FINAL NOTES

UPPER COLUMBIA WHITE STURGEON RECOVERY INITIATIVE (UCWSRI) TECHNICAL WORKING GROUP MEETING (TWG)

NOVEMBER 14 & 15, 2017
COEUR D'ALENE, IDAHO

Meeting Participants

The following individuals attended some, or all, of the November 2017 UCWSRI-TWG meeting: Paul Anders, Paul Askey, Bill Baker, Scott Bettin, Mike Clement, Mitch Combs, James Crossman, Andrew Gingerich, Larry Hildebrand, Wendy Horan, Lance Keller, Herb Klassen, Bronwen Lewis, Amy Mai, Steve McAdam, Jason McLellan, Andy Miller, Chris Mott, Matt Neufeld, Mike Parsley, Louise Porto, Dennis Scarnecchia, Reuben Smit, Shawn Young, Will Warnock, Alison Squier, and Sarah Stephenson.

UCWSRI-TWG MEETING DAY 1 – NOVEMBER 14, 2017

1. UCWSRI-TWG business items: Part 1

1a. Review and finalize Terms of Reference and review and confirm approach to membership

James C. and Jason M. explained that there has been lots of new membership requests (members and observers), and over the years the TWG group keeps growing, but at the same time there is declining active participation. The purpose of rethinking the approach to membership is to encourage more active participation. The co-chairs have also gone through and revised the UCWSRI-TWG Terms of Reference (ToR), to reflect changes in membership, the dissolution of the Community Working Group and other updates. James noted that Canada is revising the national ToR and regional ToRs; however, the approach to the UCWSRI is a little different since it is a unique transboundary group. Once the Canadian ToRs are complete, James and Jason will look at the ToR again to see if it is necessary to add some additional language to help align the UCWSRI-TWG ToR with the Canadian national and regional ToRs.

Jason reviewed the various edits to the ToR, and the approach to membership i.e., voting and non-voting members instead of members and observers. Voting members can vote on the few specific topics that require that kind of formal decision. However, the implication/hope is that non-voting members will take a more active role. Note that for most questions the TWG generally strive to develop consensus first, if consensus can't be gained, then voting is the fallback. The emphasis on TWG membership (voting or non-voting) is still intended to incorporate individuals with technical expertise that meet criteria described in the ToR.

As described in the UCWSRI Terms of Reference (2017 version), individuals may be terminated as members if they fail to attend meetings on a regular basis and miss three-consecutive in-person meetings (without compelling mitigating circumstances). The membership list will be reviewed during each in-person meeting and those individuals identified as failing to meet adequate levels of participation will be highlighted. Per TWG agreement at the meeting that the member be removed

from the TWG for failing to abide by the conditions outlined in the ToR. The member will be informed of the decision by email from the UCWSRI co-chairs and invited to reapply for membership if they wish to in the future.

For meeting documentation, draft meeting notes will go only to the members who were in attendance for review. Final notes will be posted on the website for anyone who is interested to access with any sensitive material highlighted for removal during the review of the draft notes.

See updated UCWSRI-TWG ToR for details.

1b. Review requests for UCWSRI-TWG membership

Current TWG members (current as of the November meeting) reviewed the requests for voting of non-voting member status (previously member or observer).

- Greg Andrusak (BC MFLNRO) was not at the meeting but had submitted a request to join as an observer. The TWG recommended that Greg reapply in-person when he is able to attend a meeting. Jason and James will follow-up directly with Greg to convey the TWG recommendation.
- Amy Mai (BPA) was present and requested that she be approved as a non-voting member. She is a fish and wildlife project manager at BPA. She explained that it is very helpful to her management of the US projects funded by BPA be able to attend the meetings and hear the discussions. She was approved by the TWG as a non-voting member.
- Lynn Palensky (NPCC) was present and requested that she be approved as a non-voting member. She explained the role of the Northwest Power and Conservation Council (NPCC), and their Fish and Wildlife Program, in the US. Lynn has been working at the NPCC to raise awareness of the importance of sturgeon in the Columbia Basin and to ensure they are addressed in the Fish and Wildlife Program. She has a Columbia River wide perspective since she works with individuals who manage sturgeon populations throughout the Columbia Basin. She can help make connections and support people in their work. She also has a background as a biologist. Lynn as approved by the TWG as a non-voting member.
- Howie Wright (ONA) was not at the meeting but had submitted a request to join as a non-voting member. He is a fisheries representative for ONA. He is a First Nations member. He will not be able to attend all meetings due to other obligations. After discussion, the TWG recommended that Howie reapply in person at the next opportunity. In addition, Jason and James will follow-up directly with ONA to clarify ONA representation on the TWG (see Bronwen Lewis request below). Currently the ONA voting member is Michael Zimmer.
- Bronwen Lewis from ONA, and was sitting in for Amy Duncan who is currently on maternity leave. Bronwen is the sturgeon manager for Columbia Lake. Bronwen has worked as a biologist for 24 years; she has also worked with lots of other species. She also previously worked with Golder on sturgeon populations in different areas as crew member. The TWG co-chairs recommended holding off on confirming ONA non-voting members pending discussion between co-chairs and ONA.
- The following individuals were removed from the TWG members list the reason is presented in parentheses. The TWG co-chairs will contact them and let them know the reason and explain how they can reapply for membership:
    - Bob Hallock (has missed more than three in person meetings)

- Vanessa Benwood (has missed more than three in person meetings)
- Valerie Evans (replaced by Sarah Stephenson as non-voting member)
- Chad Fritz (replaced by Paul Askey as non-voting member)
- Sue Ireland (has missed more than three in person meetings, and KTOI is represented by Shawn Young as non-voting member)
- Brent Nichols (STOI) was removed from the non-voting member list since STOI is already represented by Andy Miller (voting member) and Reuben Smit (non-voting member).

Current UCWSRI-TWG members (after November 2017 meeting agreements):

Voting members	Non-voting members

• Bill Baker (WDFW)
• Scott Bettin (BPA)
• James Crossman (BC Hydro)
• Larry Hildebrand (River Run Consulting)
• Wendy Horan (CPC)
• Mike Keehn (FFSBC)
• Herb Klassen (DFO)
• Steve McAdam (BC Ministry)
• Jason McLellan (CCT)
• Andy Miller (STOI)
• Matt Neufeld (BCMFLNRORD)
• Mike Parsley (retired USGS)
• Louise Porto (AMEC/Wood for Teck Cominco)
• Will Warnock (CCRIFC)
• Michael Zimmer (ONA)
	• Paul Anders (Cramer Fish Sciences, Univ. of Idaho)
	• Paul Askey (FFSBC, alternative to Mike Keehn)
	• Adam Brooks (Teck Cominco)
	• Mitch Combs (WDFW, alternate to Bill Baker)
	• Jason Flory (USFWS)
	• Andrew Gingerich (Douglas PUD)
	• Maureen Grainger (Fortis BC)
	• Paul Grutter (Golder Assoc.)
	• Ryan Hardy (IDFG)
	• Matt Howell (CCT, alternate to Jason McLellan)
	• Lance Keller (Chelan PUD)
	• Amy Mai (BPA)
	• Chris Mott (Grant PUD)
	• Martin Nantel (DFO, alternate to Herb Klassen)
	• Lynn Palensky (NPCC)
	• Reuben Smit (STOI, alternate to Andy Miller)
	• Sarah Stephenson (BCMFLNRO)
	• Shawn Young (KTOI)
	• *ONA non-voting member TBD*
	  ○ *Current is Amy Duncan (on maternity leave) Bronwen Lewis requested non-voting status as an alternate to Amy Duncan.*
	  ○ *ONA also presented another non-voting member request from Howie Wright.*

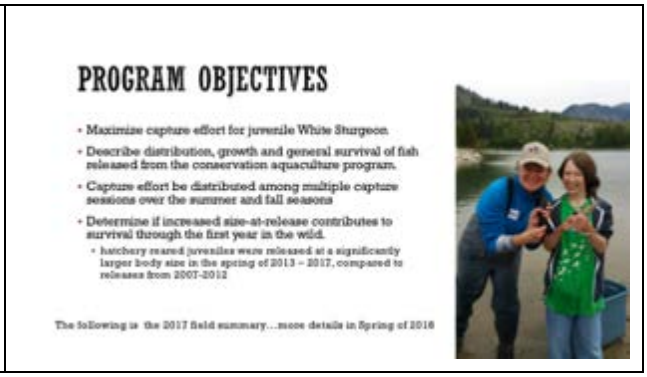
ACTIONS:

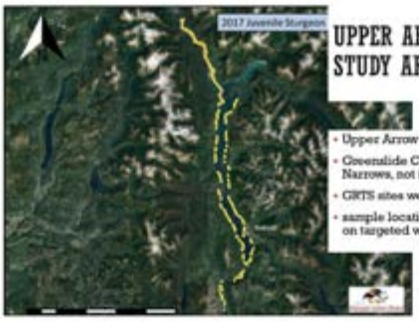
- **James and Jason will follow-up to communicate with the following voting and non-voting members regarding changes and/or seeking additional clarification regarding requests:**
  - **Bob Hallock has missed more than three in person meetings and will be removed from the TWG member list. He can reapply if he wishes.**
  - **Vanessa Benwood has missed more than three in person meetings and will be removed from the TWG member list. She can reapply if she wishes.**
  - **Sue Ireland has missed more than three in person meetings and will be removed from the TWG member list. The KTOI is represented by Shawn Young as a non-voting member.**
  - **Brent Nichols (STOI) was removed from the non-voting member list since STOI is already represented by Andy Miller (voting member) and Reuben Smit (non-voting member).**
  - **Talk with BC MFLNRORD to clarify who will be the voting member, and who will be the alternate. Currently Matt Neufeld is the voting member and Sarah Stevenson or Valerie Evans is the non-voting member. Greg Andrusak has also requested to be a non-voting member.**
  - **Talk with ONA to clarify who will be voting and non-voting member, and alternate. Currently Michael Zimmer is the voting member. Bronwen Lewis requested non-voting member status to sit in for Amy Duncan while Amy is on maternity leave, and Howie Wright has also requested to join the TWG as a non-voting member.**
- **Alison will clean up the revised Terms of Reference draft and send to the voting-members of the TWG for a final review prior to finalizing the changes reviewed at the November meeting.**

2. Upper Arrow Lake Monitoring, Maturity and Diet Research

2a. Upper Arrow Lake

Bronwen Lewis (ONA), gave the following presentation on Upper Arrow Lake monitoring work (the following is a thumbnail-scale presentation for reference, the full-size presentation is available on request):





UPPER ARROW LAKE STUDY AREA

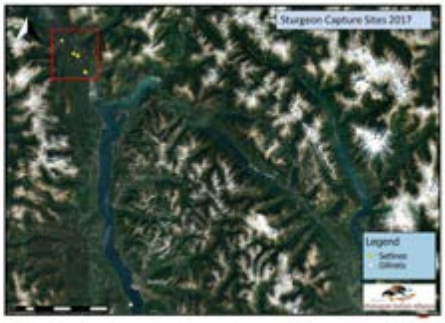
- Upper Arrow Lake near Revelstoke, BC.
- Greenslide Creek south to Nakusp Narrows, not including Beaton Arm
- GRTS sites were used as a guideline
- sample locations were selected based on targeted water depths (10 – 30 m).

FISHING EFFORT

- 7 WS captured; one of which was recaptured in the same session.
- 153 Gillnet sets ; average soak time (~4.5 hours) = 688.5 hours
- 224 Setlines; average soak time (~22 hours) = 4,928.0 hours

CAPTURE LOCATIONS

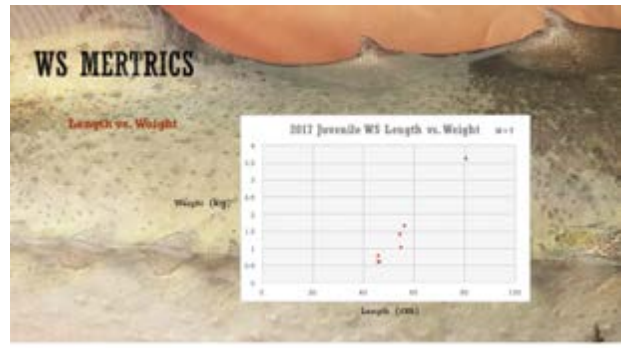
- 7 capture sites; one gillnet captured 2 WS.



CAPTURE SUMMARY

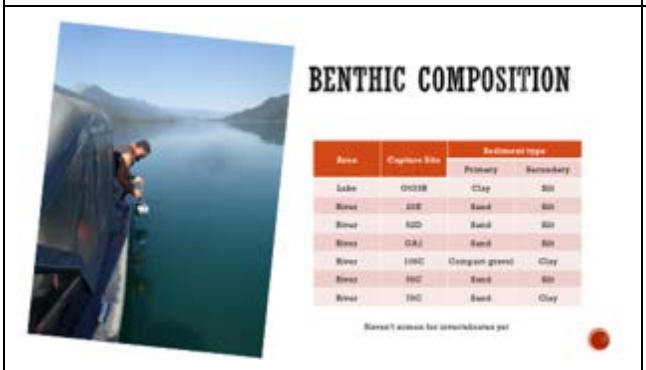
Juvenile Sturgeon No.	Release Date	Year Class	Stock Year	Age	Years at Large	
1	8-May-13	2011	2012	1	5.1	
2	9-May-13	2012	2013	1.2	4.3	
3		20077	2008	13	9.3	from pleats of scutes
4	8-May-13	2012	2013	1.2	4.3	
5	9-May-13	2014	2017	3.2	3.3	*Wild origin
6, 8	7-May-14	2013	2014	4.2	3.3	
7	8-May-13	2012	2013	5.2	4.3	

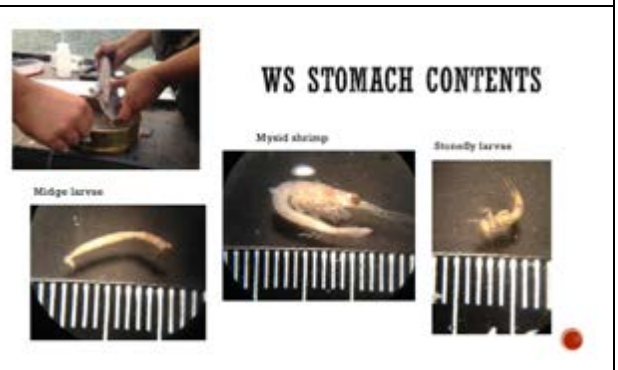
* North Fort wild origin fish, collected, reared and released this spring were over 350 grams on average (>38cm FL) and over 2 years old

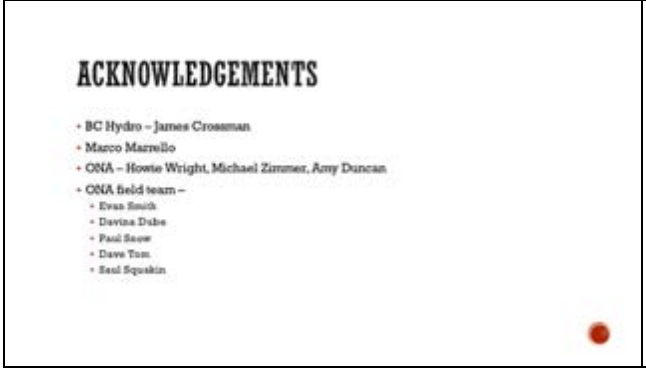


LARGEST JUVENILE TO DATE

OTHER CAPTURES

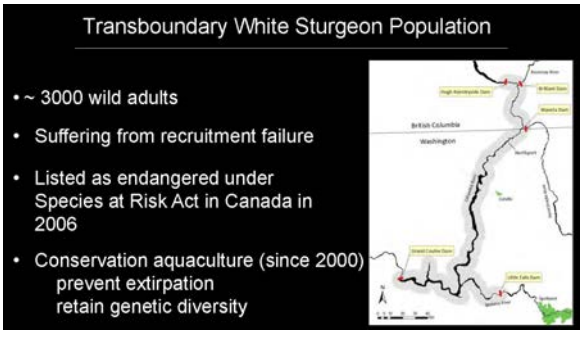






2b. White sturgeon maturity research

James Crossman gave the following presentation on sex and stage of maturity research being conducted by Molly Webb's laboratory:



Conservation Aquaculture

High survival of hatchery-origin fish

Disproportionate survival among maternal family groups

Lower than expected genetic diversity of hatchery-origin fish

Determine when hatchery-origin population will begin spawning

Objective

Assign sex and stage of maturity of hatchery-origin fish to estimate the proportion of the hatchery population that is reproductive

Reproductive Structure

Based on Webb et al. assessments below Bonneville

Female Reproductive Structure

% pre-vitellogenic (2 years out)
% vitellogenic (1 year out)
% ripe (spawning)
% post-ovulatory (already spawned)
% atretic (failed to spawn)

Photos: M.Marrello

Male Reproductive Structure

% pre-meotic (not spawning)
% meotic (could spawn)
% spermiating (spawning)
% post-spermiation (already spawned)

Photos: M.Webb

Methods - Sampling Design

Study area covered 169 km

Spring and fall samples

Spatially balanced sampling design

Fish captured using setlines

Fish only over 130 cm FL sampled in the USA

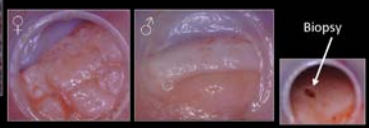
Methods - Assignment of Sex and Stage of Maturity

Histological analysis of gonadal tissue

Measurement of sex steroids in blood plasma

Histology - Gonadal Biopsy Collection

Histology used as a true measure of sex and stage of maturity and to assess accuracy of steroids as a tool



Sex Steroids - Blood Collection and Steroid Analysis

Steroids used to less-invasively assign sex and stage of maturity

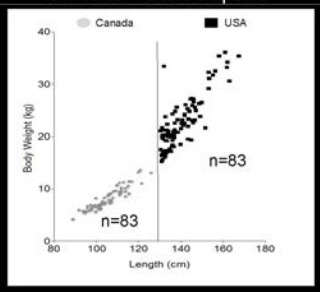
Testosterone and estradiol-17β measured by radioimmunoassay

Steroid Concentrations used to Assign Sex and Stage of Maturity

Classification	Testosterone (ng/mL)	Estradiol (ng/mL)
Non-reproductive female	< 4	< 1.5
Non-reproductive male	≥ 4 and < 40	< 1.0
Reproductive female	≥ 4	> 1.5
Reproductive male	≥ 40	< 1.0

(Webb et al. 2002; Webb et al. In Prep)

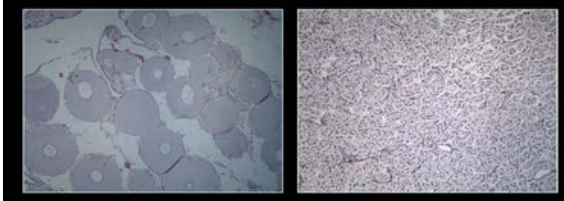
Results – Fish Capture



Results - Range of Ages Sampled

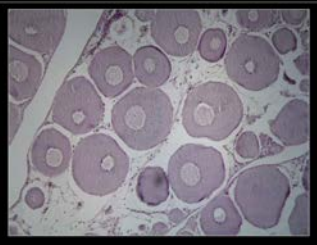
Sex	Canada	USA
Females	7-15	9-15
Males	9-15	9-15

Histological Analysis of Gonadal Tissue in Canada



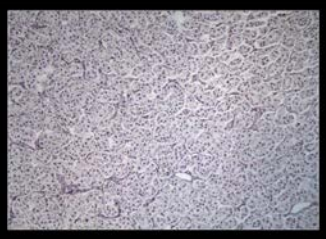
Females Males

Histological Analysis of Gonadal Tissue in USA



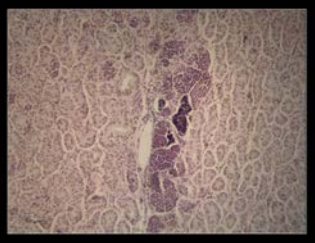
Female

Histological Analysis of Gonadal Tissue in USA



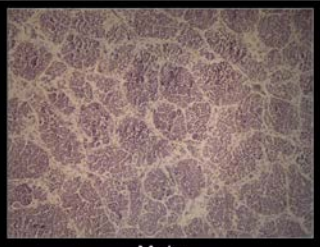
Male

Histological Analysis of Gonadal Tissue in USA



Male

Histological Analysis of Gonadal Tissue in USA



Male

Sample Size by Classes of Sex and Stage of Maturity

	Canada	USA
Pre-vitellogenic Females	35	48
Pre-meiotic Males	32	33
Meiotic Males	0	18

Percentage of Males in Different Stages of Maturity

Stage of Testicular Development	Canada	USA
Pre-meiotic (Spermatogonia)	100%	65%
Meiotic (Spermatogonia and Spermatocytes)	0	33%
Meiotic (Spermatocytes only)	0	2%

Steroid Concentrations (Canada and USA)

	Testosterone (ng/mL) ± SEM	Estradiol (ng/mL) ± SEM
Pre-vitellogenic Females	1.24 ± 0.14[a]	Below MQC
Pre-meiotic Males	12.57 ± 1.74[b]	Below MQC
Meiotic Males	71.01 ± 7.12[c]	Below MQC

Testosterone (ng/mL) Concentrations

	Canada	USA
Pre-vitellogenic Females	0.57 ± 0.09[a]	1.73 ± 0.22[b]
Pre-meiotic Males	13.49 ± 2.55[a]	21.49 ± 2.57[b]

Assignment of Sex and Stage of Maturity (Canada and US)

Classification	Error Rates (%) with T = 4 ng/mL or 40 ng/mL
Pre-vitellogenic Females	2
Pre-meiotic Males	35
Meiotic Males	0

Assignment of Sex and Stage of Maturity

Classification	Error Rates (%) in Canada	Error Rates (%) in USA
Pre-meiotic Males	69	3

Conclusions

No reproductive hatchery-origin fish were identified in Canada

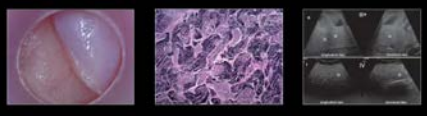
Hatchery-origin males may be capable of spawning in 2018 in the USA (35% of males over 130 cm FL)

Stresses importance of standardized monitoring that is balanced across ages, sizes and habitats

Next Steps

Determine sex and stage of maturity using multiple methods

- Ultrasound
- Endoscopy (otoscope and endoscope)
- Biopsy
- Measurement of plasma sex steroids.



Application

Important to understand reproductive structure in both wild and hatchery-origin populations for management

Reproductive Index	Description
Sex	Biological criteria used to define female or male gametogenesis
Age at first maturity	Age at which puberty is initiated; onset of vitellogenesis in females and meiosis in males
Spawning periodicity	Length of time between spawning events

Limited information on variability in time to maturation for hatchery-origin fish (e.g. pre-vitellogenic females in UCR)

Working to determine efficacy of Plasma Sex Steroids as a noninvasive tool (e.g. compared to histology)

2c. White sturgeon diet analysis

Andy Miller gave the following presentation on white sturgeon diet analysis (the following is a thumbnail-scale presentation for reference, the full-size presentation is available on request):

3. Overrepresented year class

3a. Update on US approach: Lake Roosevelt white sturgeon fishery

Jason McLellan gave the following presentation on the Lake Roosevelt activities to address the overrepresented year class (the following is a thumbnail-scale presentation for reference, the full-size presentation is available on request):

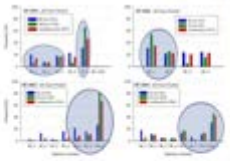
Lake Roosevelt White Sturgeon Fishery Update

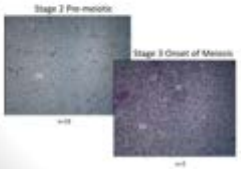
Jason McLellan
Colville Confederated Tribes

UCWSRI TWG Meeting
Coeur d'Alene, ID
November 14, 2017

Background

- Over-represented hatchery families
- Family equalization
  - Remove ≈20,000 BY10 and younger fish
- Hatchery fish nearing maturity





WA Fishery

Tribal

- Season
  - Year-round
  - Opened: May 1, 2017
- Retention lengths
  - 97-160 cm FL (38-63 in)
- Bag Limits
  - None
- Gear
  - Angling
  - Setline
- Spawning sanctuary
  - China Bend to international border

Recreational

- Season
  - May 26-July 31, 2017
- Retention lengths
  - 97-160 cm FL (38-63 in)
- Bag Limits
  - Daily – 1 fish
  - Annual – 2 fish
- Gear
  - Angling

50:50 Catch Share Agreement

Monitoring

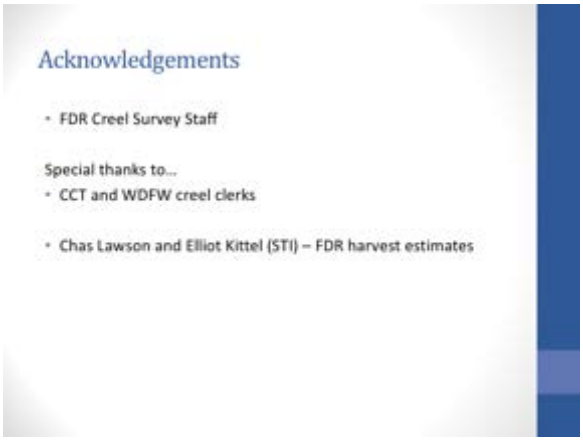
- Lake Roosevelt Angler Creel Survey
  - Supplemental creel days
- Mandatory Catch Record Cards – WDFW
- Mix of Voluntary and Mandatory Tribal Reporting
- Fishery Independent Stock Assessment

Harvest Estimates

- Lake Roosevelt Creel
  - 17,000 anglers
  - 122,000 angler hours
  - Catch = 8,852
  - 95% CI = 5,420 – 12,671
  - Harvest = 3,188
  - 95% CI = 1,930 – 4,639
- Catch Record Cards
  - Data available in 2018
- Tribal Reporting
  - Roughly 100 fish harvested

Lake Roosevelt Creel Observations

Origin	n	Proportion (%)
Caught	535	-
Harvested	239	-
Hatchery	**214**	**89.5**
BC Releases	24	10.0
WA Releases	185	77.4
Unknown Release Location	5	2.1
Unknown	**23**	**9.6**
Wild	**2**	**0.8**



Questions:

- Wendy H. – If the recreational fishery is to continue, has there been discussion about constricting the limits? I'll be getting questions for sure. Is there going to be thought given to restricting take?
    - Jason M. – What we'll do is come up with regulation proposals to make sure we meet the allotments e.g., 1,500 fish and no more. Whether that's through monitoring or changing slot limits. We'll recommend narrowing the slot limits to target that population. However, we've been directed from policy and management that we need to build in harvest going forward.
- Steve M. – Is there an opportunity to scan fish and return high priority fish?
    - Jason M. – Yes, on the tribal side of the program we can do that, and we'll also be able to collect all kinds of biological information.
- _____ – Do you know if any wild fish have been captured?
    - Jason M. – Two wild fish were caught, they were inside the slot limit. We knew that small percentage of wild fish were within the slot when we looked at it, but we figured the overall risk to not harvesting the overrepresented year class was a greater risk overall. The wide slot limit was a policy decision, not the technical recommendation that we made. The bulk of the fish caught were the younger age classes, not the ones that were maturing.
- Mike P. – Is there any evidence that people were targeting over-size fish?
    - Jason M. – No, but a lot of information about people catch and release fishing, and they did catch oversize fish.
- Mike P. – Do you think that might be an issue in the future?
    - Jason M. – Yes, and have raised that to management. Also, we'll need to continue the stock assessment to properly manage the fishery. Also, we're handling a lot of fish.
    - Andy M. – Through the fall stock assessment, we moved it down to 140. That was well received with membership.

3a. Update on Canadian approach

Herb Klassen gave the following update on the Canadian approach to addressing the overrepresented white sturgeon year class. He said that DFO had received the letter from the UCWSRI-TWG co-chairs summarizing research results and advising that survival of some hatchery-origin fish was higher than predicted. The letter noted that the disproportionate survival would result in reduced diversity.

The DFO asked their science branch and they concurred with scientific advice from the TWG to remove fish from 10 overrepresented families for one year of the program. Subsequently, BC hydro included that work in the planned Canadian portion of the annual stock assessment and incorporated studies to better understand implications of the overrepresented year class. Under the SARA permit, BC hydro proceeded with the planned stock assessment in spring 2017. In September 2017, the Ktunaxa and ONA participated with BC Hydro under the SARA permits to remove those targeted fish. The KNC and ONA permits also authorized a contaminant analysis, as well as possession of fish for beneficial use during ceremonial events.

James C. explained that the program was implemented as a collaborative effort in order to get extra information. He said it went well, and was the first example of this type of collaboration. It was a good fall session with one of the larger fall captures of last 5 years. They removed 147 hatchery-origin fish. About 105 of those were US origin fish, the others were Canadian. They ranged in size up to 145 cm and the main age classes were 2006, 2005 and also some 2001-2002 fish. The process was very selective and every fish had to check back to match the criteria. For 2018, the TWG will review and analyze the data collected in 2017. Results from US portion work will also help to chart a longer-term strategy. The Canadian strategy and basis will be peer reviewed to determine its integrity.

Martin N. added that Canada supported the removal actions this year. That is not to say this is going to happen going forward. His understanding is that some, and not all of that data, has been looked at. To make a longer-term management decision, they will want to have more data to look at.

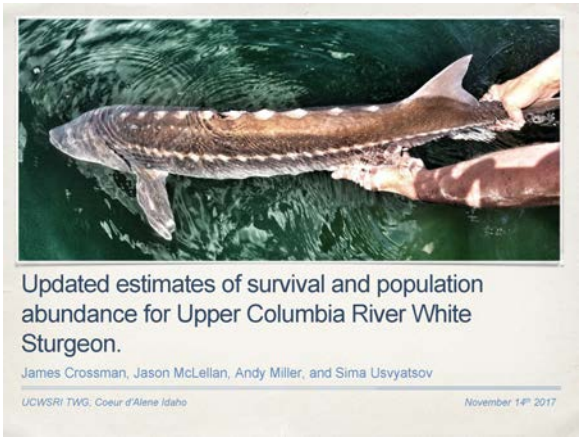
Questions:

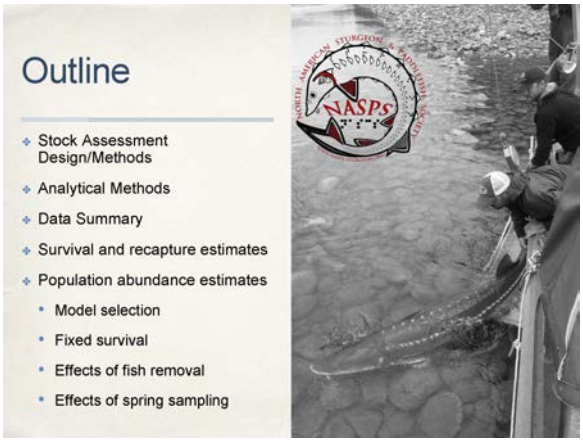
- Bill B. – On the US side the target was about 20,000 fish, what is target on Canadian side?
    - James C. – It wasn't an abundance problem, it was an overrepresentation problem. So, we don't have a target. If we were to proceed with just overrepresented families, we would expect to encounter about 150 fish per session.
- Jason M. – The 20,000 number was applied to using the stock assessment data on both sides of the border. The 20,000 number is the number that need to be removed, which is fine because it's going to be over a 10-year period.
    - Steve M. – We did talk about what proportion of that 20,000 might occur in Canada, we thought probably less than 3,000, or about 10%.
- Larry H. – what was Canadian response, e.g., tribal, anglers, etc.
    - Matt N. – We didn't get a big response. There was some pressure from angling groups before that fishery was in place. We were pretty good at communicating the difference in tools between the US and Canada.

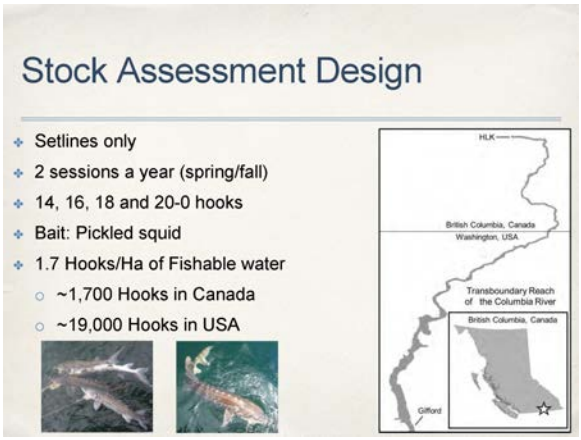
4. Joint Stock Assessment

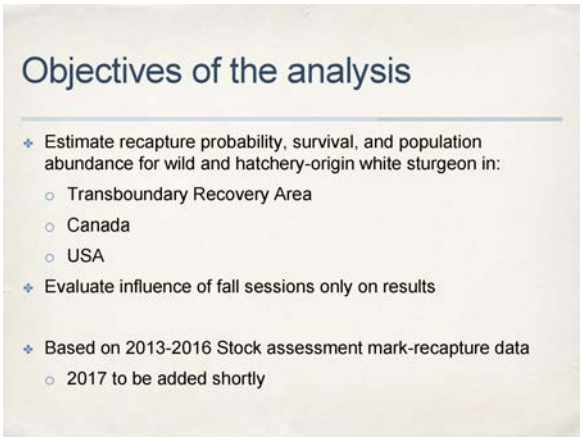
4a. Stock assessment design

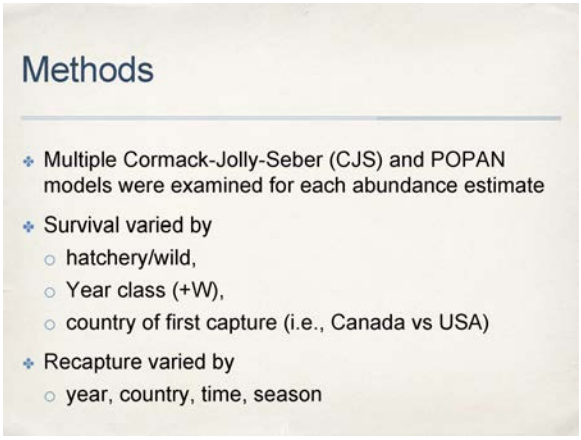
James C. gave the following presentation on the joint stock assessment design:

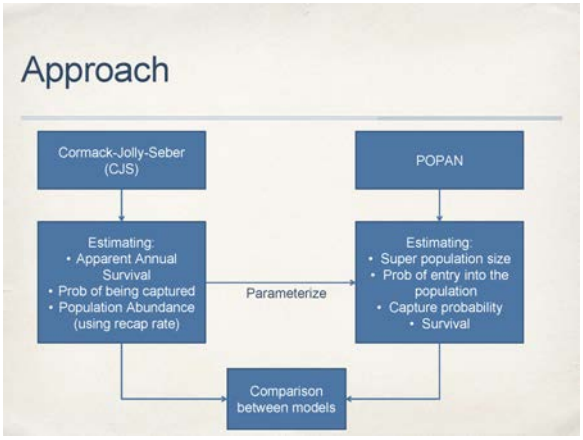












Results: Fish capture

Origin	Sampling event	N individuals		N Recaptured							
		Total	New*	2013 Spring	2013 Fall	2014 Spring	2014 Fall	2015 Spring	2015 Fall	2016 Spring	2016 Fall
Hatchery	2013 spring	474	474	0	56	11	76	23	46	31	37
	2013 fall	1,204	1,147	0	0	18	130	47	77	61	58
	2014 spring	352	322	0	0	0	36	10	27	20	30
	2014 fall	1,789	1,541	0	0	0	0	64	117	53	90
	2015 spring	658	510	0	0	0	0	0	43	20	32
	2015 fall	1,406	1,092	0	0	0	0	0	0	41	62
	2016 spring	818	587	0	0	0	0	0	0	0	9
	2016 fall	1,135	807	0	0	0	0	0	0	0	0
Wild	2013 spring	262	262	0	19	15	40	13	12	11	14
	2013 fall	278	259	0	0	12	20	8	7	6	14
	2014 spring	173	146	0	0	0	15	8	6	10	3
	2014 fall	326	251	0	0	0	0	8	9	7	6
	2015 spring	119	82	0	0	0	0	0	2	4	7
	2015 fall	123	87	0	0	0	0	0	0	4	6
	2016 spring	123	81	0	0	0	0	0	0	0	6
	2016 fall	156	100	0	0	0	0	0	0	0	0

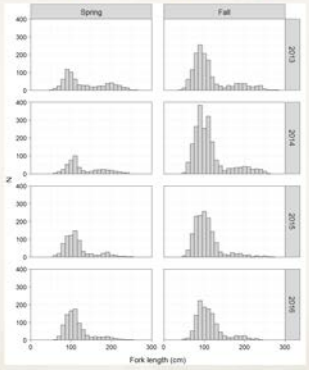
Results: Canadian fish capture

Origin	Sampling event	N individuals		N Recaptured							
		Total	New1	2013 Spring	2013 Fall	2014 Spring	2014 Fall	2015 Spring	2015 Fall	2016 Spring	2016 Fall
Hatchery	2013 spring	31	31	0	1	1	1	1	2	3	0
	2013 fall	152	151	0	0	1	3	10	5	8	9
	2014 spring	99	97	0	0	0	3	3	2	5	7
	2014 fall	264	256	0	0	0	0	8	10	9	7
	2015 spring	209	186	0	0	0	0	0	7	8	5
	2015 fall	279	251	0	0	0	0	0	0	14	7
	2016 spring	352	303	0	0	0	0	0	0	0	8
	2016 fall	279	234	0	0	0	0	0	0	0	0
Wild	2013 spring	85	85	0	5	10	5	9	5	6	6
	2013 fall	97	92	0	0	9	4	7	4	4	9
	2014 spring	92	73	0	0	0	4	7	3	9	2
	2014 fall	92	79	0	0	0	0	7	4	2	3
	2015 spring	86	56	0	0	0	0	0	1	3	7
	2015 fall	77	60	0	0	0	0	0	0	2	4
	2016 spring	73	47	0	0	0	0	0	0	0	4
	2016 fall	89	54	0	0	0	0	0	0	0	0

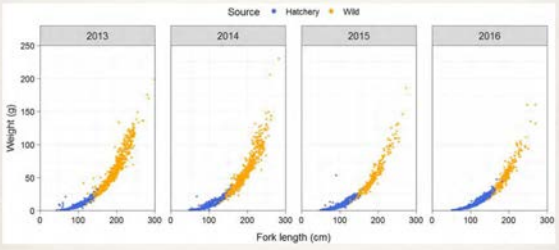
Results: US fish capture

Origin	Sampling event	N individuals		N Recaptured							
		Total	New1	2013 Spring	2013 Fall	2014 Spring	2014 Fall	2015 Spring	2015 Fall	2016 Spring	2016 Fall
Hatchery	2013 spring	443	443	0	55	10	74	22	44	26	36
	2013 fall	1,052	996	0	0	17	126	37	70	52	49
	2014 spring	253	225	0	0	0	33	7	25	15	23
	2014 fall	1,525	1,287	0	0	0	0	56	106	43	80
	2015 spring	449	324	0	0	0	0	0	36	12	26
	2015 fall	1,129	844	0	0	0	0	0	0	26	52
	2016 spring	466	289	0	0	0	0	0	0	0	1
	2016 fall	856	582	0	0	0	0	0	0	0	0
Wild	2013 spring	177	177	0	14	5	34	4	6	4	8
	2013 fall	181	167	0	0	3	15	1	2	2	5
	2014 spring	81	73	0	0	0	11	1	3	1	1
	2014 fall	234	174	0	0	0	0	1	5	5	3
	2015 spring	33	26	0	0	0	0	0	1	1	0
	2015 fall	46	29	0	0	0	0	0	0	2	2
	2016 spring	50	35	0	0	0	0	0	0	0	2
	2016 fall	67	46	0	0	0	0	0	0	0	0

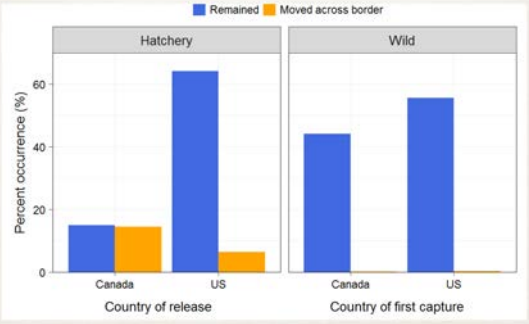
Length frequency



Weight length relationships



Movement between countries



Survival and recapture estimates

CJS

Phi	p	npar	QAICc	ΔQAICc	QAICc weight
~YearClass	~Country * time	25	15,927	0	1

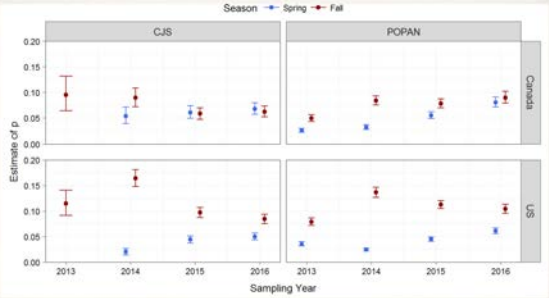
- CJS models had few convergence issues, which was an improvement from previous analyses with the addition of the 4th year of data

POPAN

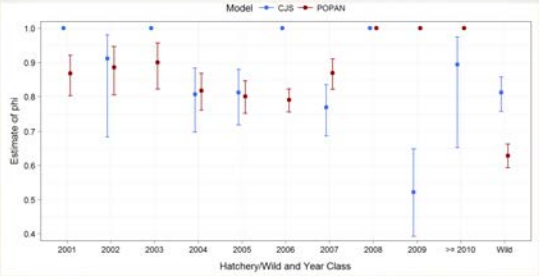
Phi	p	pent	N	npar	QAICc	ΔQAICc	QAICc weight
~YearClass	~Country * time	~1	~YearClass * Country	48	18,768	0	1

- POPAN models had multiple convergence failures. Therefore, only relatively simple POPAN models were constructed with fixed values

Recapture probability

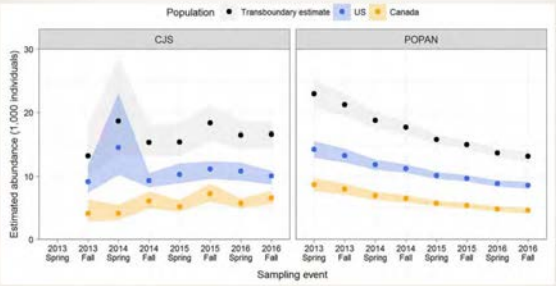


Survival

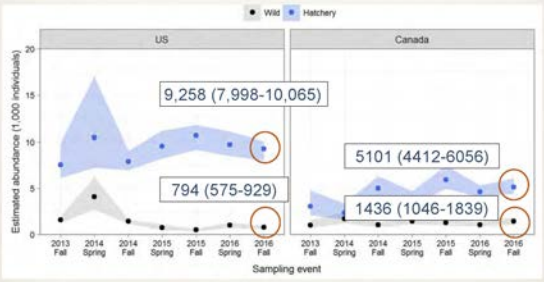


Population abundance

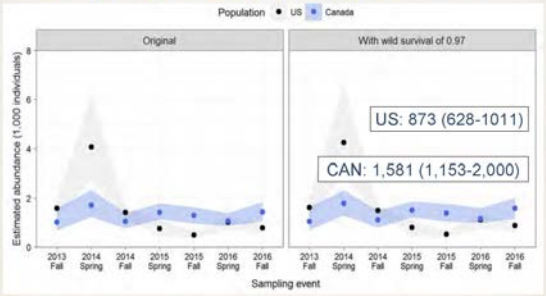
CJS vs POPAN



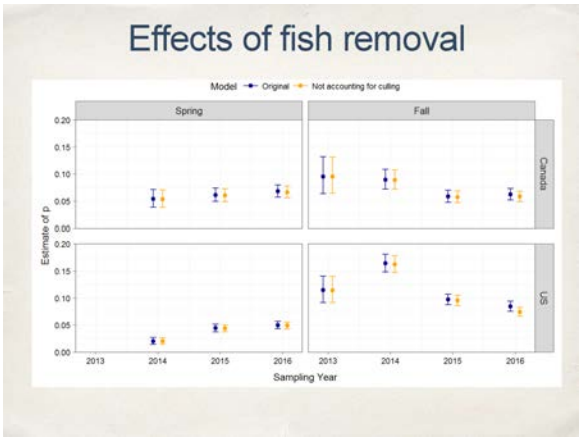
Population abundance - CJS

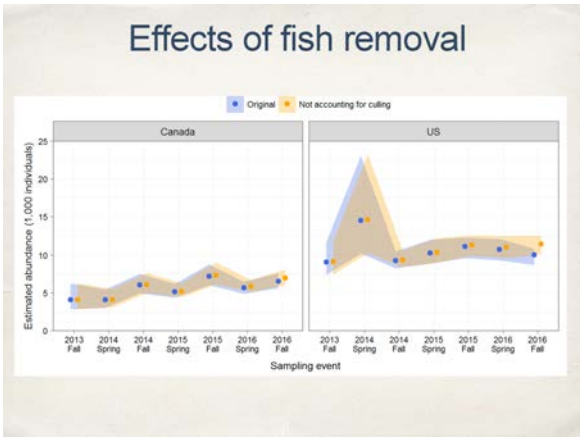


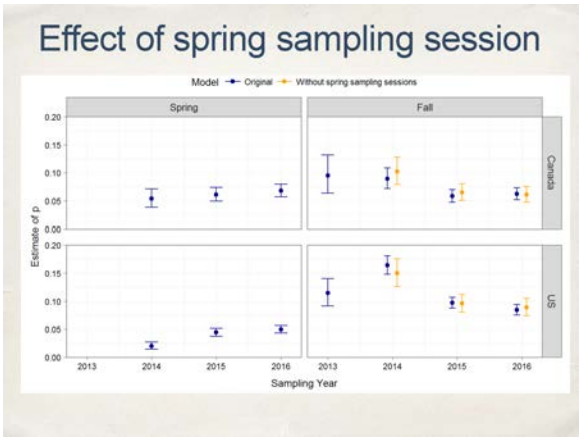
Population abundance - CJS

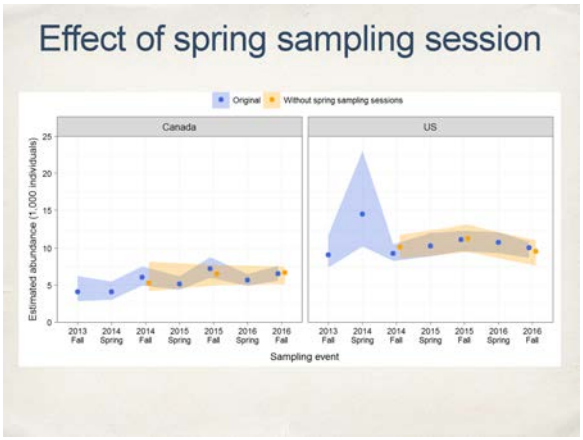


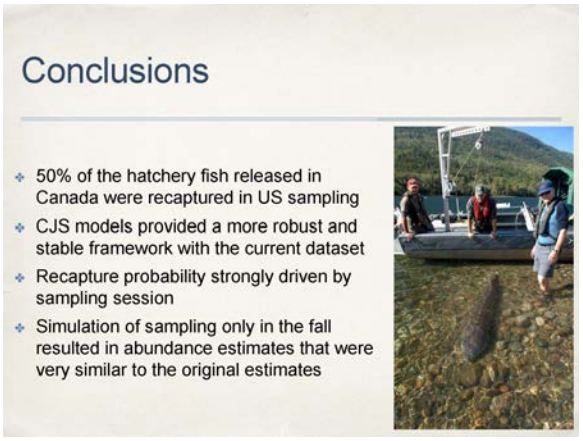
Recapture probability strongly driven by sampling session so fixing wild survival to 97% would not strongly influence the overall estimates of recapture











4b. Joint stock assessment discussion

The TWG discussed whether the joint stock assessment should be continued beyond the originally scoped 5-years? What are the pros and cons? Participant's identified the following pros and cons (next page):

Pros	Cons
• More data, specifically data to provided better confidence intervals, and better information on how younger fish are doing. • Get more information on 2011 larval release (e.g., determine survival). • Removal of overrepresented year class is a higher risk approach than other management actions. More years of stock assessment provides a direct feedback loop. • Information to better inform maturity analysis. • Stock assessment informs the Canadian removal of overrepresented fish. • Stock assessment is also a tool for focused removal of overrepresented fish.	• Cost/time/efforts • Additional handling of wild fish • Is it necessary to have the stock assessment to mitigate risks associated with removal of overrepresented year class? • What are impacts of 160 hours of angler effort in US on fish?
	Other
	• What are impacts of 160 hours of angler effort in US on fish? • Do we need to do it annually? Or every 3 years? Or some other frequency?

4c. Identify and confirm TWG recommendation and next steps

After additional discussion, the TWG members agreed to the following for 2018:

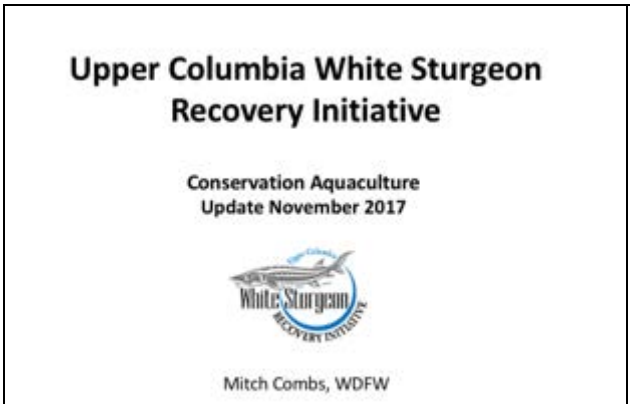
- US
    - Go forward with another year of stock assessment.
    - Fall only
        - Drop spring because: spring logistics are difficult, river conditions are difficult and highly variable, can't sample whole reach in spring, low spring capture
        - Also, the model is largely driven by fall results, won't compromise the model to drop spring
- Canada
    - Go forward with another year of stock assessment
    - Continue sampling in fall and spring in Canada.

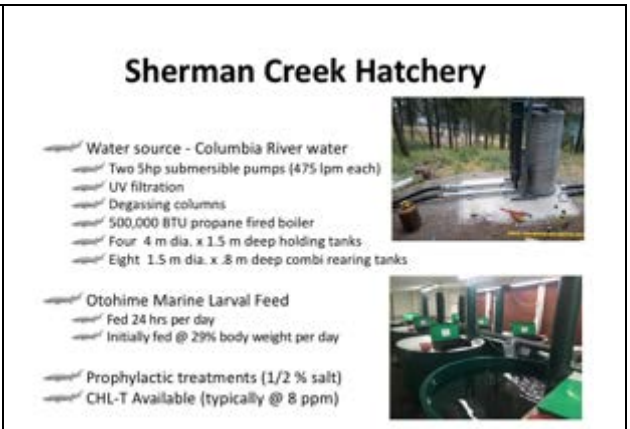
- At the April 2018 meeting discuss future joint stock assessment plants for 2019 and/or beyond:
    - Provide summary of results of initial five-years of the joint stock assessment.
    - Report on anticipated consequences of changing frequency/intensity.
    - Identify what questions the TWG would be trying to answer with a future year or years of the joint stock assessment?
    - Identify the frequency of joint stock assessment needed to address those questions (e.g., annually, bi-annually, every three years, etc.)?

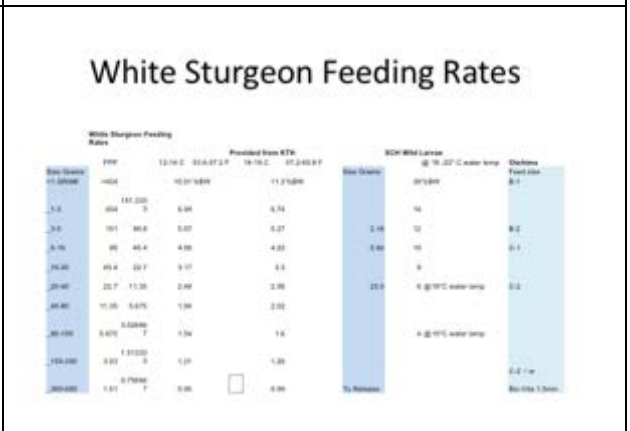
5. Conservation aquaculture lessons, opportunities, and questions

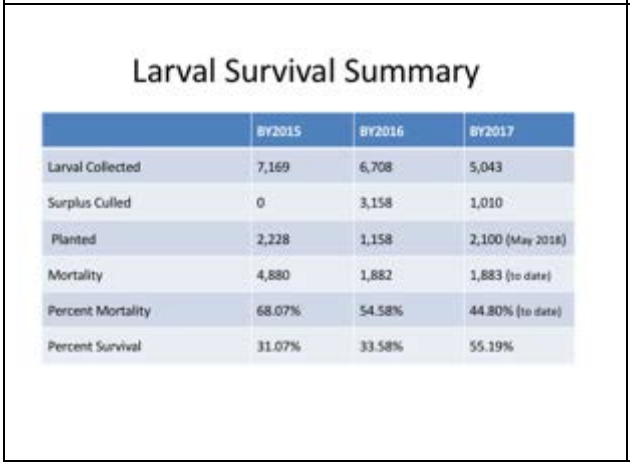
5a. U.S. portion of program

Mitch Combs gave the following presentation on the Sherman Creek Hatchery, highlighting some of the lessons learned over the years (the following is a thumbnail-scale presentation for reference, the full-size presentation is available on request):







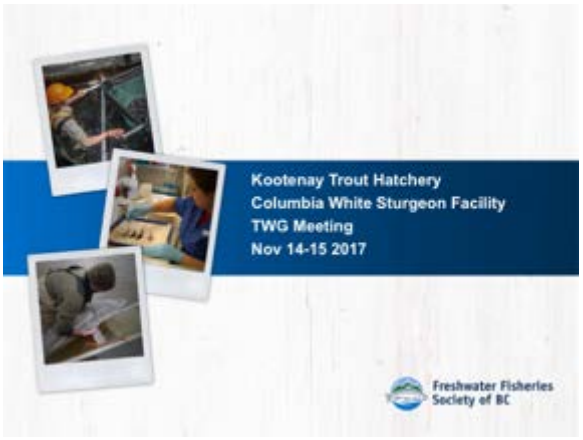


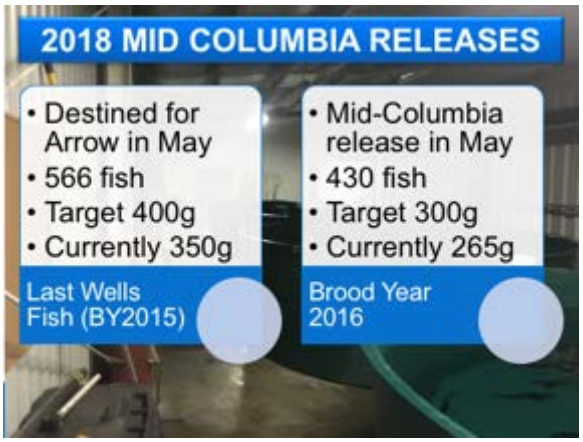
Mitch noted that:

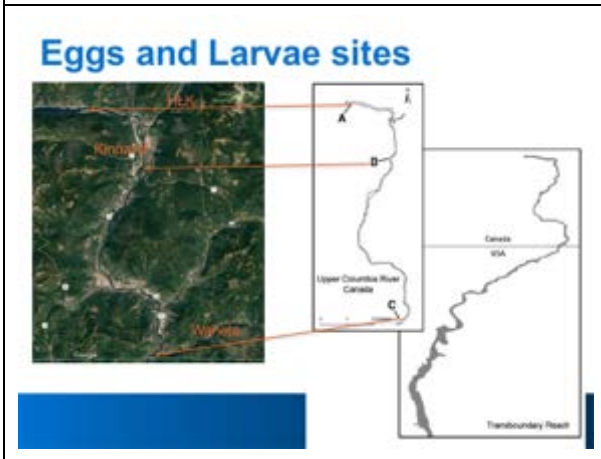
- Survival is up, disease is down due to less fish stocked in tanks.
- Survival is higher due to lower densities.
- Would like to have the TWG plan ahead and have a place for surplus wild larval origin fish to go, so the hatchery doesn't have to euthanize them.

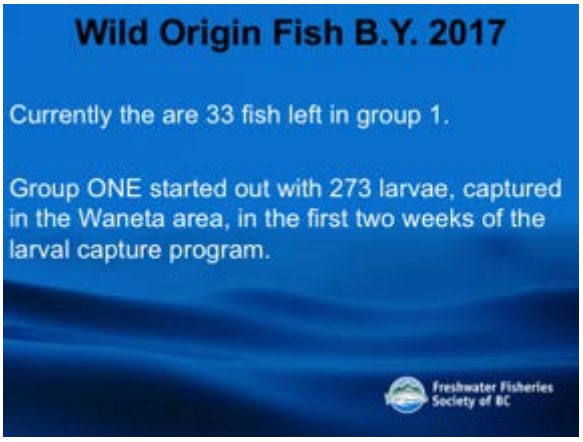
5b. Canadian portion of program

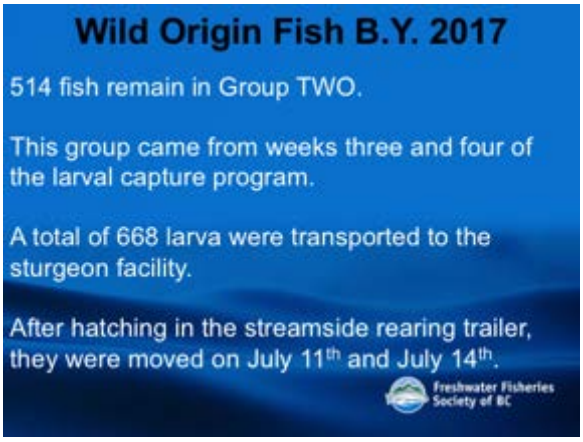
Paul Askey gave the following presentation for Mike Keehn who was not able to attend, on the Kootenay Trout Hatchery (the following is a thumbnail-scale presentation for reference, the full-size presentation is available on request):

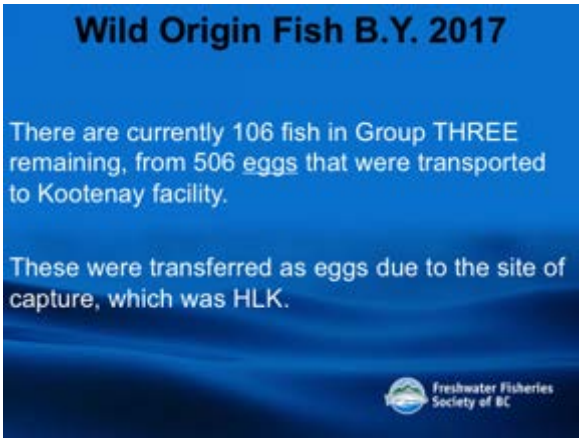


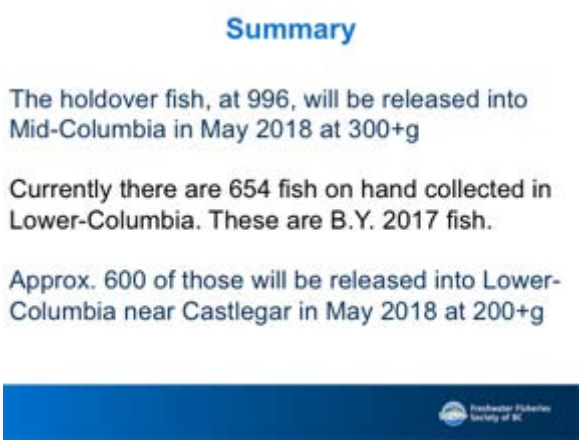












6. Future TWG discussion topics

Alison asked the TWG members to respond to the following question in writing: *"What questions/issues will the TWG as a transboundary group, need to address given the Canadian listed population, and change in U.S. to incorporate harvest on regular basis?"*

Following are the TWG responses sorted by general category:

- Communication to First Nations, public, and anglers (outward communications)

- Pressure will rise in Canada for fishery, yet unlikely to occur. A clear documentation of rationale behind long-term fishy planning in US and what is different in Canada will be needed for the public.
- Public perception
  - Canadian anglers were asking about increased white sturgeon by-catch while walleye fishery underway.
  - First Nations were asking about fishing in Arrow Lake. Perception that the same rules apply to one population in various locations.
- Clear, concise messaging on Canadian and US side of border and, ideally, coordination of release of information. Need better alignment between US and Canadian regulations (good luck with that ☺)
- Conduct PR to inform public why the management actions are different between the two countries while you are dealing with the same species.
- Public interactions/expectations. Future stocking taking into consideration harvest on Washington side, while no harvest opportunity in Canada.
- Getting information out to anglers.
- Public image.
- Public meeting(s) with First Nations and anglers.
- International consistency/cooperation and clear communication of general current status and rationale of program (more detail internally).
- A unified presentation front internally with the TWG and externally to publics.

- Communications between UCWSRI members and management entities
  - How to share information in timely manner.
  - Clarification on results that DFO needs and timeline for permits annually? 5-year plan example.
- Differences in approaches (US and Canada)
  - Can we agree on different approaches for respective sides of the border that meet the needs of the US and Canada?
  - How does the TWG ensure that actions on one side of the border do not jeopardize objective or policies on the other side?
  - How do management actions in US influence the approach(s) taken to recovery in Canada?
  - How about managing hatchery versus wild fish in Canada and mortality of hatchery fish when in US they are open harvest.
  - How do we approach a shared model of recovery of the population and maintain harvest opportunities?
  - How does this change each respective country's approach to conservation aquaculture?
- Recovery should be the priority

    - 1st always recovery. 2nd the TWG should continue with conservation recommendations. This should be the case regardless of US recreational fishery unless the fishery is negatively impacting conservation to the point of TWG concern.
    - Discord between CAN and US and movement away from recovery plan objectives.
- Documentation of harvest, tracking effectiveness of program to reduce overrepresented families, etc.
    - TWG needs to have a review program in place to track the success of reducing the over-represented families. This may become harder as harvest takes precedent. We probably have this but we need to report on success of aching goal – not just harvest success.
    - Whether fish removals in US would project over time to also fully address family over-abundance in Canada.
    - Assuming continued harvest:
        - Well defined objectives and monitoring to track harvest goals, and
        - Rigorous reporting of harvest to ensure high confidence of data and inform future harvest goals
    - Does a major new source of mortality on the US side cause fish in Canada to move to fill the gap?
    - Improved monitoring of angler take in US (sound like its planned for 2018).
    - Accurate catch records.
    - Continued improvement of number allocated by year with total of 20,000 maximum? 18,000 US?
    - Does the TWG view this popular fishery as a success in general? Or as just a byproduct of an adaptive management action, not necessarily as having achieved a significant goal?
- Does new maturity data indicate an urgency or end point for fish removal?
- Stock assessment
    - Integrating harvest into the stock assessment analysis.
    - How does joint monitoring (e.g., stock assessment) change?
    - Understanding transboundary movement better.
    - Fish movement. If fish harvested in US originated from US then rick to recovery is low. If excessive numbers in US move into Canada, then Canadian risk.
- Genetics, risk to wild fish, and related
    - Genetics. Is distinctness being lost?
    - Wild and hatchery fish interact, does stocking affect ability to detect and maintain wild recruits?
    - Risks to wild fish.
- 1) Recruitment failure, 2) stock assessment, 3) recommendations.

- Policy and management
    - What happens when policy conflicts with science (as it already has)?
    - Will be important to keep emphasis on the technical/advisory nature of the TWG.
    - Lack of discussions between Canada and US policy and governments on how to recover and manage this species.
    - Lots of management questions, but those are separate.
    - Should the TWG write a letter to US policy folks to reign in over-zealous harvest goals e.g., length limit too large?
    - I see most issues occurring outside of the biological/genetic problem to be addressed i.e., political issues between the definitions of endangered between countries is unlikely to be resolved by the TWG.

After identifying questions, each TWG member was asked to select the topic or question (via dot vote) they thought was the highest immediate priority for discussion at a future TWG meeting. Following are the results of that vote:

- Documentation of harvest, tracking effectiveness of program to reduce overrepresented families, etc. (includes subset of questions listed under general heading) **[14.5 dots]**
- 1st always recovery. 2nd the TWG should continue with conservation recommendations. This should be the case regardless of US recreational fishery unless the fishery is negatively impacting conservation to the point of TWG concern. **[3 dots]**
- Wild and hatchery fish interact, does stocking affect ability to detect and maintain wild recruits? **[1.5 dots]**
- Does the TWG view this popular fishery as a success in general? Or as just a byproduct of an adaptive management action, not necessarily as having achieved a significant goal? **[1 dot]**
- What happens when policy conflicts with science (as it already has)? **[1 dot]**

7. UCWSRI stocking targets

7a. Overview UCWSRI-TWG aquaculture program history and assumptions

Jason M. gave the following presentation summarizing the history of the UCWSRI conservation aquaculture program (the following is a thumbnail-scale presentation for reference, the full-size presentation is available on request):

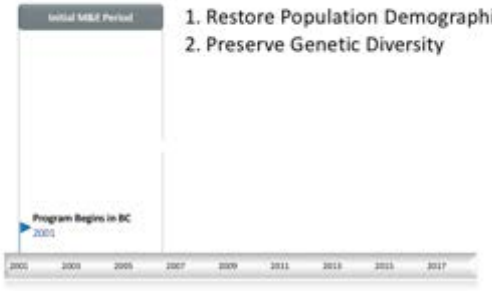
Upper Columbia White Sturgeon Recovery Initiative

Conservation Aquaculture Program History

Jason McLellan
Colville Confederated Tribes

UCWSRI TWG Meeting
Coeur d'Alene, ID
November 14, 2017

Conservation Aquaculture



1. Restore Population Demographics
2. Preserve Genetic Diversity

- Abundance = 2,500 adults/RA
- Adult broodstock
- Release target = 12,000 juveniles/yr
- Min size = 30 g each
- 5 equal families

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- 2 additional "families"
- Release target = 4,000/yr
- Total Transboundary release target = 16,000/yr

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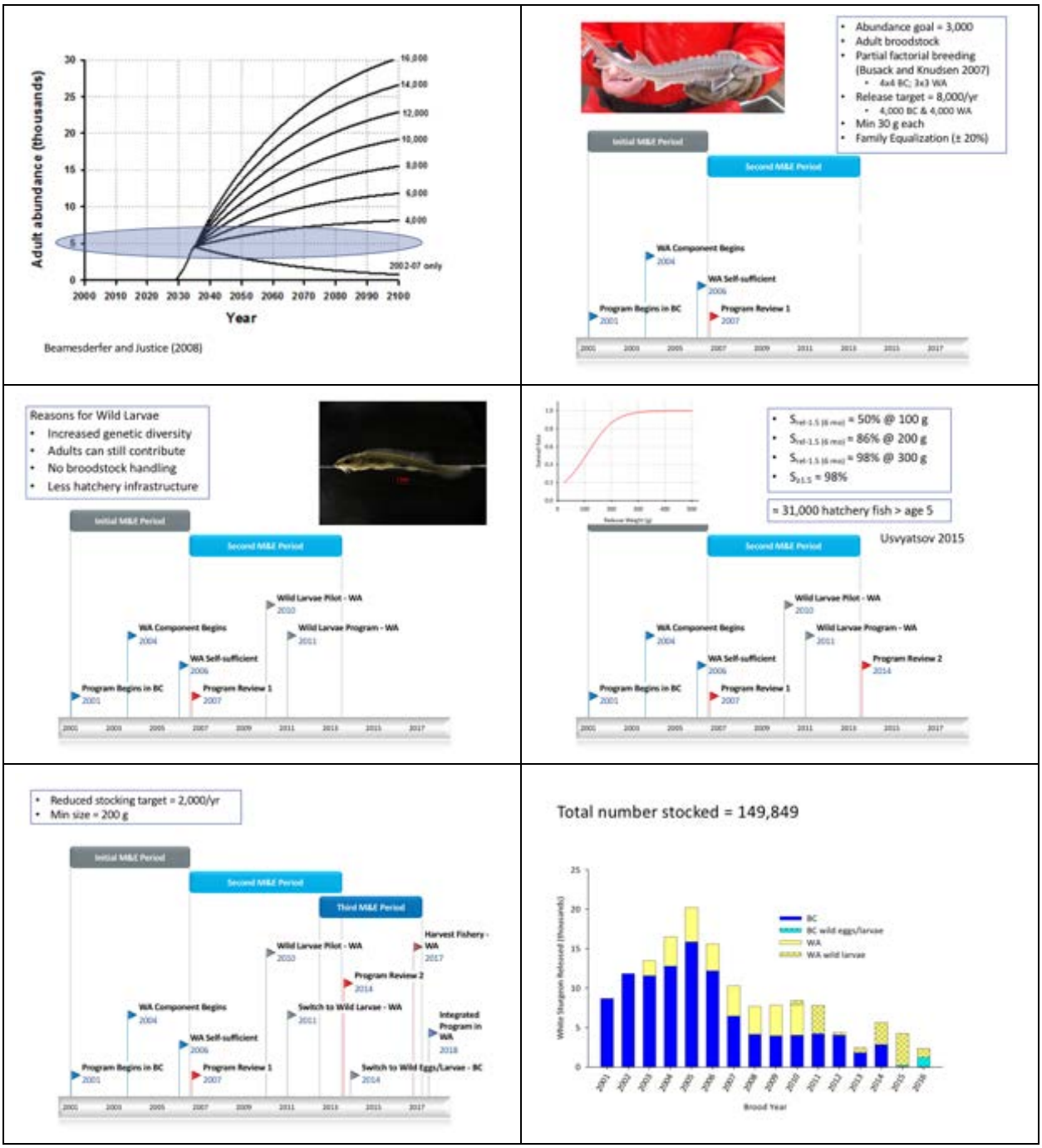
Initial M&E Results
- Primarily gill nets
- Mark-recapture
- Survival release year = 28% (12-54%)[a]
- Survival age 2-6 = 88% (35-99%)[a]
- Survival adults = 97% (92-99%)[a]



7b. Model and assumptions

Jason McLellan reviewed a model developed initially by Ray Beamesderfer and subsequently updated by Larry Hildebrand. The model was used to develop the initial stocking targets for the UCWSRI. A similar model is currently being used in the mid-Columbia (US) to help inform stocking targets.

Per previous discussions, the UCWSRI wants to develop a process to review, update and document decisions about stocking targets. The last discussion that the UCWSRI had regarding stocking targets set the target at 1,000 fish. Now there is a desire to have an integrated program (i.e., include the harvest

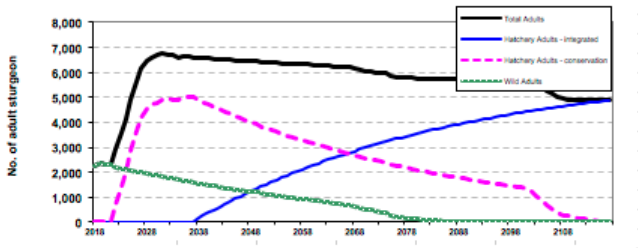
component in the US). The challenge is how to best document the past decisions, and then the transition to releasing fish for harvest in US but not Canada. The model was sent out to the TWG for review prior to the meeting, only Mike Parsley responded to that review.

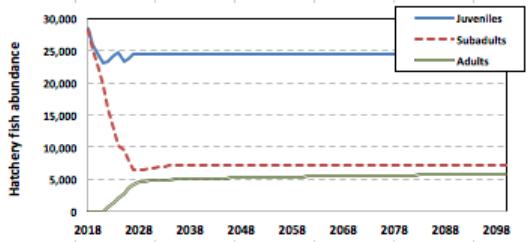
Jason walked the UCWSRI through some of the inputs and assumptions that are embedded in the model. Inputs include: starting population, natural recruitment, hatchery release numbers, life stages, survival rates, fishing exploitation rates, age and growth, and assumptions regarding reproduction. Following is an example of the types of outputs the model can provide:

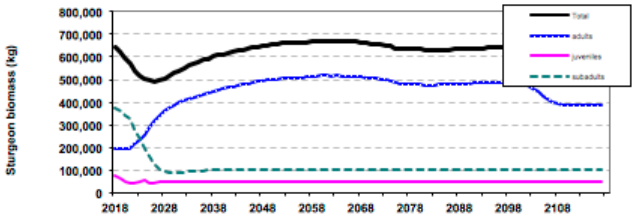
Results

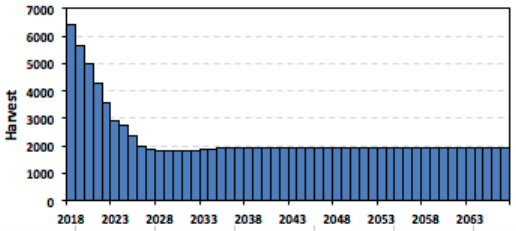
	yr 1	yr 25	yr 50
# conservation hatchery juveniles	25,305	0	0
# conservation hatchery subadults	28,183	0	0
# conservation hatchery adults	0	4,517	2,726
# integrated hatchery juveniles	3,000	24,530	24,530
# integrated hatchery subadults	0	7,296	7,296
# integrated hatchery adults	0	613	2,786
# total hatchery juveniles	28,305	24,530	24,530
# total hatchery subadults	28,183	7,296	7,296
# total hatchery adults	0	5,130	5,512
Harvest / year	6,437	1,930	1,930
ELER	93%		

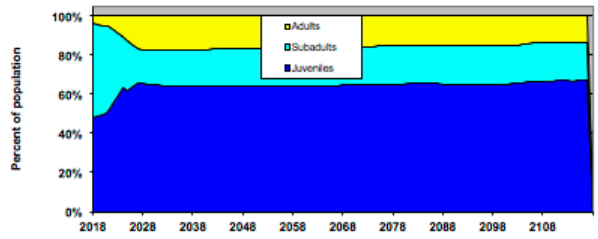
	yr 1	yr 25	yr 50
# wild	2475	1388	690
# new wild	0	0	0
# ♀ spawning/yr (all)	219	157	264
biomass (kg)	643,195	621,503	670,012

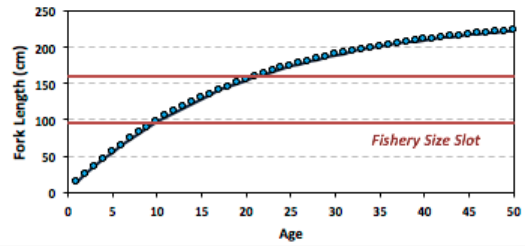


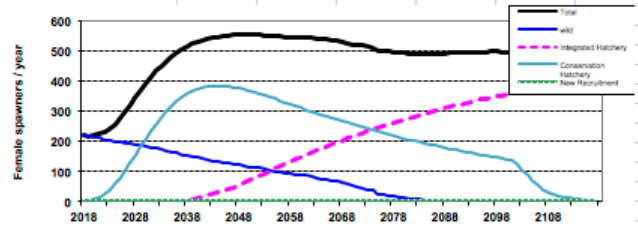












He asked the UCWSRI members to consider if this model is a tool that they would like to use to help inform and document the development and periodic updating of stocking targets for the UCWSRI.

7c. Example of stocking target approaches

Paul Askey gave the following presentation on one approach to developing stocking targets for trout, and how that framework could apply to white sturgeon (the following is a thumbnail-scale presentation for reference, the full-size presentation is available on request):

7d. UCWSRI stocking target discussion

Meeting participants discussed the use of the model, the need to document how stocking decisions are made, the need to incorporate documentation of how the UCWSRI program is adaptively management, and the challenges of incorporating the US harvest component.

Jason explained that the model takes survival estimates, and years of release, and applies those to numbers released and size at release, and then projects abundances after that. The survival model is based on larger fish and doesn't address survival of younger fish. Those younger fish are probably the biggest driver for the UCWSRI. James C. noted that the model is essentially estimating the abundance of fish Age-9 and older. Mike P. added that the current spreadsheet as it exists is just a tool to estimate stocking rates.

Participants agreed that for now the spreadsheet model was the best tool available to inform stocking targets, they also discussed the importance of reviewing, documenting, and updating assumptions in the model.

Alison asked the group to split into two groups, one composed of Canadian TWG members and one of US TWG members. Each group was asked to discuss their recommendations for stocking targets, what they need in terms of documentation, and recommendations for the process. The groups reported back on these discussions on Day 2.

Adjourn Day 1

UCWSRI-TWG Meeting Day 2 – November 15, 2017

1. UCWSRI stocking targets (continued from Day 1)

1a. Stocking target discussions report-back

The TWG members provided the following report-backs from the previous days break-out groups:

- Canadian reach of UCWSRI
    - Discussed staying with 1,000 at 200 grams on each side of border, per recovery plan.
    - Discussed importance of maintaining UCWSRI focus on addressing recruitment failure as core of UCWSRI approach.
- United States reach of UCWSRI
    - Discussed need to agree on abundance targets, at minimum, agreement to continue with what is in recovery plan.
    - Discussed need for harvest target numbers from Policy co-manager group in US to inform stocking targets.
    - Talked about need for annual documentation of aquaculture approach.
    - Currently the model/spreadsheet is set up with one stocking number and one size of release. One option under consideration is to grow fish larger in hatchery, so that fish are not taken away from recruitment failure testing. This might need to be addressed in the model.

In 2017, the stocking targets were:

- 1,000 @ 200 grams on each side of border with extra going to Arrow = 2,000 total
- Canada to release everything (boom/bust)

1b. Agreements and next steps (actions)

The UCWSRI-TWG members agreed to the following:

- 2018 stocking targets
    - 1,000 @ 200 grams in Canada
    - In US will be based on harvest target from policy group using the spreadsheet
- Documentation
    - US to provide update on harvest targets at teleconference in winter
    - Review and compile a report documenting decision inputs, outputs, etc. at the April 2018 TWG meeting (as part of the annual review of the Operational Plan)

ACTIONS:

- **UCWSRI TWG will convene a stocking target model review subgroup to review the model in detail, including review/update of inputs, assumptions, etc.**
- **The model review subgroup members will include: Jason M., James C., Andy M., Paul Askey, Larry H., Mike P., Bill B, and Paul Anders**
- **The subgroup will prepare an update and give a presentation on their review for the April 2018 UCWSRI-TWG meeting.**

2. Habitat assessment and/or restoration work

2a. Update on Chinook Salmon reintroduction proposal and implication for sturgeon

Will Warnock gave a briefing on the status of the upper Columbia chinook salmon reintroduction proposal and highlighted potential implications for white sturgeon.

Will asked if there's all this food (chinook salmon) coming up, does this change how sturgeon move? Currently, there is not a lot of reason for sturgeon to go into Arrow; if salmon move there it could be an additional benefit.

Questions:

- Wendy W. – Another implication is fish passage. An obligation of the hydro entities is fish passage. If we're looking at passage for sturgeon, could we also look at passage for sturgeon as well? We're paying attention to this, and looking at possible use of Whoosh technology.
- Will W. – If there's all this food coming up, does this change how sturgeon move? Currently there is not a lot of reason for sturgeon to go into Arrow. If salmon move there it could be an additional benefit.
- Louise P. – You mentioned fish going into Arrow, but Arrow is cold. What are the thermal limitations for chinook. Do they have more lethality or at higher temps, or lower growth? What about Revelstoke?
    - Will W. – I think it would be a different life history of use in that reach. It would be really good for spawning. In the transboundary reach its too hot until early September or October.
- Paul Askey – Are there plans to do additional habitat characterization, to get a more refined estimate of suitability?

- Will W. – There's talk of that. There are different ways to look at suitability in small tributaries. There are plans to do that on the US side with the Colville Tribes. What it would likely tell us is there's more habitat available than these studies predicted.

2b. Environment Canada Environmental Damages Fund subgroup update

On the previous TWG video call, Steve M. updated the group on Environment Canada Environmental Damages Fund (EDF) grant opportunities. At that time, a TWG subgroup was set up to explore opportunities, that group included: *Steve M., Wendy H., James C., Will W. Mike Z., Matt N., Sarah S. Herb K., and Martin N*.

Steve reported that the subgroup had a conference call with Gregory Campbell from Environment Canada. A number of subgroup members have also talked with Environment Canada directly too.

Steve explained that the fund is the result of a $3.4 million fine paid by Cominco. Some of that went to the Environmental Trust Fund, $3 million falls under the criteria of Kootenay and Columbia, with priority being the Columbia River south of Nelson. The border is included but funds have to be spent in Canada. The challenge is what does this word priority mean; we don't have clarity on that. The funding is for fish and fish habitat restoration, not just sturgeon. It also applies also to salmon and other fish habitat. There will be another opportunity to interact on a December 11 conference call hosted by Environment Canada. The application deadline will be at the end of February. The federal government and Teck Cominco can't apply, but Tribes and other entities can.

Steve sent the subgroup an email with list of initial ideas for projects. The subgroup is trying to structure an application package with a strong focus on restoration, monitoring, and planning for that restoration. Two potential locations for on the ground habitat work are the spawning habitat in Robson Reach, or Waneta Reach. Both have benefits and challenges. The subgroup will need to come up with a structure for the proposal i.e., approaches advanced under the umbrella of the recovery initiative, but lead by individuals. Maybe it could be a series of linked proposals. Would like to get a letter of support for the project(s) that ultimately get submitted from the TWG.

ACTIONS:

- **Subgroup members to participate in December 11 call to get more information.**
- **Subgroup will continue to develop ideas/framework for proposal(s)**
- **Provide update to TWG on January TWG call.**
- **Once the proposal or proposals are developed, secure letter of support from TWG.**

3. Mortality updates

3a. Update from TWG members on any known sturgeon mortalities

Louise P., reporting for Teck said that on September 29, Unit 1 started, and 5 minutes later a sturgeon was observed floating in the water. They followed the sturgeon risk management protocols, which includes having an observer monitor start up activities. Photos were taken as it is difficult to retrieve fish directed below Waneta Dam. Photos were sent by FortisBC to Louise, and it was confirmed that it was a sturgeon. They contacted the observer/report line and attempted to retrieve the fish as per management/mortality protocols. It was too late in the day during the initial observations so they weren't able to retrieve the fish. A boat was deployed the next day and the crew couldn't locate it.

3b. Update on status of Canadian mortality protocol

Martin N. gave the following update on the status of the Canadian mortality protocol. He explained that since 2009, members of the TWG have been working on a protocol for collection of data, disposal, etc. related to sturgeon mortalities. Key changes to the latest iteration of that efforts are that the Kootenay population was added to the protocol. Also, more flexibility was incorporated into the protocol. Anything to do with permitting has been removed. It incorporates a flow chart and an amended recording form. Will get together with a handful of individuals after the TWG meeting today to finalize the document. For the purpose of the protocol, they removed funding from the document so that it allows the facility to cover the costs if it's their facility.

ACTION:

- **Herb will distribute the mortality protocol to the TWG when it is done.**

4. UCWSRI-TWG business items: Part 2

4a. UCWSRI website

Jason M. said he submitted a request for proposals for a contractor to work on the database and website. He had enough funds for the database but not the website. He got a little additional funding from the TWG group, but not enough; however, Jason found additional funds. They are currently working on transferring the domain name from Brent N. to Sitka the contractor. Once that is complete, the Sitka SOW includes refreshing and cleaning it up.

Once they start working on the updates they will provide links to polls to vote/review different designs. There will be a place on the website for the TWG where members will have a log in and be able to file share. There will also be an update to the find your sturgeon tool. Jason also worked with the contractor to build in an angling component too, so anglers can provide information on the sturgeon they capture.

In terms of the database. They went down development road with the previous contractor, but the design didn't work out because of IT concerns from various entities. Then went with a Microsoft platform, but Microsoft discontinued that. Then they went with a web based format, but had to start over because it wasn't possible to import the previous work. The new web based format is a lot nicer than the original. The admin from individual entities will be able to indicate who they will share data with.

Questions:

- Is analysis of stock assessment dependent on the database?
    - Jason – No. It isn't dependent on that. All of the data will live on that site. To get the historical data, it's going to be a one-time import so we're going to have to work closely to get that data.

ACTION:

- **Put on agenda for January call, a discussion of who should the contact(s) for the web site be (i.e., when people want to contact someone via the website who is that)? How do people get more information?**

4b. Education Subgroup

Participants briefly reviewed the education subgroup previous discussions and activities. The question remains, what should focus of the subgroup be? What would be most useful for them to work on?

Per discussion on Day 1, the education subgroup agreed to draft language regarding US sturgeon harvest (i.e., what was initial reason for harvest, listed and non-listed status of transboundary population, how is US approach different from Canadian approach, etc.)

The TWG reviewed the education subgroup membership and confirmed the following members for 2017-2018: Mitch C., Mike K., Jason M., Will W., Bronwen L., Andy M., Matt N., Louise P. Alison agreed to coordinate education subgroup calls.

Mitch C. reported that in September the Lake Roosevelt Water Festival hat 424 school kids participate in the educational programs (Alison will add to Operational Plan).

ACTIONS:

- **Alison will convene a call of the education subgroup in January or February 2018 to coordinate the following:**
  - **Subgroup members to draft communications for public about difference in US and Canada approaches to harvest. Each subgroup member will draft a version of communication.**
  - **Alison to combine into two or three different versions.**
  - **Discuss other education coordination needs, recommendations.**
- **Subgroup to present draft communications on harvest to TWG at April meeting for review/discussion (and any other topics).**
- **Alison to send Louise and Larry the latest version of the Operational plan that lists student/educational activities and participants numbers.**

4c. December through April UCWSRI-TWG meetings/calls

The TWG members identified the following schedule and initial list of topics for two conference calls and one in-person from December through April 2018.

- January 2018 video/conference call (date TBD). Topics to include:
  - Check-in with education subgroup.
  - Discuss EDF proposal.
  - Recruitment failure session planning (for April meeting).

- March 2018 video/conference call (date TBD). Topics to include:
  - Planning for April TWG meeting.
  - Other topics as identified in January.

- April 24-25, 2018 in-person meeting (in coordination with Lake Roosevelt Forum Conference in Spokane, WA). Initial draft list of meeting topics:
  - Joint stock assessment future activities, i.e., discuss and agree on approach to focus and frequency from 2019 on.
  - Review of joint stock assessment results from the initial 5-year period (2013-2017)
  - "Annual report" for stocking target/model review

- Discuss one or more, of the transboundary program SARA listing/US harvest topics identified at November meeting (start with highest priorities identified by dot voting)
- Final results on larval drift modeling
- Final report on Waneta predation study (possible)
- Environmental DNA presentation
- Early life history research updates
- Update on Canadian Action Plan
- Operational plan (update)
- Recruitment failure hypotheses review (Part 1 activity)
- Database and web site update

Adjourn Day 2