MEMORANDUM

TO: Fish and Wildlife Committee Members
FROM: Todd Ungerecht
SUBJECT: Presentation of Kootenai Tribe of Idaho and Idaho Department of Fish & Game on the status of Kootenai River Burbot recovery efforts

Presenters: Shawn Young, Kootenai Tribe of Idaho
Ryan Hardy, Idaho Department of Fish and Game

Summary: Dr. Young and Mr. Hardy will update the Committee on the status of two successful Council-recommended resident fish programs (KTOI #1988-064-00 and IDFG #1988-065-00) to restore Kootenai River Burbot.

Background: Native Burbot in the transboundary Kootenai basin were once abundant and provided an important subsistence, social, and sport fishery. However, due to changes in the ecosystem over the last century, the Burbot population collapsed. Burbot sport-fishing in Idaho was closed in 1992, and Tribal cultural harvest was no longer possible, due to declining populations.

Since 2003, the Kootenai Tribe of Idaho (KTOI), Idaho Department Fish and Game (IDFG), and British Columbia Ministry (BC) have co-led a Burbot recovery collaboration which includes other agencies, and a line of research through the University of Idaho Aquaculture Research Institute (UIARI). The collaboration has been guided by the Burbot Conservation Strategy, formally completed in 2005. The strategy outlines a suite of adaptive recovery measures to implement for rehabilitation of the burbot population, and is a culmination of a multitude of agencies and stakeholders coming together through the Kootenai Valley Resource Initiative (KVRI) to state that Burbot recovery is a priority and agree upon a path forward for restoration of the population.
The Burbot program has focused on re-establishing a naturally produced, self-sustaining population, using genetically similar stock from within the subbasin, as well as annual population and hatchery monitoring. From 2009-2014, Burbot were reared and released from the research collaboration. In 2014, the KTOI completed a conservation hatchery at the confluence of the Moyie and Kootenai Rivers in northern Idaho to increase flexibility for the Tribe’s sturgeon aquaculture program, as well as to implement population rehabilitation for Burbot. Since then, the Twin Rivers Sturgeon and Burbot Hatchery has greatly scaled up releases that have resulted in a significant Burbot abundance increase.

KTOI collaborates with IDFG and BC to capture and spawn adults from the donor population and from the re-established in-river population. In the hatchery, KTOI rears the Burbot in a manner to simultaneously support rebuilding Burbot abundance, post-release research, monitoring, and evaluation, and studies investigating early life habitat requirements that determine recruitment dynamics. Dr. Young will present an overview of the collaborative effort, and how KTOI conducts the in-hatchery portion to support post-release monitoring and evaluations completed primarily by IDFG, which then helps guide adaptive management by the working group collaboration.

IDFG performs the primary in-river evaluations to determine the efficacy of the stocking program, to identify factors limiting wild recruitment, and gauge the success of reaching population targets identified in the Burbot Conservation Strategy. Mr. Hardy will present results of these surveys, which are provided to the Kootenai Tribe of Idaho to assist in setting hatchery stocking numbers as well inform the effect of different stocking strategies on survival. Through these evaluations, it is clear that the Burbot restoration program has been a success at accomplishing many pre-established objectives including the ability to sustain a harvest fishery, which was re-opened in January of 2019.
The Kootenai Tribe
Kootenai River

Prior to European settlement, the Kootenai River watershed with its riparian forest and wetland complexes was one of the most productive in the Pacific Northwest.
Since 1890’s...........

- > 100,000 acres of off-channel floodplain disconnected.
- 60,000 acres of wetlands converted.
Libby Dam was completed in 1974.

“Nutrient Sink”

- Hydrograph is managed seasonally and annually.
- Thermograph is altered across annual cycle.
✓ No natural recruitment since 1970’s.
✓ Burbot were functionally extirpated by 1990’s.
✓ There were not enough burbot to support a hatchery program or to use for research.
Agency, Tribal and Community Collaboration

February 2002

KVRI agrees to form a Burbot Subcommittee to develop a conservation strategy.
Burbot Conservation Strategy

- Habitat Restoration
- Conservation Aquaculture
- Alternative Hydro Operations Plan
- Monitoring and Evaluation
- Education and Outreach
Burbot Program History

1999-2002: KTOI, IDFG, BC investigate feasibility

2003: Aquaculture Research Begins (U. of Idaho)

2005: Burbot Conservation Strategy (multi-agency)

2009: 1st Hatchery Burbot Released

2009-2014: U. of Idaho Reared Burbot
Burbot Conservation Strategy

Guiding Documents:

Kootenai River Native Fish Conservation Aquaculture Program
Step 2 Document
Volume 2 – Appendices

Appendix C
Monitoring and Evaluation Plan
for Kootenai River Burbot
(Lota lota maculosa)
2015-2019: KTOI assumes all rearing, Twin Rivers Hatchery Operational

Burbot Program History
With this information, here we are again:

Adaptive Management – Change your plan

1. Population Rebuild
2. Genetic Diversity
3. Research, Monitoring, and Evaluation
   - Supports science-based adaptive management.
RECOVERY AREAS – ADULT ABUNDANCE GOALS

LAKE = 20,000

RIVER = 17,500
1. Lower Kootenay Recovery
2. Lake Roosevelt Monitoring Program
Knowledge Transfer

1. Lower Kootenay Recovery
2. Lake Roosevelt Monitoring Program
3. Upper Kootenay Recovery
1. Lower Kootenay Recovery
2. Lake Roosevelt Monitoring Program
3. Upper Kootenay Recovery
4. Upper Columbia Recovery
Knowledge Transfer

1. Lower Kootenay Recovery
2. Lake Roosevelt Monitoring Program
3. Upper Kootenay Recovery
4. Upper Columbia Recovery
5. Okanagan Nation Alliance Program
Kootenai Tribe of Idaho Burbot Hatchery Operations to Support Idaho Fish and Game M&E

NPCC Meeting
12-13 Nov 2019
Nathan Jensen
njensen@kootenai.org
208-267-1689
Hatchery Plan View and General Production Timeline

Burbot adults and eggs come in January-February

Larvae/Juveniles out to specific locations April-September

October-December Prepare for next Life-cycle/Year-class
Kootenai River Adults

1. Broodstock are captured by IDFG in January and transported to KTOI-H2 by KTOI

2. Fish are sorted in hatchery, PBT is used to track fish-groups and groups are allowed to volitionally spawn

3. Eggs are collected in a custom catch system
Eggs From Moyie Lake B.C.
(Primary source for program)

1. Adults captured through ice

2. Adults are given unique code(s) and ‘fin-clips’ are collected for parental based tagging (PBT)

3. Fertilized eggs are transported through US customs to hatchery
Some Program Notes

1. We have multiple brood sources now
   - Adults from Kootenai River
   - 99%ish Hatchery Fish
   - Fertilized eggs from Moyie Lake
     - Genetic variation from lake is now in river

2. Individual family separation is required

3. Burbot require live feed during early life

In-hatchery family tracking example
1. Live feed begins when mouth develops
2. No mouth for two weeks
3. Swim bladder inflation is a critical phase for survival

Swim bladder
Two weeks

No mouth at hatch

70K, 42% loss
56K, 20% loss
Live Feed Culture is Required

1. Rotifer and Artemia are raised March-June

2. Harvestable populations of 10 Billion is the target
   - 200 Million organisms are needed per day

3. We are investigating other ‘native’ freshwater zooplankton species
Juvenile Rearing

1. Numbers and size vary by family

2. After feed training mortality subsides

3. Cannibal fish can be graded out or left in rearing tanks to “clean-up” poor-quality fish

(Top) a look into a tank of fish ready to go to river; (Bottom) example of size variation within a family group
General Release Sites

Release Locations

Kootenai Tribe Community Burbot Release

British Columbia

Idaho

General Release Sites
ALL JUVENILE BURBOT RELEASES COMBINED (2009-2019)

OVERALL SINCE 2009 = 1,440,000

BC = 182,000
BORDER = 404,000
ID = 854,000
Release numbers since 2009

Hatchery Burbot Release History 2009-2019

Juvenile/Adult Release Numbers

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Release numbers since 2009

Burbot Larvae, Juvenile, Adult Stocking History 2009-2019

- Prefeeding larvae
- Postfeeding larvae
- Juvenile/Adult
Summary

1. Expect high mortality, variability among year classes
   • We have PBT now, can now experiment with release of small fish to study survival bottlenecks

2. Hatchery burbot larvae will survive post release
   • May be able to use this to condense some production cycles to provide more ‘natural’ fish
   • Still need to produce juveniles for disease testing and diversify releases to spread out risk

3. All hatchery operations are focused on supporting IDFG monitoring program while meeting production targets
BURBOT
(Lota lota maculosa)
BURBOT ABUNDANCE

Abundance

1997 1999 2001 2003 2005 2007
- AGE SPECIFIC SURVIVAL
- EFFECTS OF STOCKING LOCATION, SIZE, AND AGE AT RELEASE
- JUVENILE AND ADULT ABUNDANCE
- MOVEMENT AND DISTRIBUTION
- RECRUITMENT BOTTLENECKS
BURBOT
PARENTAL BASED TAGGING (PBT)
RESULTS – CATCH RATES

CPUE (# fish / day)

Year

1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019

0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
BURBOT SURVIVAL

- Annual Survival (%)
  - Weight = 8 g
  - Weight = 9 g
  - Weight = 10 g

Release location
BURBOTT SURVIVAL

Annual Survival (%) vs Age at Release

-10 to 110 scale on y-axis

-0 to 4 scale on x-axis

Larval, 0, 1, 2, 3, 4

Graph showing survival rates for different age groups.
BURBOT SURVIVAL

Annual Survival (%) vs. Age at Release

-10 10 30 50 70 90 110

Larval 0 1 2 3 4

Age at Release
BURBOT SURVIVAL

Annual Survival (%) vs Age at Release

- Larval

Age at Release:
- 0
- 1
- 2
- 3
- 4

Annual Survival (%):
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 110
BURBOT GROWTH
BURBOT GROWTH

Relative Frequency (%)

Weight (g)
BURBOT RECRUITMENT

2019 Season

8 year classes

n = 526

2009

2011

2012

2013

2014

2015

2016

2017

Unknown
BURBOT RECRUITMENT

BURBOT RECRUITMENT

Burbot lifecycle
BURBOT ABUNDANCE

The graph shows the total abundance of burbot from 2019 to 2040, with a trend line indicating an increase. The year 2019 is marked on the graph, and the total abundance is shown to be increasing over time.
BURBOT ADULT ABUNDANCE
HISTORICAL BURBOT FISHERY
BURBOT FISHERY – REOPENED IN 2019
BURBOT FISHERY – REOPENED IN 2019
Thanks to Cooperators:

KTOI
BCMFLNRO
MFWP
USFWS
USGS
USACE
Steve Dinsmore – Iowa State University
IDFG Staff
NWPCC
BPA