is Water Use Planning
- Current Water Use Plans
- Water Use Planning in the Columbia Region
- Duncan WUP
- Columbia WUP
- WUP Ordered Reviews





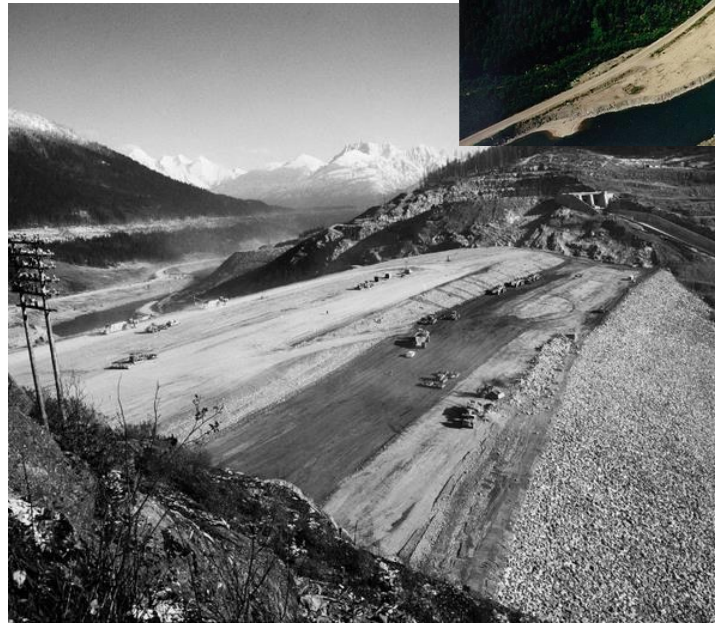
# Background of Water Use Planning:

## Why are WUPs Done:

- Genesis= litigation and NAFTA challenges
- Guideline triggers

## WUP Guidelines:

- Guideline development
- Goals
- Key Provincial priorities



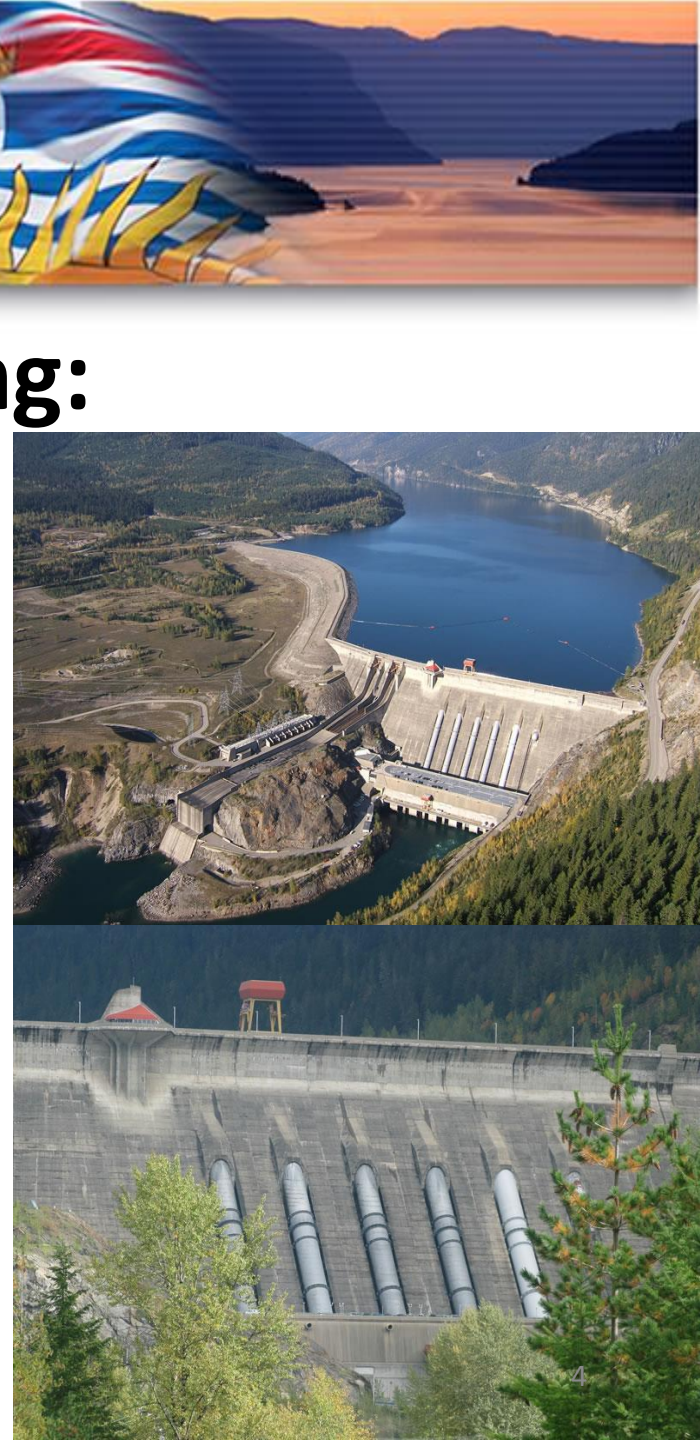
# What is Water Use Planning:

## What is a Water Use Plan

- Defined in WUP guidelines
- Technical document on incremental changes at water control facilities to achieve multiple objectives

## What isn't Water Use Planning

- Watershed management plans (land)
- Water management plans (WA)
- Water sustainability plans (WSA)





# Goal of Water Use Plans:

“ ..... to achieve consensus on a set of operating rules for each facility that satisfies the full range of water use interests at stake, while respecting legislative and other boundaries”

1998 WUP Guidelines



# Key Objectives for the Province

- Fish and aquatic habitat
- Flood management
- Power generation
- First Nations issues





# Benefits of Water Use Planning:

- Better balance among competing interests
- Greater certainty for the licensee and regulators
- Broader understanding by all participants
- Flexibility to meet future challenges
- New working relationships
- Social licence



# Current Water Use Plans:

- 23 WUPs have been developed and implemented for BC Hydro facilities.
- 1 WUP has been developed for Metro Vancouver (Capilano-Seymour) facilities and is awaiting implementation.



Jordan



Capilano



Revelstoke



# Process of developing a WUP:

Step 1- Initiate WUP process

Step 2- Scope water use issues and interests

Step 3- Determine the consultative process and initiate it

Step 4- Confirm issues and interests in terms of specific water use objectives

Step 5- Gather information on water flow impacts on each objective

Step 6- Create operating alternatives for regulating water use to meet different interests

Step 7- Assess trade-offs between operating alternatives

Step 8- Determine and document areas of consensus and disagreement

Step 9- Prepare draft WUP and submit it to Comptroller for review

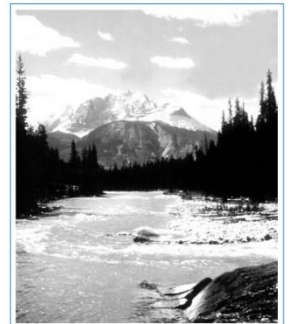
Step 10- Review draft plan and issue provincial decision

Step 11- Review authorized WUP and issue federal decision

Step 12- Monitor compliance with authorized WUP

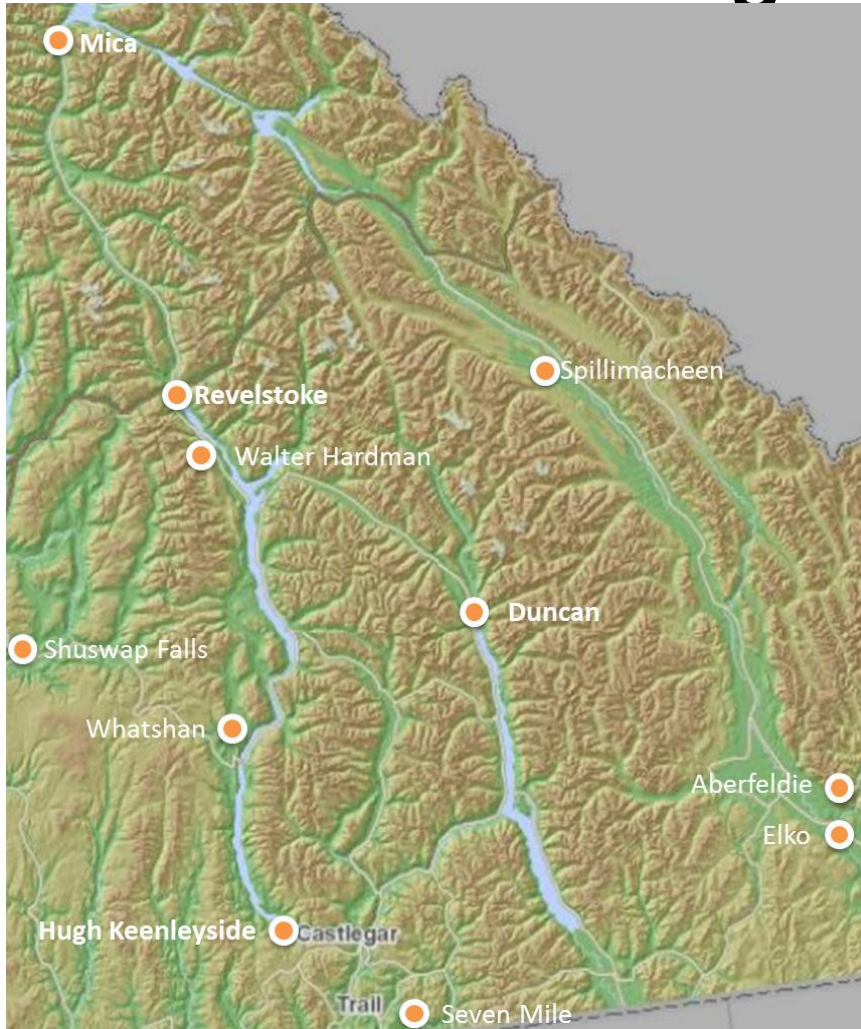
Step 13- Review plan on a periodic basis

## **WATER USE PLAN** guidelines





# Water Use Planning in the Columbia Region:



- **Columbia**  
(Mica, Revelstoke, Hugh Keenleyside)
- **Duncan**
- **Seven Mile**
- **Aberfeldie**
- **Spillimacheen**
- **Elko**
- **Shuswap Falls**
- **Whatshan**
- **Walter Hardman**





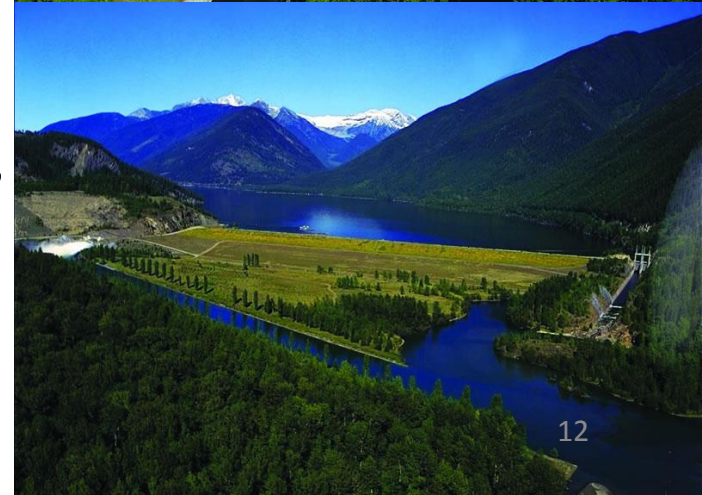
# Water Use Planning in the Columbia Region:

- Consultative committees formed
- WUPs focused on operations
- WUPs did not look at footprint
- Bounded by the Columbia River Treaty (CRT)



# Water Use Planning- Duncan Dam:

- 3 water licences
  - Storage Licence C027067 (treaty)
  - Diversion Licences C037633 & C126392
- No generation (storage only)
- Duncan Dam WUP signed Dec 21, 2007
- Consists of 10 clauses & 1 schedule
- BC Hydro developed and submitted Terms of Reference for:
  - 17 Monitoring Programs
  - 4 Works Projects








# Water Use Planning- Duncan Dam:

DDMMON-01	LOWER DUNCAN RIVER RAMPING RATE MONITORING	Monitoring	In Implementation
DDMMON-02	LOWER DUNCAN RIVER FISH HABITAT USE MONITORING	Monitoring	Project Completed
DDMMON-03	LOWER DUNCAN RIVER HYDRAULIC MODEL DEVELOPMENT	Monitoring	In Implementation
DDMMON-04	LOWER DUNCAN RIVER KOKANEE SPAWNING MONITORING	Monitoring	In Implementation
DDMMON-05	UPPER DUNCAN RIVER BULL TROUT MIGRATION MONITORING	Monitoring	In Implementation
DDMMON-06	LOWER DUNCAN RIVER BULL TROUT PASSAGE MONITORING	Monitoring	In Implementation
DDMMON-07	LOWER DUNCAN RIVER WATER QUALITY MONITORING	Monitoring	Project Completed
DDMMON-08	DUNCAN RIPARIAN MONITORING	Monitoring	In Implementation
DDMMON-09	LOWER DUNCAN RIVER MOSQUITO MONITORING AND MANAGEMENT PLAN DEVELOPMENT	Monitoring	In Implementation
DDMMON-10	DUNCAN RESERVOIR FISH HABITAT USE MONITORING	Monitoring	In Implementation
DDMMON-11	DUNCAN RESERVOIR BURBOT MONITORING	Monitoring	In Implementation
DDMMON-12	DUNCAN RESERVOIR ARCHEOLOGICAL OVERVIEW ASSESSMENT	Monitoring	Project Completed
DDMMON-13	DUNCAN RESERVOIR ARCHEOLOGICAL SITE EROSION MONITORING	Monitoring	Project Completed
DDMMON-14	DUNCAN WILDLIFE USE MONITORING	Monitoring	In Implementation
DDMMON-15	DUNCAN RESERVOIR RIVER STRANDING PROTOCOL DEVELOPMENT AND FINALIZATION	Monitoring	In Implementation
DDMMON-16	LOWER DUNCAN RIVER FISH STRANDING IMPACT MONITORING	Monitoring	In Implementation
DDMMON-17	DUNCAN RESERVOIR KOKANEE STOCK ASSESSMENT	Monitoring	In Implementation
DDMWORKS-01	LOWER DUNCAN RIVER ARGENTA SLOUGH EROSION PROTECTION	Physical Works	In Implementation
DDMWORKS-02	DUNCAN RESERVOIR GLACIER CREEK BOAT RAMP EXTENSION	Physical Works	Project Completed
DDMWORKS-03	PLAN TO ADDRESS NUTRIENT RETENTION CAUSED BY DUNCAN DAM OPERATIONS	Physical Works	In Implementation
DDMWORKS-04	ACTION PLAN TO MINIMIZE STRANDING OF KOKANEE SPAWNING IN LOWER DUNCAN RIVER SIDECHANNELS	Physical Works	In Implementation

# Water Use Planning- Duncan Dam:

- Monitoring & works programs:
  - 10 years to complete monitoring & works
  - All will be completed by 2018
- Annual report submitted annually by April (reporting period April 1- March 31)
- All annual reports and Terms of Reference on BC Hydro website
  - [https://www.bchydro.com/about/sustainability/conservation/water\\_use\\_planning/southern\\_interior/duncan\\_dam.html](https://www.bchydro.com/about/sustainability/conservation/water_use_planning/southern_interior/duncan_dam.html)



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## Duncan Dam Water Use Planning

- Project initiated August 2001 and completed April 2004.
- Consultative Committee Report and draft Water Use Plan submitted to the Comptroller of Water Rights in March and October 2005, respectively.
- [Executive summary](#) [PDF, 142 KB] of Consultative Committee Report provides an overview of the water use planning process and outcomes.
- [Water Use Plan](#) [PDF, 995 KB] accepted by the Comptroller of Water Rights and implemented in December 2007.

### Annual Reports

- [April 2009](#) [PDF, 138 KB]
- [April 2010](#) [PDF, 211 KB]
- [April 2011](#) [PDF, 3.5 MB]
- [April 2012](#) [PDF, 173 KB]
- [April 2013](#) [PDF, 65 KB]
- [April 2014](#) [PDF, 240 KB]
- [April 2015](#) [PDF, 150 KB]

PROJECTS	STUDIES	TERMS OF REFERENCE
DDMMON-1 Lower Duncan River Ramping Rate Monitoring	<ul style="list-style-type: none"> <li>• <a href="#">March 2009</a> [PDF, 200 KB]</li> <li>• <a href="#">April 2010</a> [PDF, 3.9 MB]</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">April 2008</a> [PDF, 252 KB]</li> </ul>



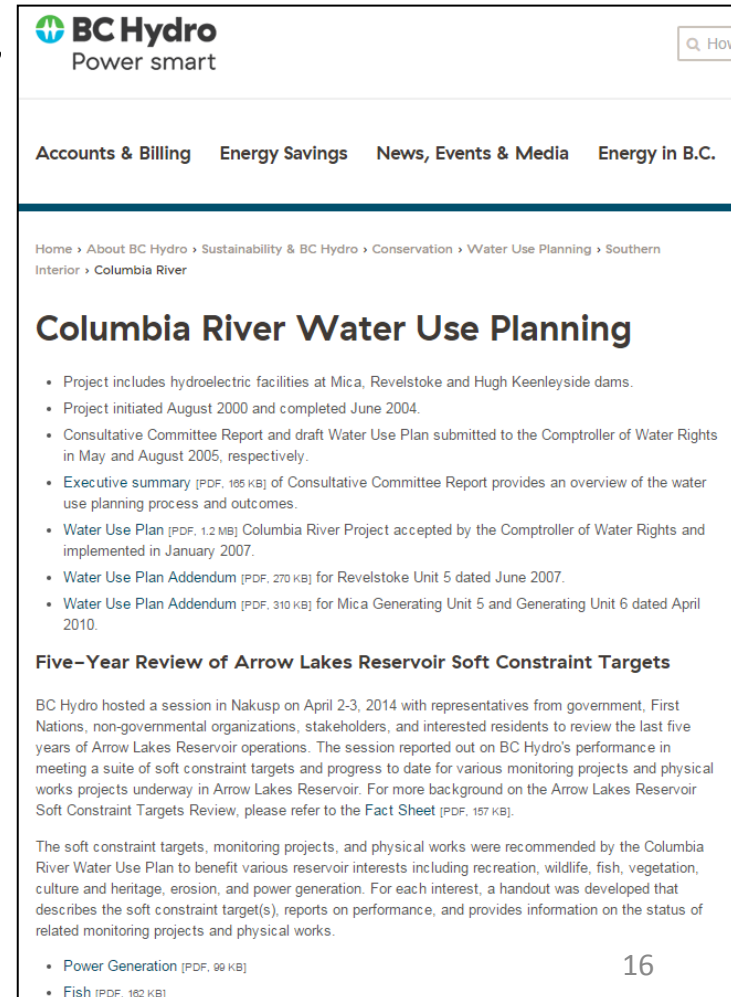
# Water Use Planning- Columbia River:

- 3 facilities with a total of 5 licences
  - **Mica**
    - Diversion Licence C039431
    - Storage Licences C027068 (non treaty) & C039432 (treaty)
    - Generation (6 units)
  - **Revelstoke**
    - Storage & Diversion Licence C047215
    - Generation (5 units)
  - **Hugh Kennleyside**
    - Storage Licence C027066 (treaty)
    - No generation



# Water Use Planning- Columbia River:

- Columbia WUP signed January 26, 2007
  - Amended August 23, 2007 (Rev 5)
  - Amended August 12, 2010 (Mica 5/6)
- Consists of 7 clauses & 6 schedules
  - Schedule A- Kinbasket Reservoir
  - Schedule B- Revelstoke Reservoir
  - Schedule C- Mid Columbia River
  - Schedule D- Arrow Lakes Reservoir
  - Schedule E- Lower Columbia River
  - Schedule F- Columbia River White Sturgeon Management Plan



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## Columbia River Water Use Planning

- Project includes hydroelectric facilities at Mica, Revelstoke and Hugh Keenleyside dams.
- Project initiated August 2000 and completed June 2004.
- Consultative Committee Report and draft Water Use Plan submitted to the Comptroller of Water Rights in May and August 2005, respectively.
- [Executive summary](#) [PDF, 105 KB] of Consultative Committee Report provides an overview of the water use planning process and outcomes.
- [Water Use Plan](#) [PDF, 1.2 MB] Columbia River Project accepted by the Comptroller of Water Rights and implemented in January 2007.
- [Water Use Plan Addendum](#) [PDF, 270 KB] for Revelstoke Unit 5 dated June 2007.
- [Water Use Plan Addendum](#) [PDF, 310 KB] for Mica Generating Unit 5 and Generating Unit 6 dated April 2010.

### Five-Year Review of Arrow Lakes Reservoir Soft Constraint Targets

BC Hydro hosted a session in Nakusp on April 2-3, 2014 with representatives from government, First Nations, non-governmental organizations, stakeholders, and interested residents to review the last five years of Arrow Lakes Reservoir operations. The session reported out on BC Hydro's performance in meeting a suite of soft constraint targets and progress to date for various monitoring projects and physical works projects underway in Arrow Lakes Reservoir. For more background on the Arrow Lakes Reservoir Soft Constraint Targets Review, please refer to the [Fact Sheet](#) [PDF, 157 KB].

The soft constraint targets, monitoring projects, and physical works were recommended by the Columbia River Water Use Plan to benefit various reservoir interests including recreation, wildlife, fish, vegetation, culture and heritage, erosion, and power generation. For each interest, a handout was developed that describes the soft constraint target(s), reports on performance, and provides information on the status of related monitoring projects and physical works.

- [Power Generation](#) [PDF, 99 KB]
- [Fish](#) [PDF, 182 KB]



# Water Use Planning- Columbia River:

- BC Hydro developed and submitted Terms of Reference for:
  - 60 Monitoring Programs
  - 39 Works Projects
- Monitoring & works programs:
  - 12 years to complete monitoring & works
  - All will be completed by 2020
- Interim review occurred in 2014 for the Arrow Lakes Reservoir Operations
  - Focused on power generation, fish, vegetation, culture and heritage, recreation and erosion





# Ministry of Forest, Lands and Natural Resource Operations

## Water Use Planning- Columbia River:

CLBMON-01	MICA DAM TGP MONITORING & ABATEMENT PROGRAM	Monitoring	In Implementation
CLBMON-02	KIN & REV KOKANEE POPULATION MONITORING	Monitoring	In Implementation
CLBMON-03	KIN & REV ECOLOGICAL PRODUCTIVITY MONITORING	Monitoring	In Implementation
CLBMON-04	KIN FISH STRANDING ASSESSMENT	Monitoring	In Implementation
CLBMON-05	KIN BURBOT LIFE HISTORY & HABITAT USE ASSESSMENT	Monitoring	In Implementation
CLBMON-06	KIN BULL TROUT LIFE HISTORY & HABITAT USE ASSESSMENT	Monitoring	In Implementation
CLBMON-07	KIN RAINBOW TROUT LIFE HISTORY & HABITAT USE ASSESSMENT	Monitoring	In Implementation
CLBMON-08	KIN MONITORING OF VALEMONT PEATLAND	Monitoring	In Implementation
CLBMON-09	KIN MONITORING OF REVEGETATION EFFORTS	Monitoring	In Implementation
CLBMON-10	KIN INVENTORY OF VEGETATION RESOURCES	Monitoring	In Implementation
CLBMON-11a	KIN REVEGETATION WILDLIFE EFFECTIVENESS MONITORING OF REVEGETATION	Monitoring	In Implementation
CLBMON-11b	ARROW REVEGETATION & WILDLIFE PHYSICAL WORKS	Monitoring	In Implementation
CLBMON-12	ARROW REVEGETATION MONITORING AND VEGETATION COMPOSITION ANALYSIS	Monitoring	In Implementation
CLBMON-13	MID COL MONITORING: MOSQUITO POPULATIONS	Monitoring	Project Completed
CLBMON-14	KIN & ARR BOAT RAMP USE STUDY	Monitoring	In Implementation
CLBMON-15	MID COL PHYSICAL HABITAT AND ECOLOGICAL PRODUCTIVITY	Monitoring	In Implementation
CLBMON-16	MID COL FISH POPULATION INDEXING SURVEYS	Monitoring	In Implementation
CLBMON-17	OR MID COL JUVENILE FISH HABITAT USE	Monitoring	In Implementation
CLBMON-18	OR MID COL ADULT FISH HABITAT USE	Monitoring	In Implementation
CLBMON-19	KIN STURGEON INVENTORY & HABITAT	Monitoring	Project Completed
CLBMON-20	OR MID COL WHITE STURGEON SPAWNING HABITAT	Monitoring	Project Completed
CLBMON-21	MID COL JUVENILE STURGEON DETECTION & HABITAT USE STUDY & TRACKING OF EXISTING TAGGED ADULTS	Monitoring	In Implementation
CLBMON-23	MID COL STURGEON EGG SUBSTRATE	Monitoring	In Implementation
CLBMON-26	KIN STURGEON RECOLONIZATION RISK	Monitoring	Project Completed
CLBMON-27	MID COL JUVENILE STURGEON INCUBATION & REARING	Monitoring	Project Completed
CLBMON-28	LOW COL ADULT STURGEON POPULATION MONITORING	Monitoring	In Implementation
CLBMON-29	LOW COL JUVENILE STURGEON DETECTION	Monitoring	In Implementation
CLBMON-30	LOW COL OPPORTUNISTIC ASSESSMENT OF HIGH FLOW EVENTS	Monitoring	In Implementation
CLBMON-31	OR ARROW BURBOT LIFE HISTORY	Monitoring	Project Completed
CLBMON-32	ARROW TRIBUTARY FISH MIGRATION	Monitoring	Project Completed
CLBMON-33	OR ARROW INVENTORY VEGETATION	Monitoring	In Implementation





# Ministry of Forest, Lands and Natural Resource Operations

## Water Use Planning- Columbia River:

CLBWORKS-01	KINBASKET: REVEGETATION 1800/1500	Physical Works	In Implementation
CLBWORKS-02	ARR & MID COL: REVEGETATION - Phase4	Physical Works	In Implementation
CLBWORKS-05	KIN VALEMOUNT MARINA EXTEND RAMP	Physical Works	In Implementation
CLBWORKS-06	KIN NIXON CREEK EXTEND RAMP	Physical Works	In Implementation
CLBWORKS-07	KIN BUSH HARBOUR RAMP EXTENSION	Physical Works	Project Completed
CLBWORKS-11	ARR BURTON NEW RAMP	Physical Works	Project Completed
CLBWORKS-12A	ONR ARR EDGEWOOD RAMP - CLAUSE M	Physical Works	In Implementation
CLBWORKS-13A	ONR ARR FAUQUIER RAMP EXTENSION - CLAUSE M	Physical Works	Project Completed
CLBWORKS-13B	ARR FAUQUIER RAMP EXTENSION - WUP	Physical Works	Project Completed
CLBWORKS-14A	ONR ARR MACDONALD RAMP EXTENSION - CLAUSE M	Physical Works	Project Completed
CLBWORKS-14B	ARR MACDONALD RAMP EXTENSION - WUP	Physical Works	Project Completed
CLBWORKS-16	OR KIN DEBRIS INVENTORY, MANAGEMENT STRATEGY AND REMOVAL	Physical Works	In Implementation
CLBWORKS-17	OR ARR DEBRIS INVENTORY, MANAGEMENT STRATEGY AND REMOVAL	Physical Works	In Implementation
CLBWORKS-18	FEASIBILITY OF BOAT RAMPS	Physical Works	Project Completed
CLBWORKS-19	LOW COL INDIAN EDDY DREDGING ENVIRONMENTAL & ENGINEERING ASSESSMENT	Physical Works	Project Completed
CLBWORKS-20	LOW COL INDIAN EDDY DREDGING	Physical Works	In Implementation
CLBWORKS-21	LOW COL DEBRIS REMOVAL AT INDIAN EDDY ENVIRONMENTAL REVIEW	Physical Works	Project Completed
CLBWORKS-22	LOW COL DEBRIS REMOVAL AT INDIAN EDDY	Physical Works	In Implementation
CLBWORKS-23	KIN & ARR DEBRIS REMOVAL ENVIRONMENTAL REVIEW	Physical Works	Project Completed
CLBWORKS-24	MID COL STURGEON EXPERIMENTAL AQUACULTURE	Physical Works	Project Completed
CLBWORKS-25	MID COL STURGEON CONSERVATION AQUACULTURE	Physical Works	In Implementation
CLBWORKS-26	MID COL STURGEON UPGRADE HATCHERY	Physical Works	Project Completed
CLBWORKS-28	LOW COL PLANNING & ASSESSMENT OF WSG TURBIDITY	Physical Works	Project Completed
CLBWORKS-29a	ARROW FEASIBILITY STUDY OF WILDLIFE PHYSICAL WORKS	Physical Works	Project Completed
CLBWORKS-29b	ARROW STUDY OF HIGH VALUE HABITAT	Physical Works	Project Completed
CLBWORKS-30	ARR WILDLIFE PHYSICAL WORKS IN LIEU - PHASE 1	Physical Works	In Implementation
CLBWORKS-32	ARR RENATA NEW RAMP	Physical Works	Project Completed
CLBWORKS-33	ARR SYRINGA NEW RAMP	Physical Works	In Implementation
CLBWORKS-34	LOW COL STURGEON AQUACULTURE PROGRAM	Physical Works	In Implementation
CLBWORKS-35	MCR BANK EROSION PROTECTION & MONITORING	Physical Works	Project Completed
CLBWORKS-36	MCR LONG TERM EROSION MONITORING	Physical Works	In Implementation

# Water Use Planning- Columbia River:

- Columbia annual report broken up into 9 reports due to complexity
  - Kinbasket Reservoir Fish and Wildlife Information Plan (January)
  - Kinbasket & Arrow reservoirs Revegetation management plan (February)
  - Kinbasket & Arrow Recreation Management Plan (January)
  - Revelstoke Flow Management Plan (February)
  - Columbia River White Sturgeon Management Plan (July)
  - Arrow Reservoir Operations Management Plan (June)
  - Arrow Reservoir Wildlife Management Plan (March)
  - Lower Columbia River Fish Management Plan (August)
  - Heritage Management Plan (April)
- All annual reports and Terms of Reference on BC Hydro website:
  - [http://www.bchydro.com/about/sustainability/conservation/water\\_use\\_planning/southern\\_interior/columbia\\_river.html](http://www.bchydro.com/about/sustainability/conservation/water_use_planning/southern_interior/columbia_river.html)



# Water Use Planning- Columbia River:

- Interim review conducted in 2014
- Focused on Arrow Reservoir (soft constraints)
  - Recreation
  - Wildlife
  - Fish
  - Vegetation
  - Culture & heritage
  - Erosion
  - Power Generation
- Feedback from the review was used to understand the balance and trade-offs during operating decisions and to evaluate the monitoring programs.





# Water Use Planning- Columbia River:

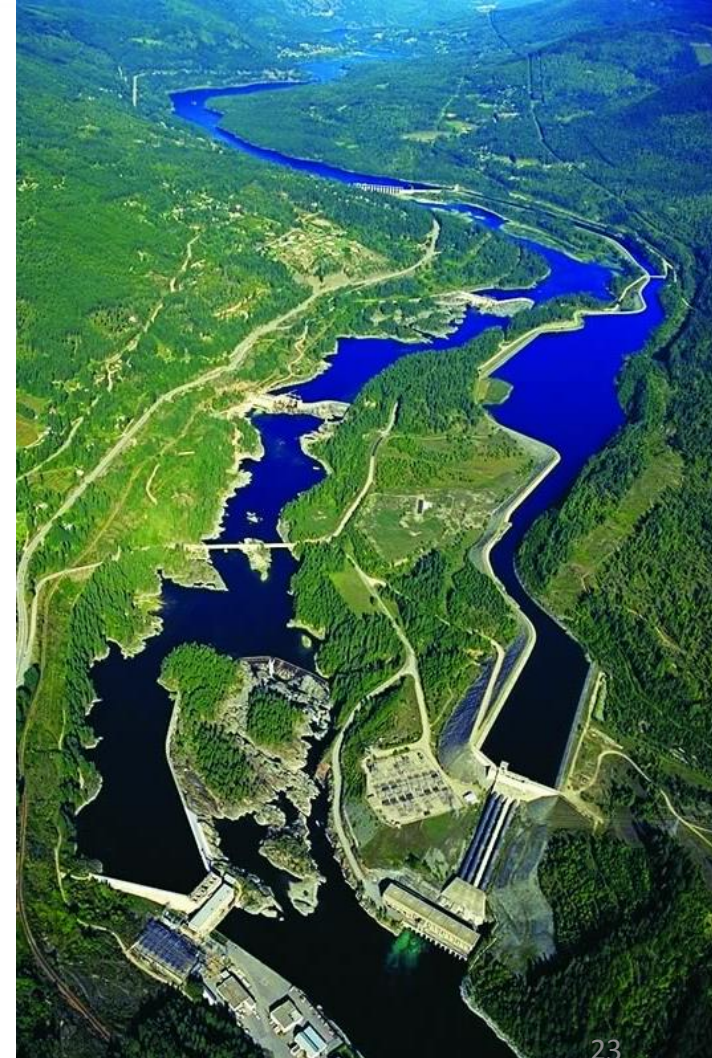
- It is expected that roughly \$115 million will be spent on the implementation of the Columbia WUP over the 12 years
- Other BC Hydro programs outside of WUP:
  - Fish and Wildlife Compensation Program (FWCP)
  - Reservoir Archaeological Program
  - Fish Impact Mitigation Program (Fish Entrainment Strategy, Total Dissolved Gas Strategy, Fish Passage Decision Framework)





# Kootenay System:

- Kootenay System is complicated due to multiple hydro facilities owned by different parties (including USACE)
- To date no issues have been identified that would require a WUP to resolve



# Ordered Reviews:

- Started in 2015 with Jordan and Ash River WUPs (Vancouver Island)
- Will take roughly 15+ years to complete all Ordered Reviews
- Review will focus primarily based on water management constraints data and documents that have been generated from studies & projects
- Orders will either be confirmed, revised, replaced or rescinded







# Summary:

- WUP guidelines set the development of a WUP
- 23 WUPs have been developed for BC Hydro facilities
- Duncan WUP: 17 monitoring & 5 works all will be completed by 2018 (10 year window)
- Columbia WUP: 60 monitoring & 39 works all will be completed by 2020 (12 year window)
- Ordered Reviews started in 2015 and will continue for 15+ years until all WUPs reviewed
- Orders will either be confirmed, revised, replaced or rescinded

