

# KOOTENAI BURBOT RESTORATION PROGRAM

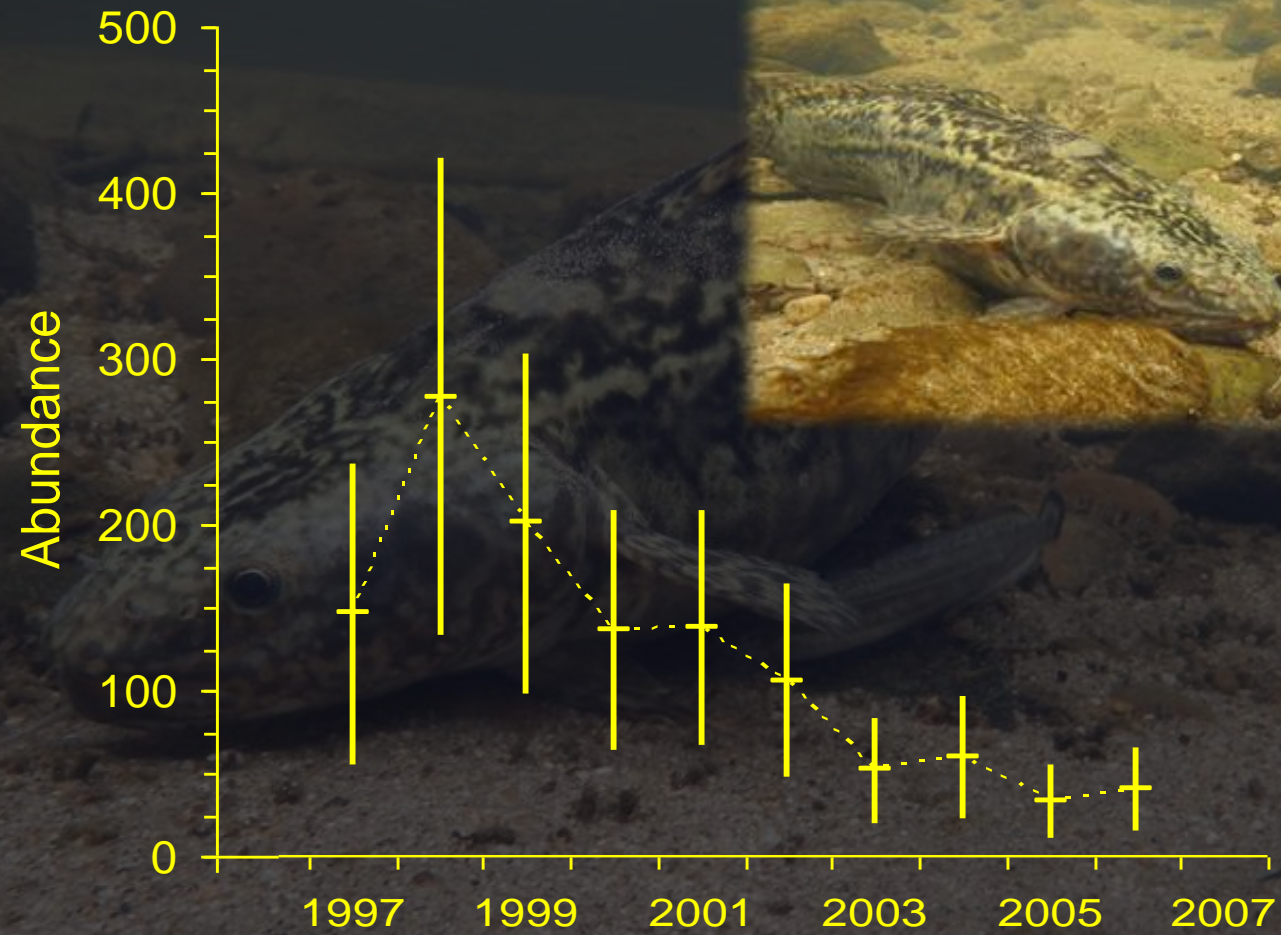


# BURBOT

(*Lota lota maculosa*)



# BURBOT ABUNDANCE



A large fish, possibly a salmon, is resting on a sandy beach. The fish is positioned horizontally, facing left. Its body is covered in dark spots and stripes. In the background, there is a piece of driftwood and some rocks. The overall scene is dimly lit, suggesting a low-light environment.

# RESEARCH OBJECTIVES

- AGE SPECIFIC SURVIVAL
- EFFECTS OF STOCKING LOCATION,  
SIZE, AND AGE AT RELEASE
- JUVENILE AND ADULT ABUNDANCE
- MOVEMENT AND DISTRIBUTION
- RECRUITMENT BOTTLENECKS

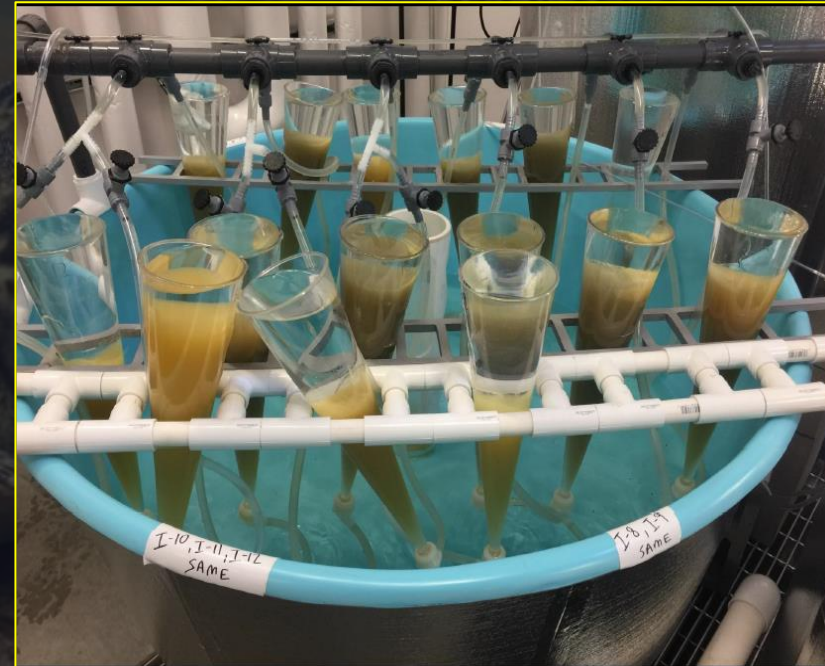
# BURBOT



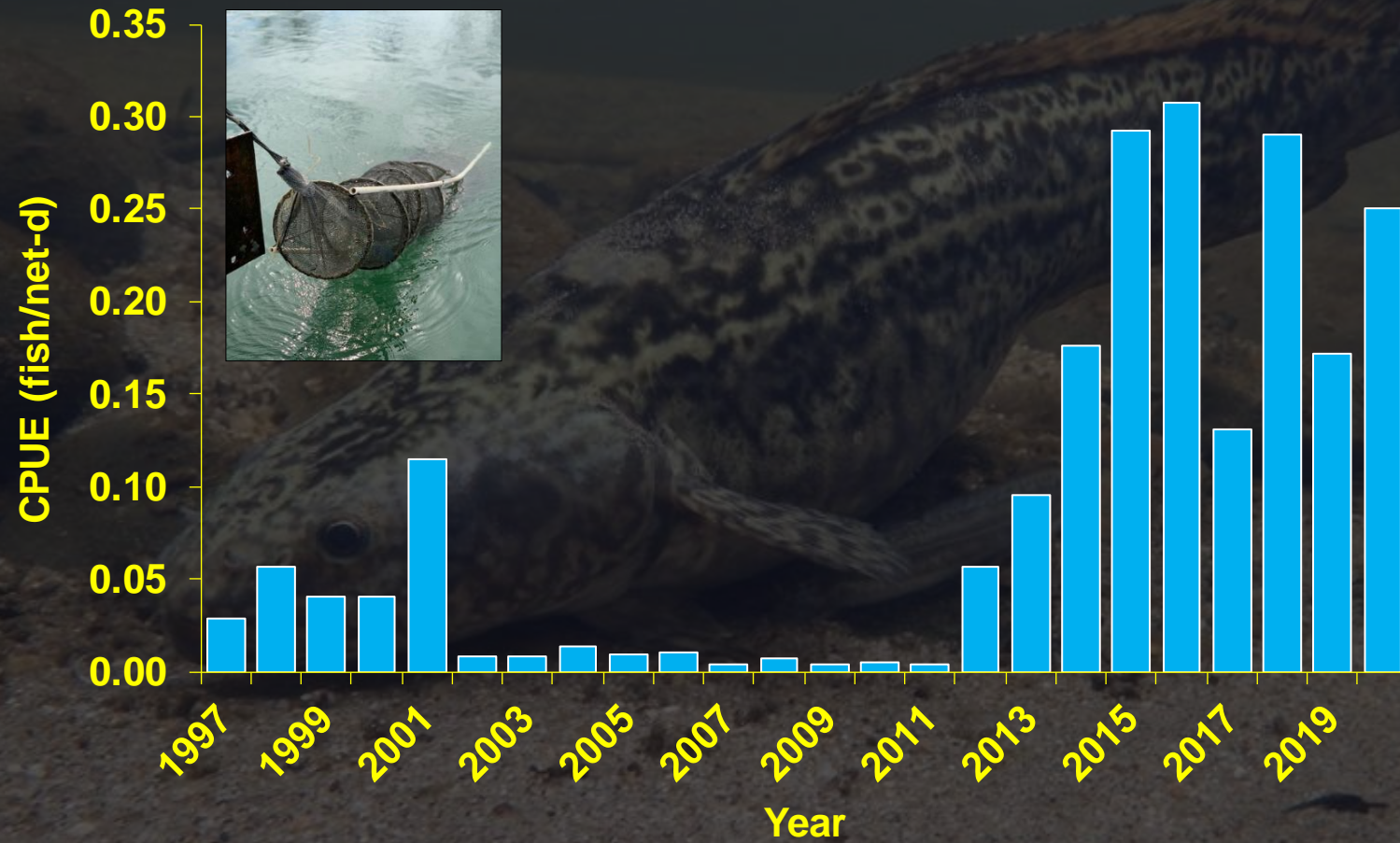
# PARENTAL BASED TAGGING (PBT)



# FAMILY SEPARATION IN HATCHERY

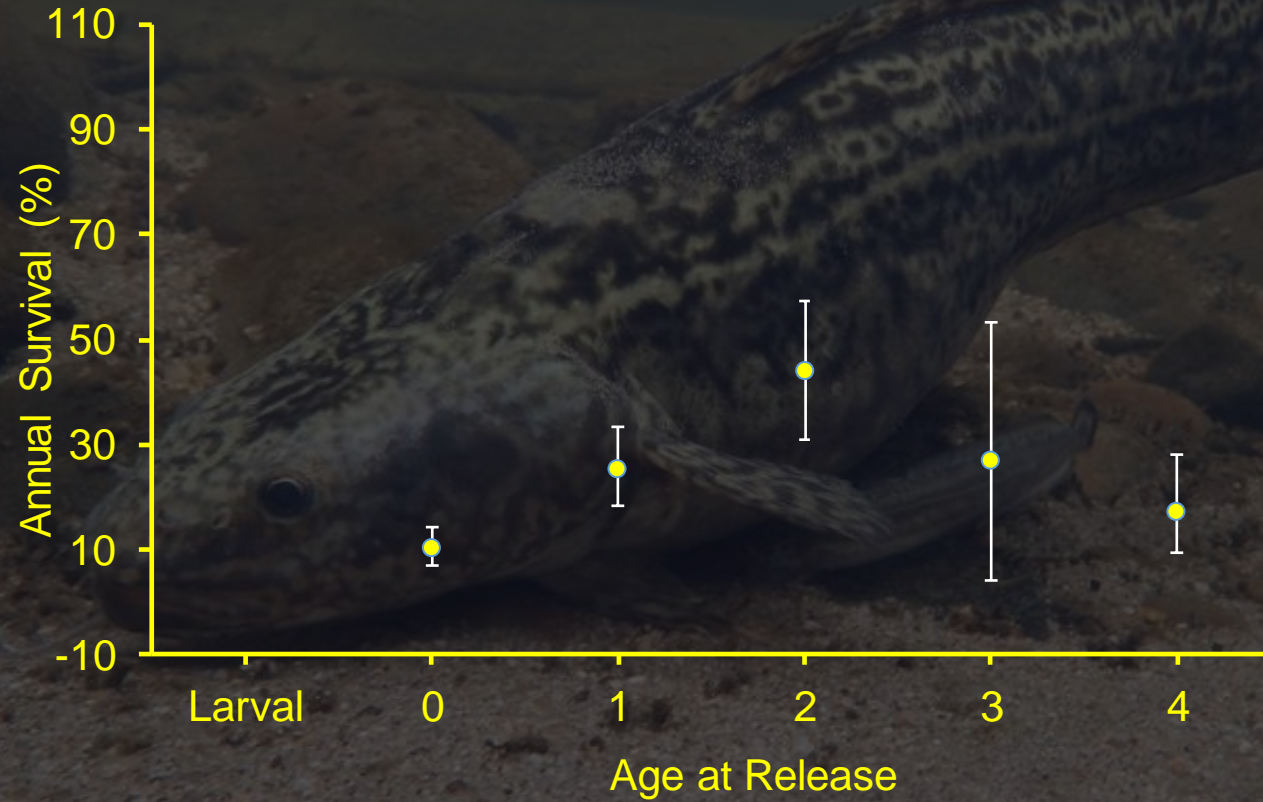


# RESULTS – CATCH RATES

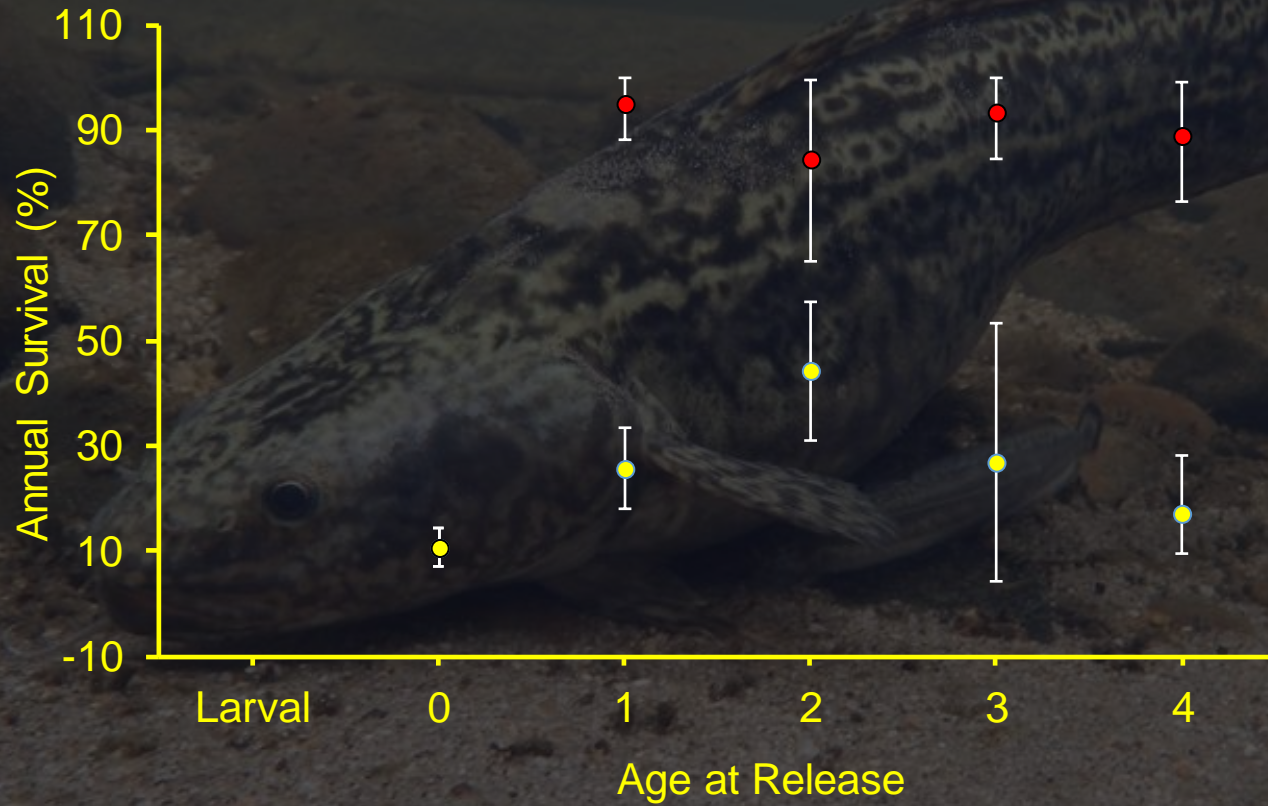




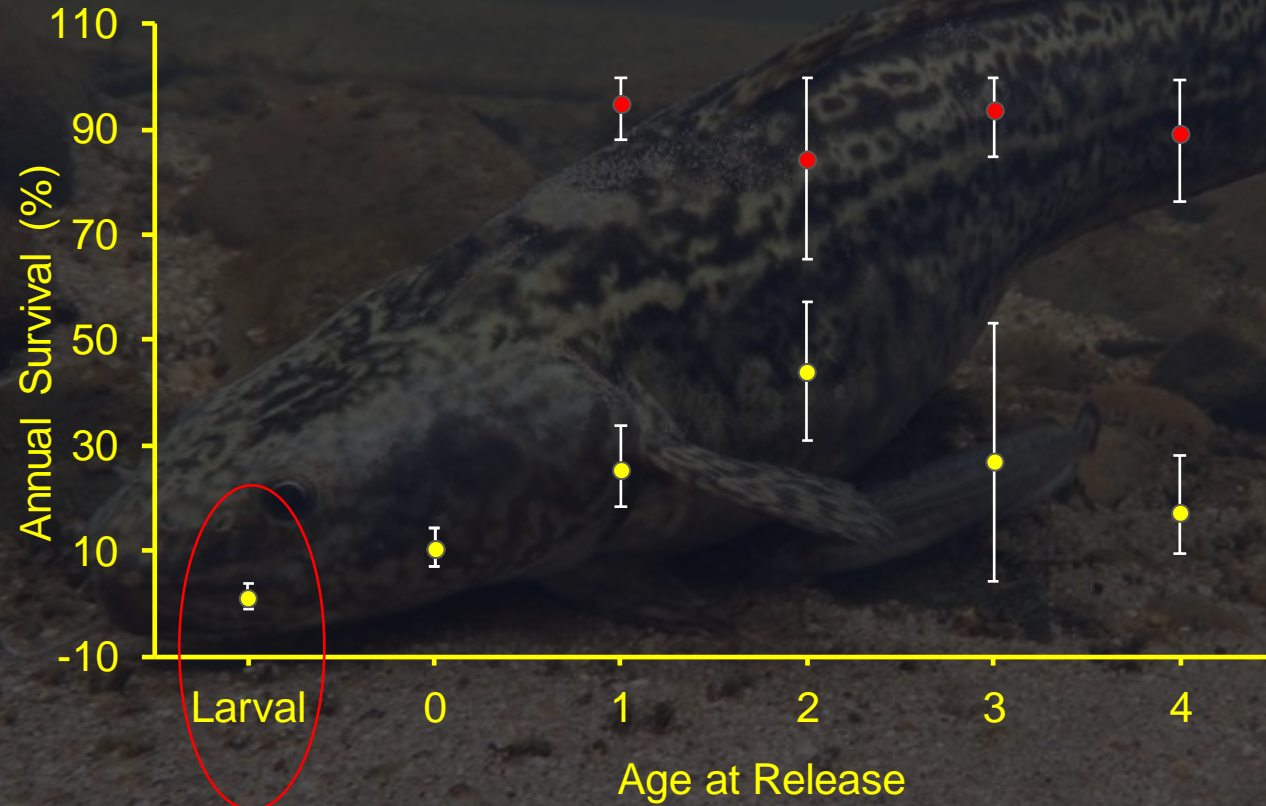
# BURBOT SURVIVAL



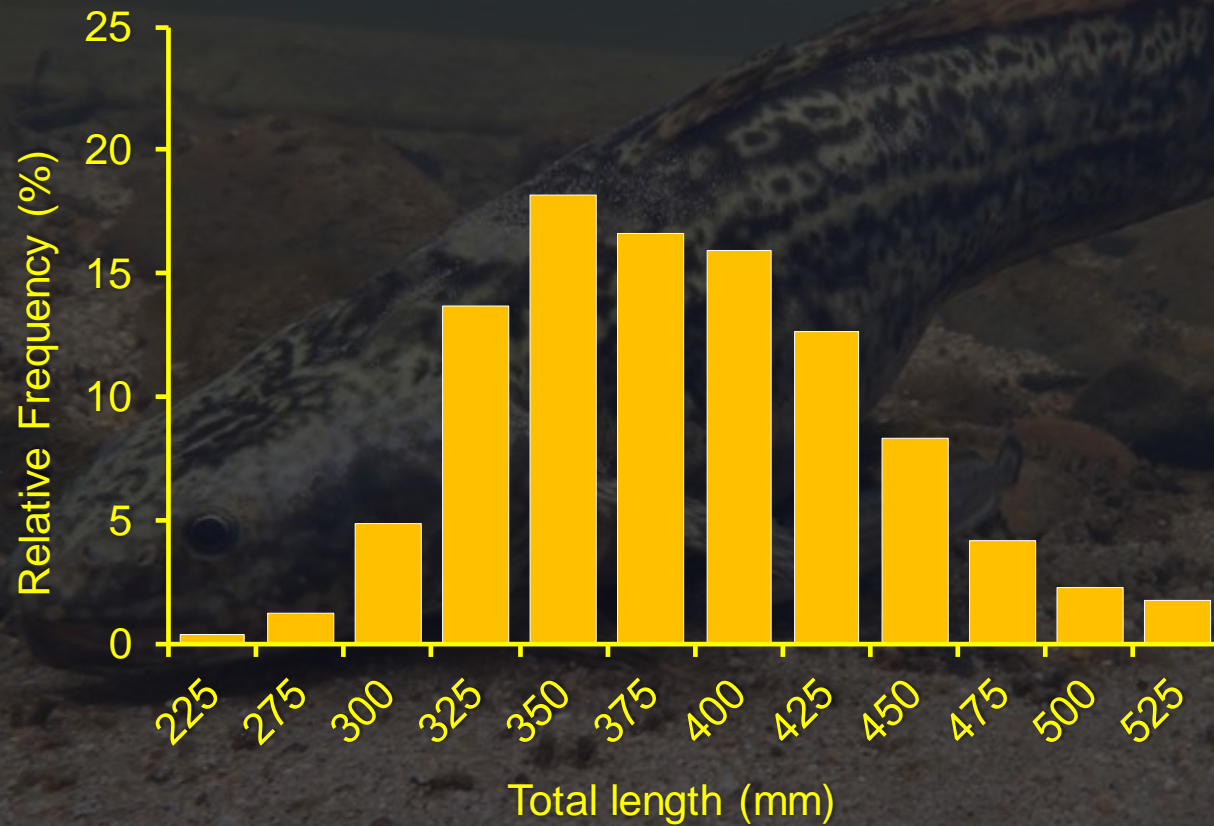
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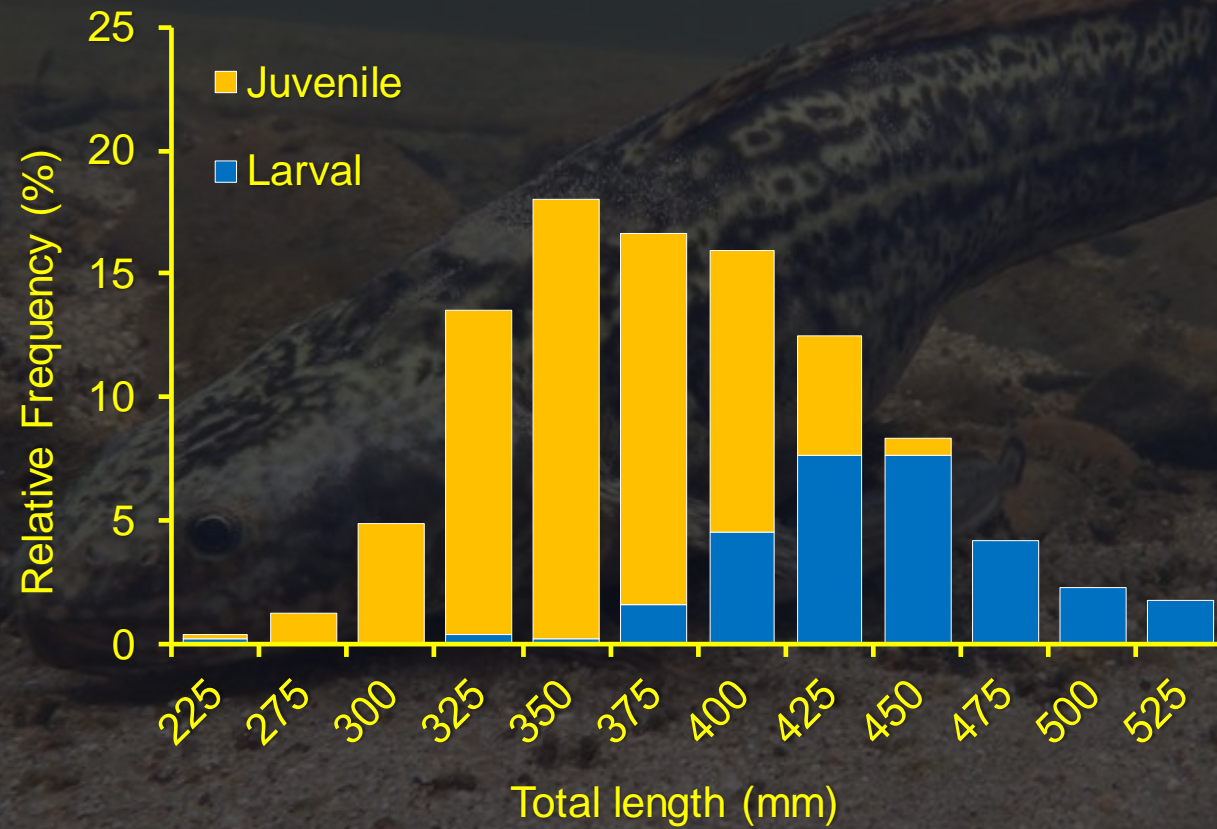
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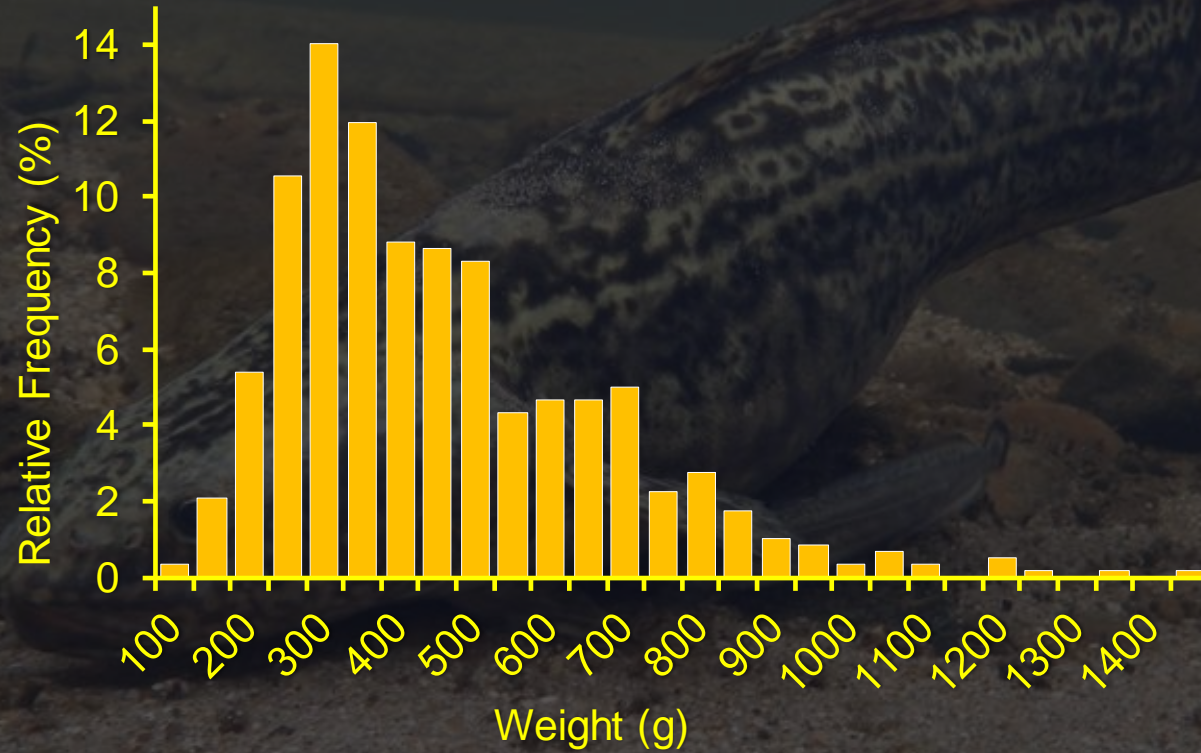
# BURBOT GROWTH



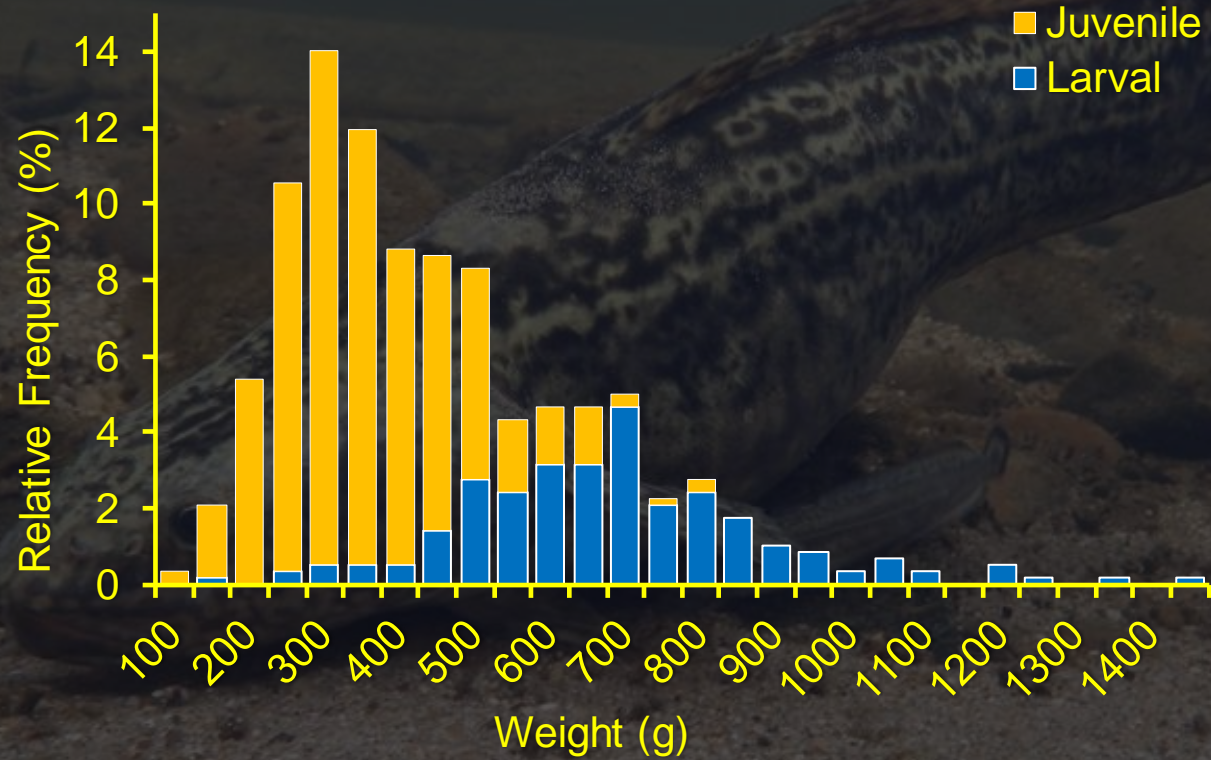
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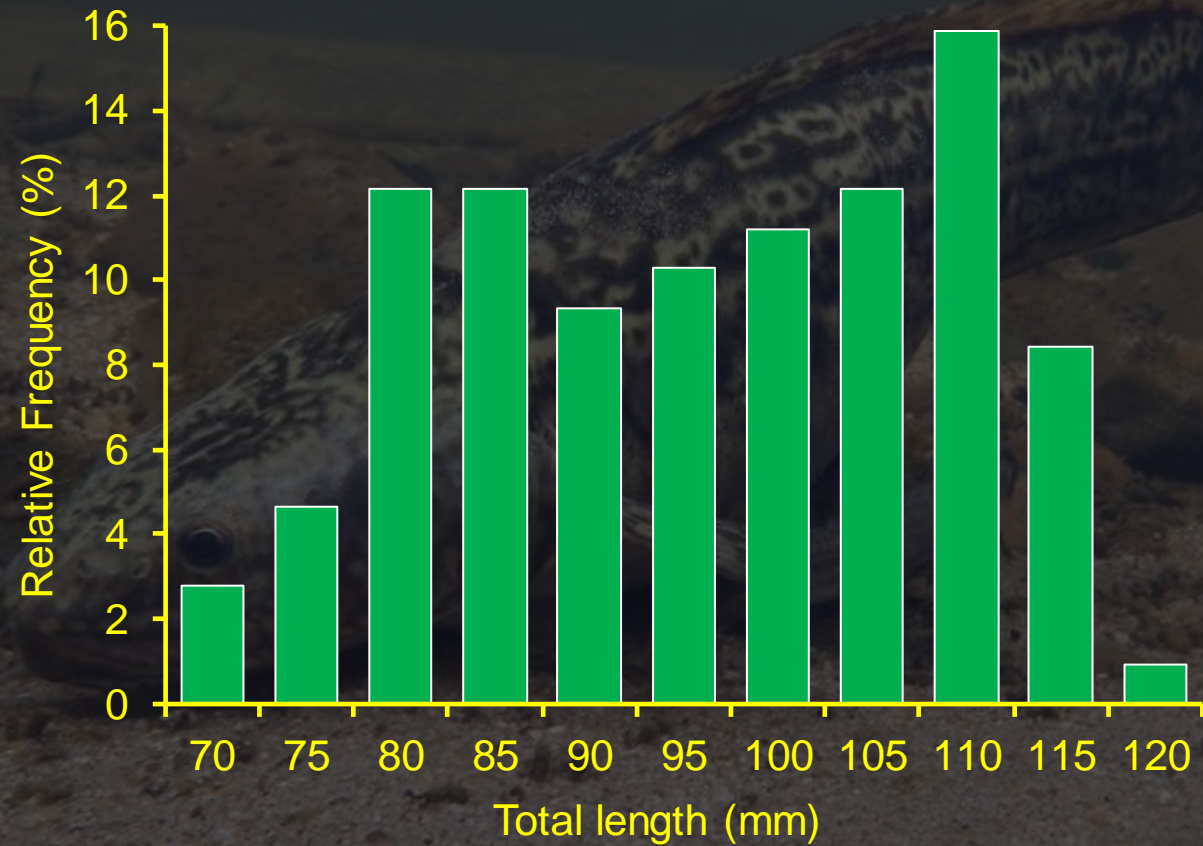
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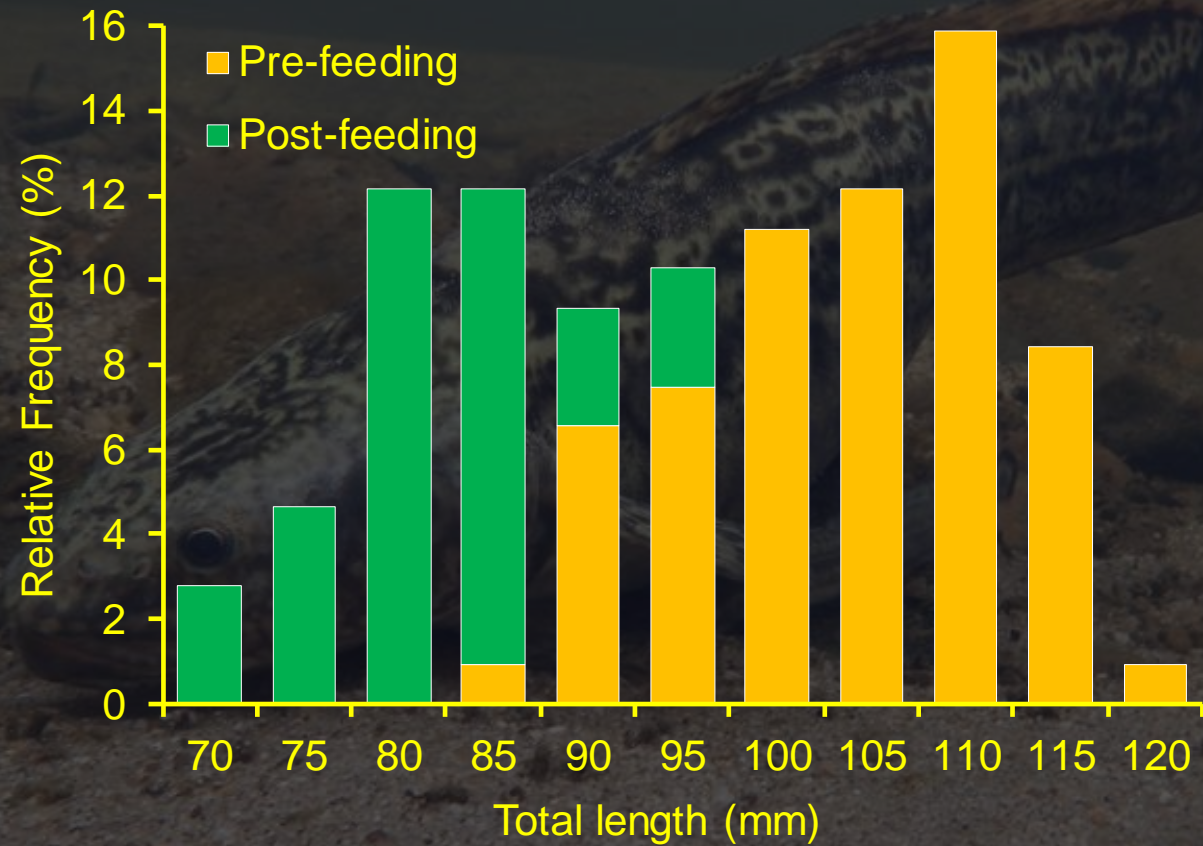


# BURBOT GROWTH





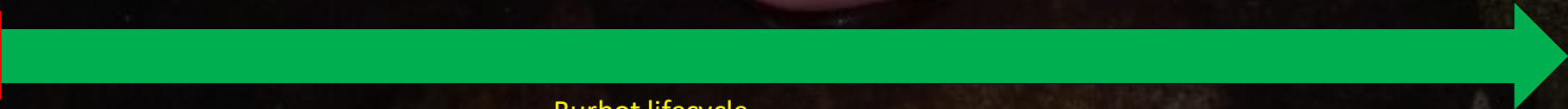
# BURBOT GROWTH



BURBOT  
RECRUITMENT

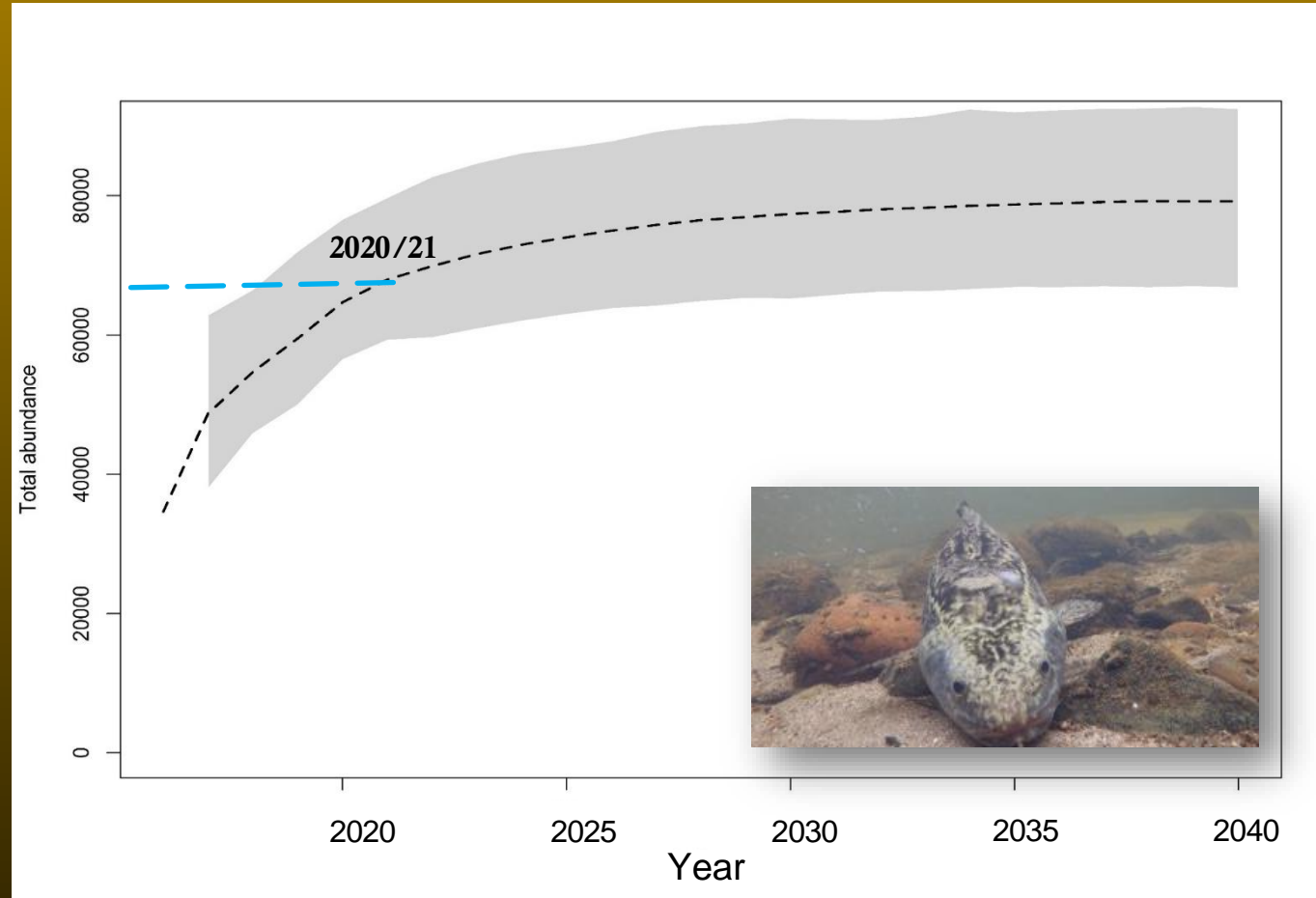


# BURBOT RECRUITMENT

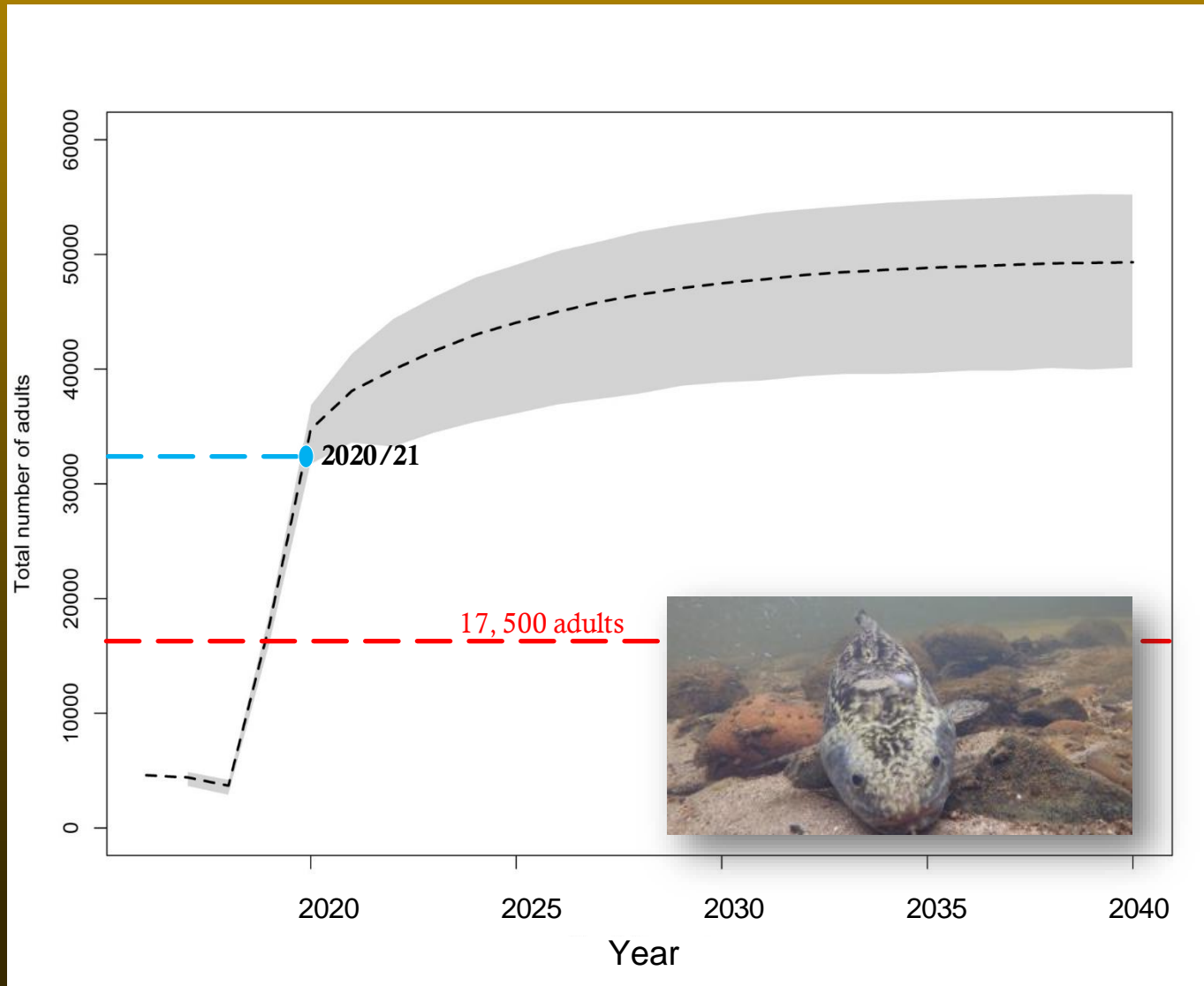


Burbot lifecycle

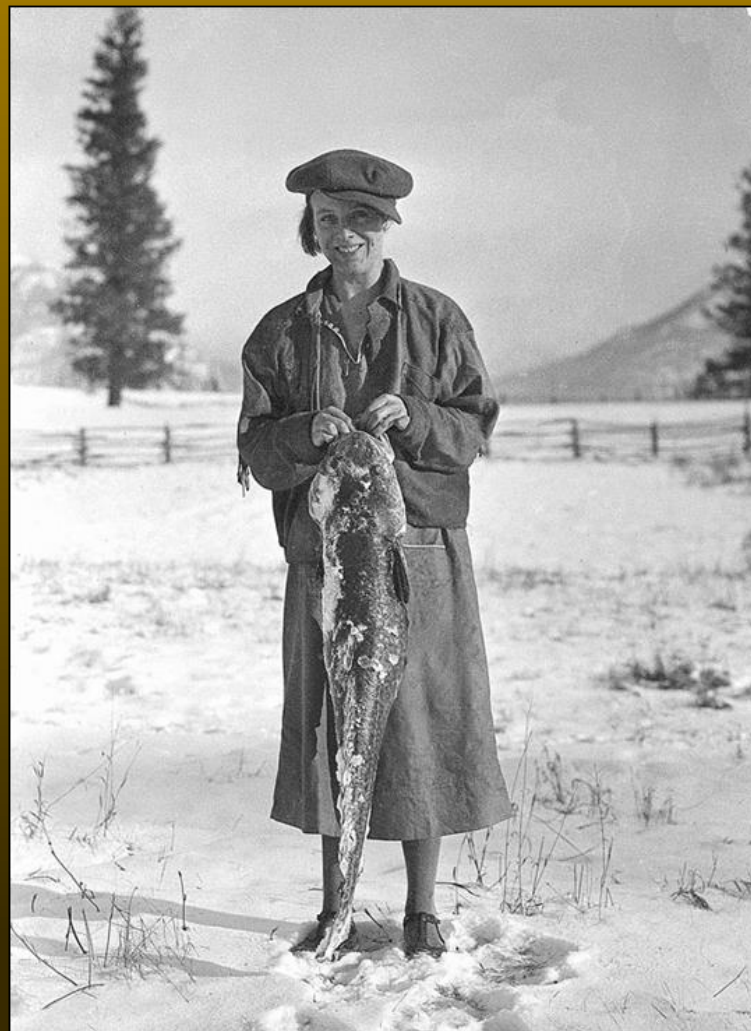
# BURBOT ABUNDANCE



# BURBOT ADULT ABUNDANCE



# HISTORICAL BURBOT FISHERY



# BURBOT FISHERY – REOPENED IN 2019



# BURBOT FISHERY – REOPENED IN 2019





# BURBOT CONCLUSIONS



# Thanks to Cooperators:

KTOI

BCMFLNRO

MFWP

USFWS

USGS

USACE

Steve Dinsmore – Iowa State University

IDFG Staff

NWPCC

BPA

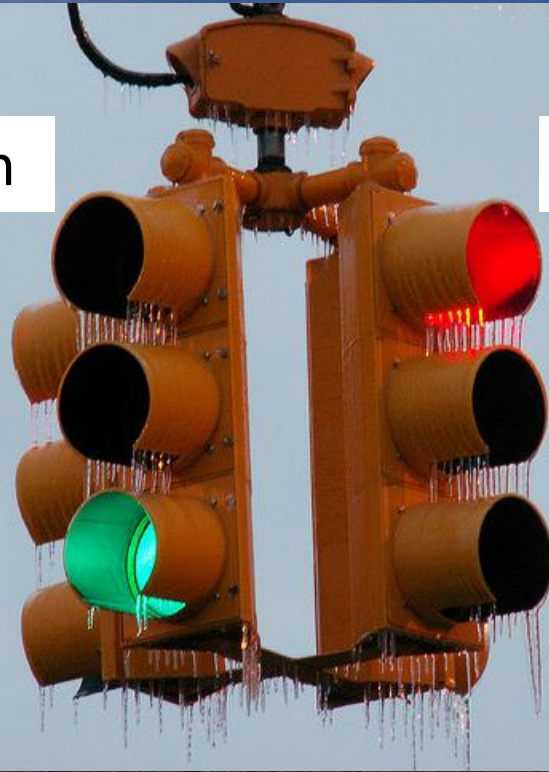


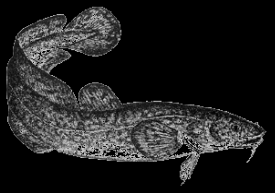
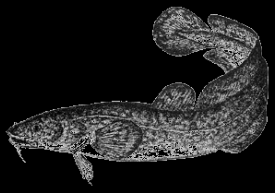


University of Idaho provided burbot 2009-2014.  
The KTOI burbot facility produced first year class in 2015.

Population Restoration

Natural Recruitment



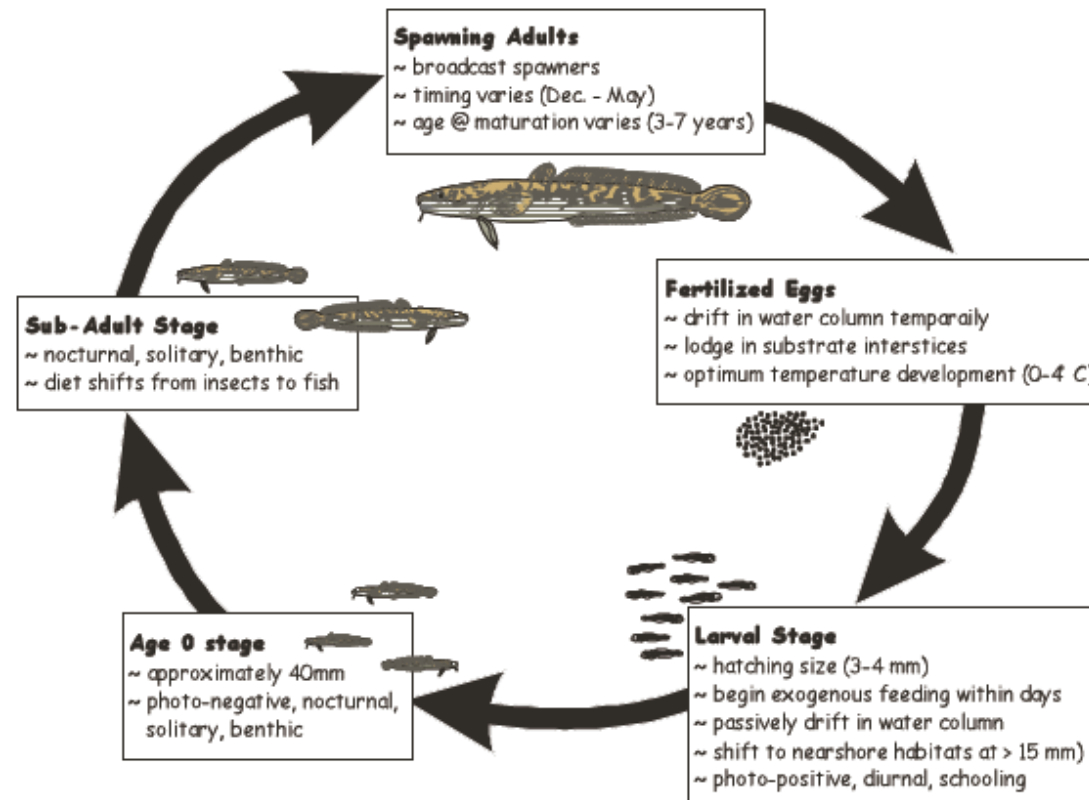
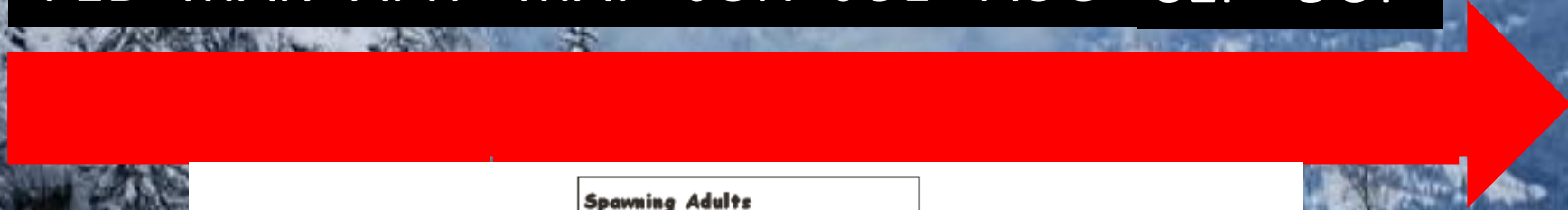


1. Rebuild population abundance
2. Experimental early life stage releases to investigate habitat dynamics



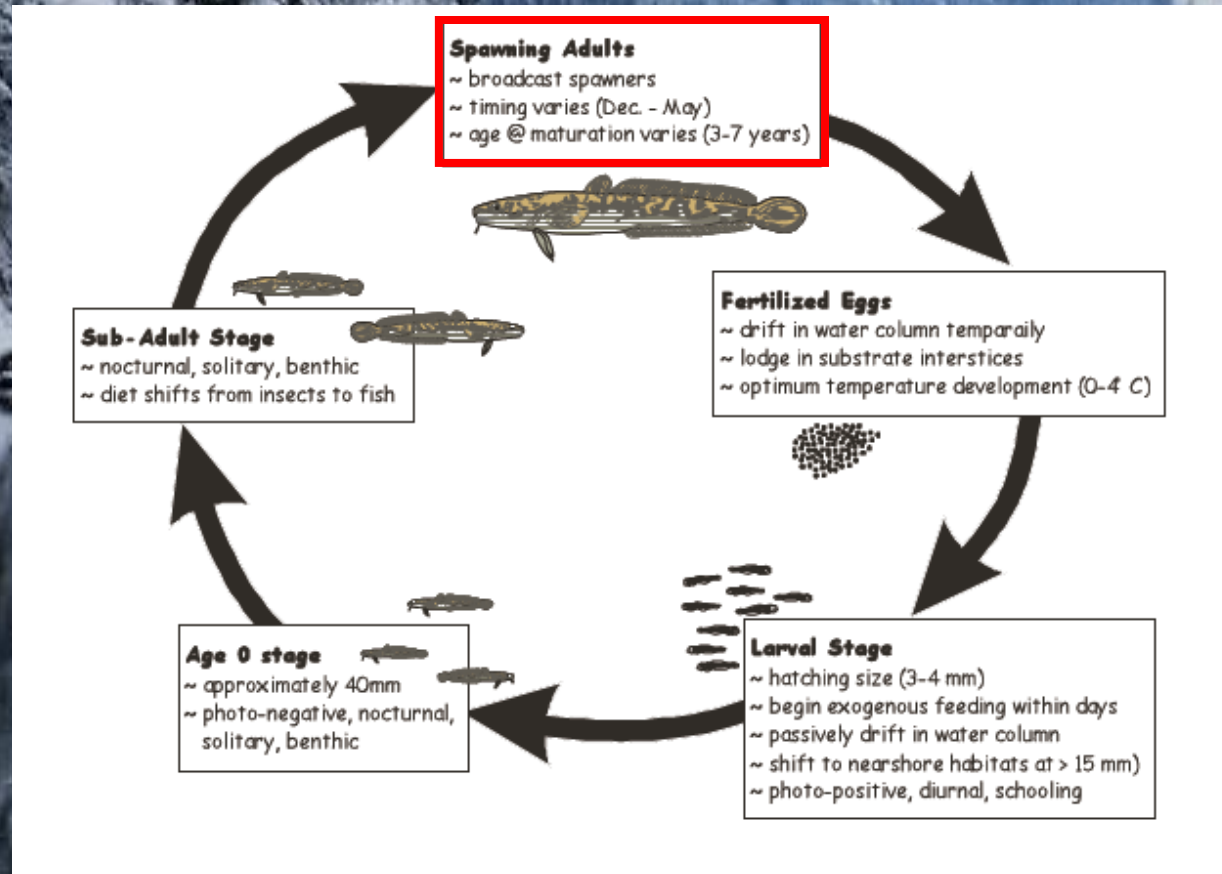
# When and why do the recruitment bottlenecks occur?

FEB MAR APR MAY JUN JUL AUG SEP OCT



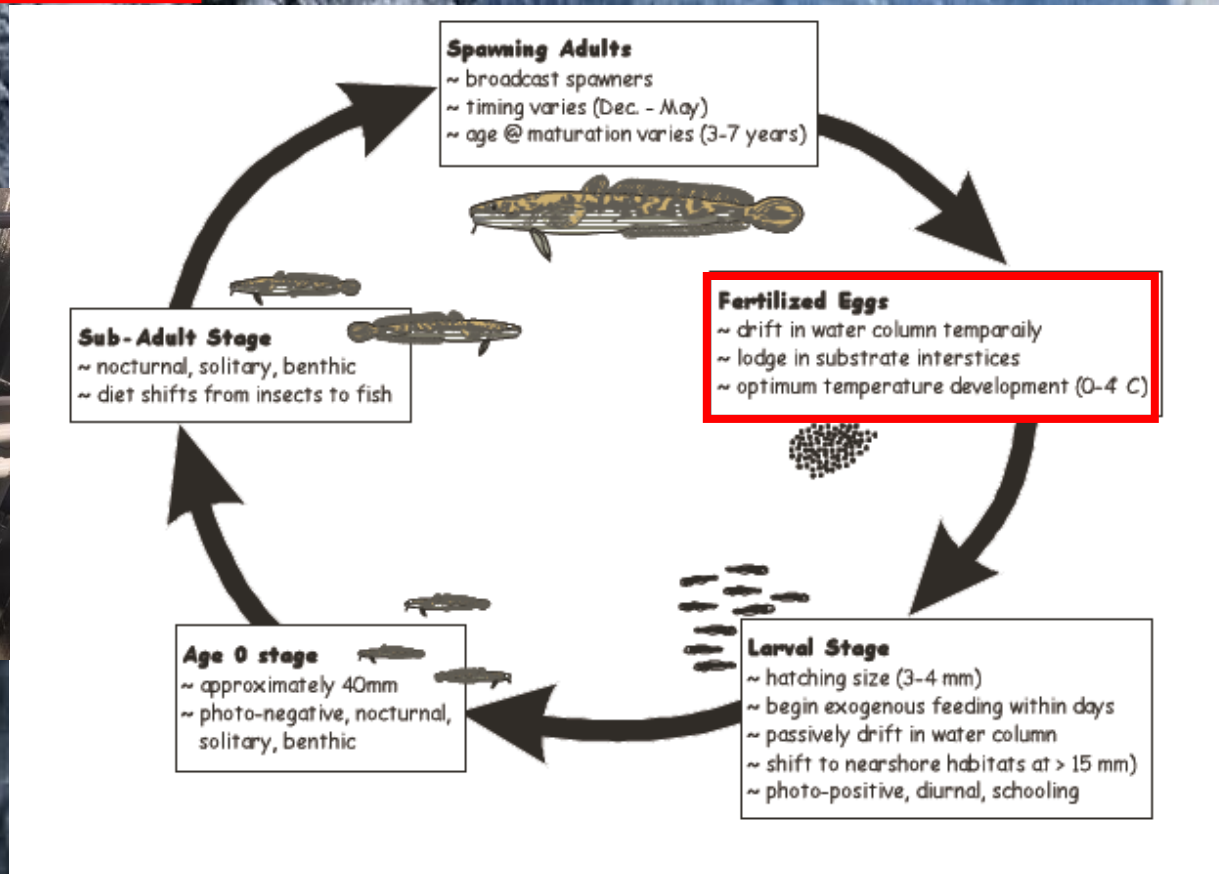
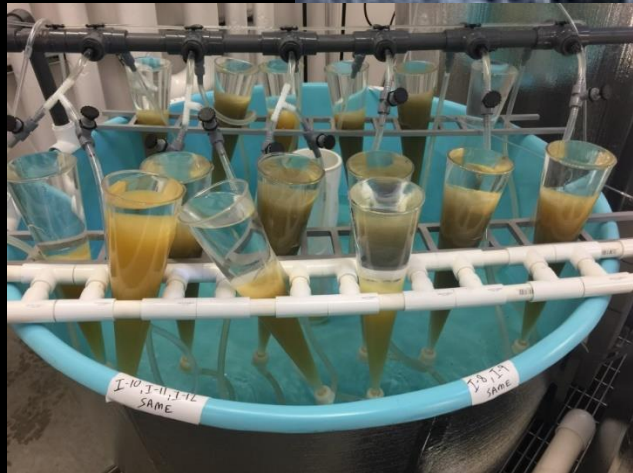
# Chronology of Burbot Early Life Stages

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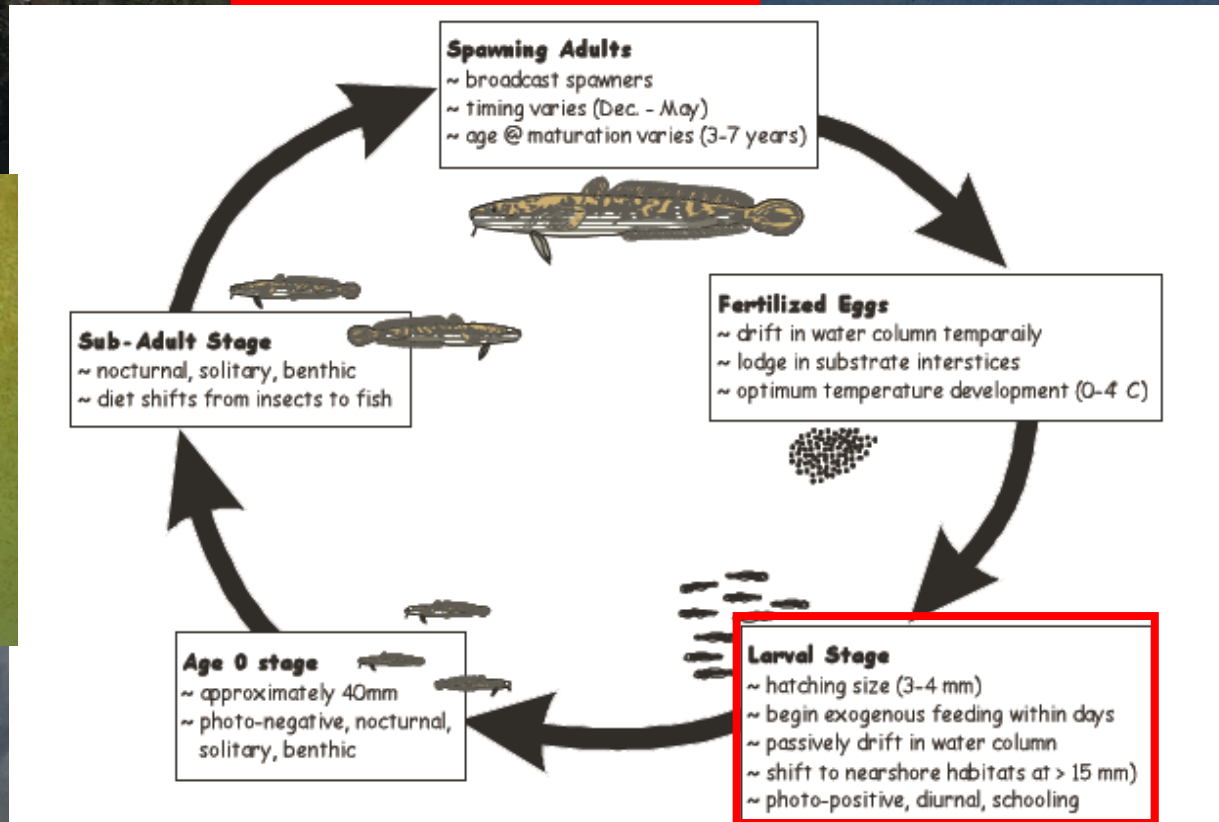
FEB MAR APR MAY JUN JUL AUG SEP OCT





# Chronology of Burbot Early Life Stages

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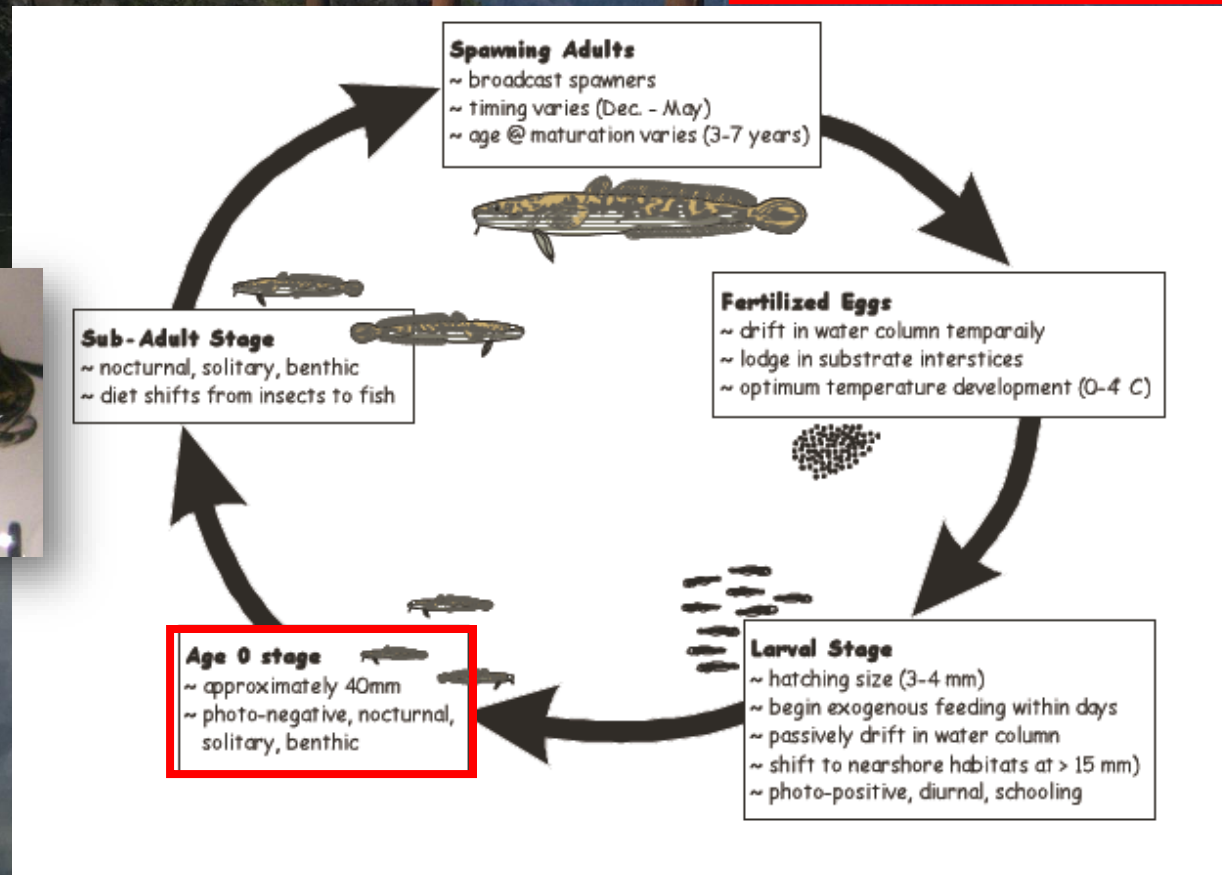


Guess how many larvae are in this pic?



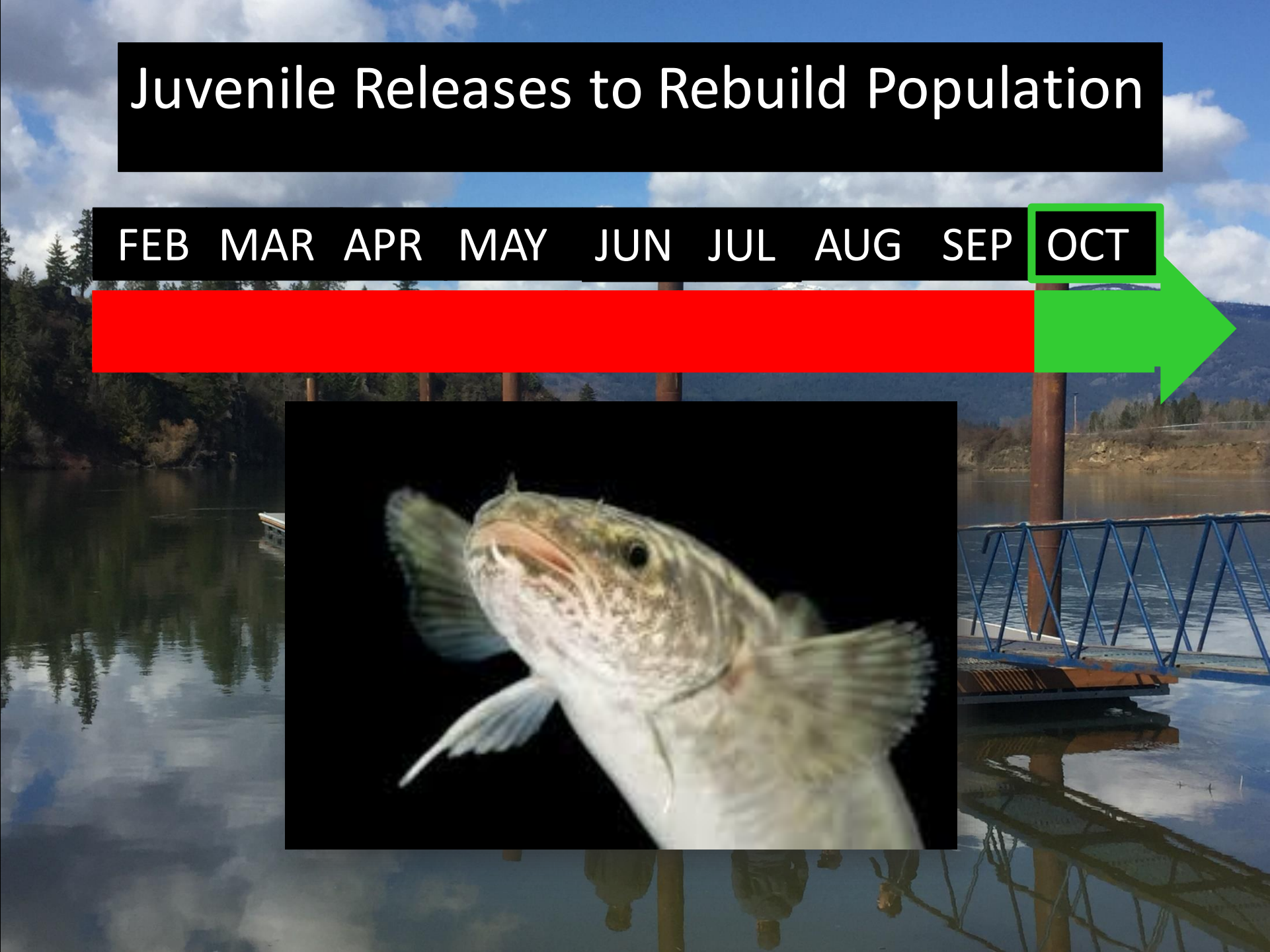
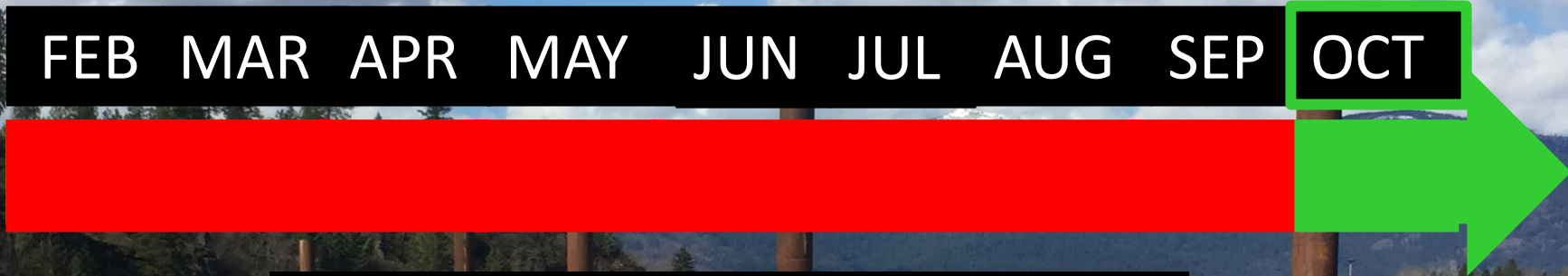
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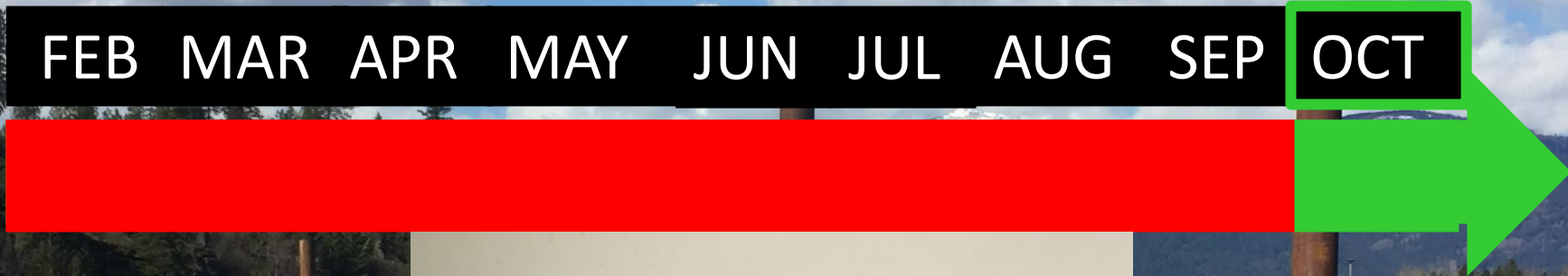
# Juvenile Releases to Rebuild Population

FEB MAR APR MAY JUN JUL AUG SEP OCT



# Juvenile Releases to Rebuild Population

FEB MAR APR MAY JUN JUL AUG SEP OCT



Parental Based Tagging



# Juvenile Releases to Rebuild Population

FEB MAR APR MAY JUN JUL AUG SEP OCT



- ✓ 10% survive during Age-1.
- ✓ Annual survival is 80–90% for Age-2 to Age-8.
- ✓ Estimated 50,000 2-8 year olds.

Are adults maturing, producing viable gametes,  
and spawning?

FEB MAR APR MAY JUN JUL AUG SEP **OCT**



Are adults maturing, producing viable gametes,  
and spawning?

FEB

MAR

APR

MAY

JUN

JUL

AUG

SEP

OCT



# Picture of Kootenai Tribe of Idaho staff releasing larval burbot

Co-author, Nathan Jensen



Kootenai Tribe Burbot Specialist, Brycen Lunger

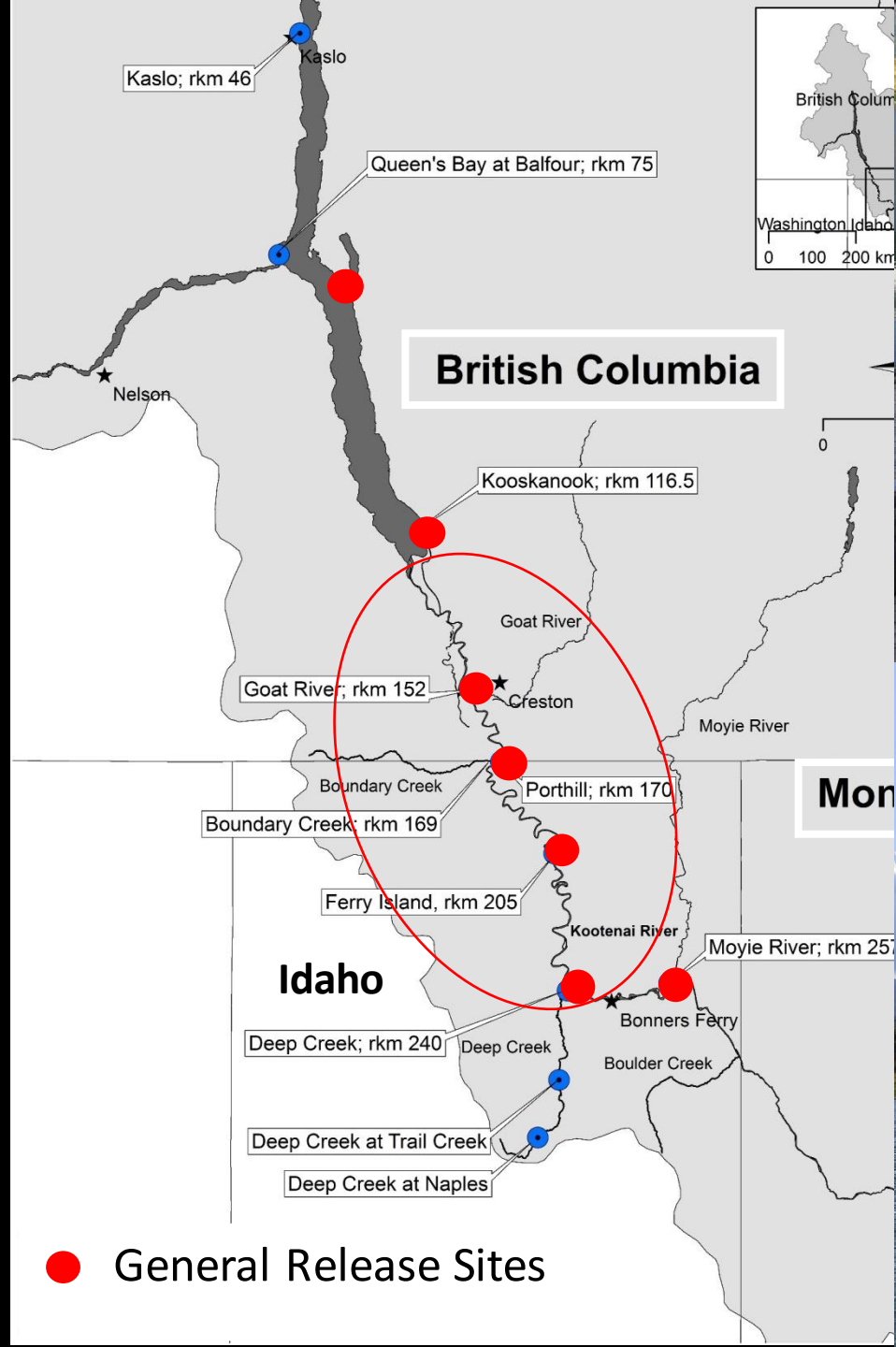






**Picture of Kootenai Tribe of Idaho staff releasing larval burbot**





KTOI staff releasing burbot





## Example of Lower Tributary Release Sites



## Habitat Project – Floodplain Reconnect

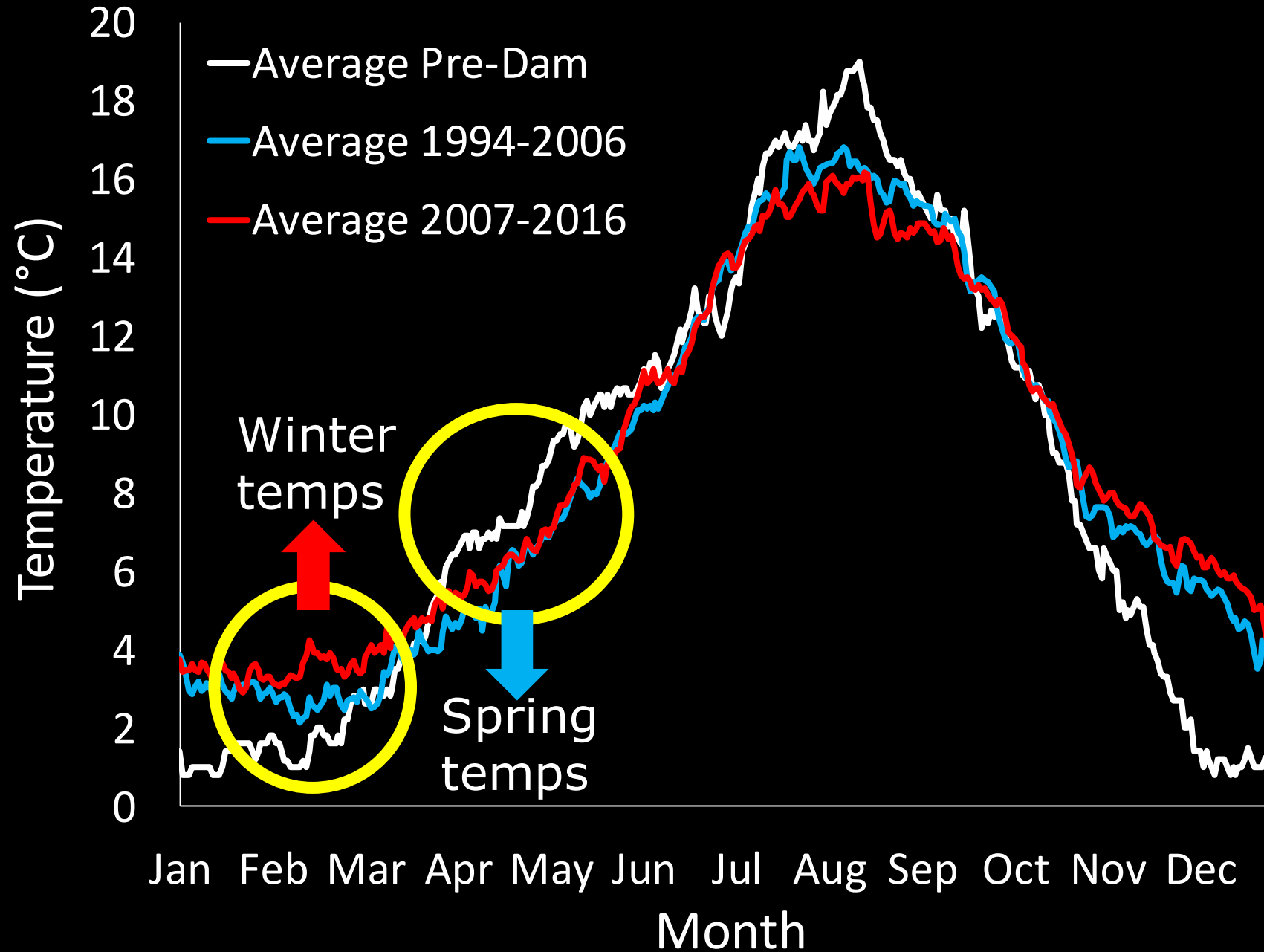


# Egg Incubation

FEB MAR APR MAY JUN JUL AUG SEP OCT

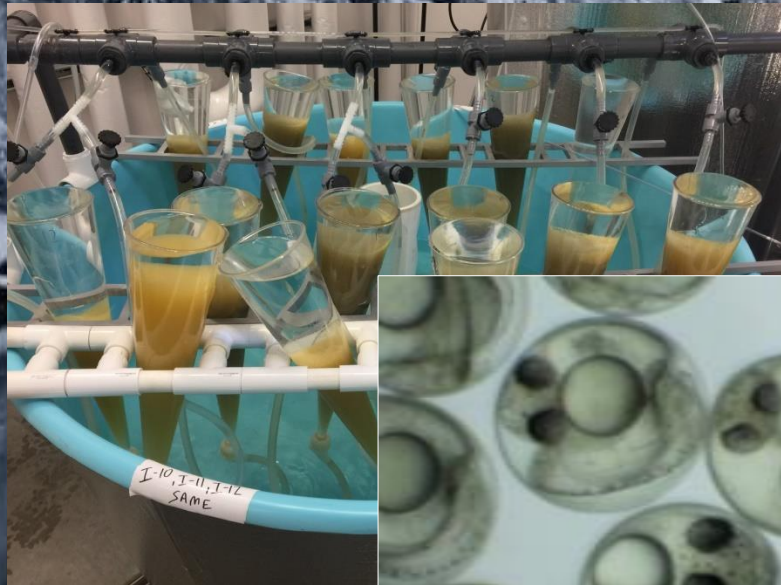
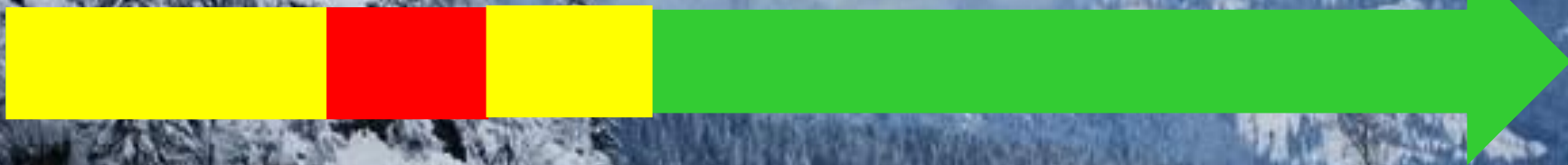


# Changes in Average River Surface Temperature

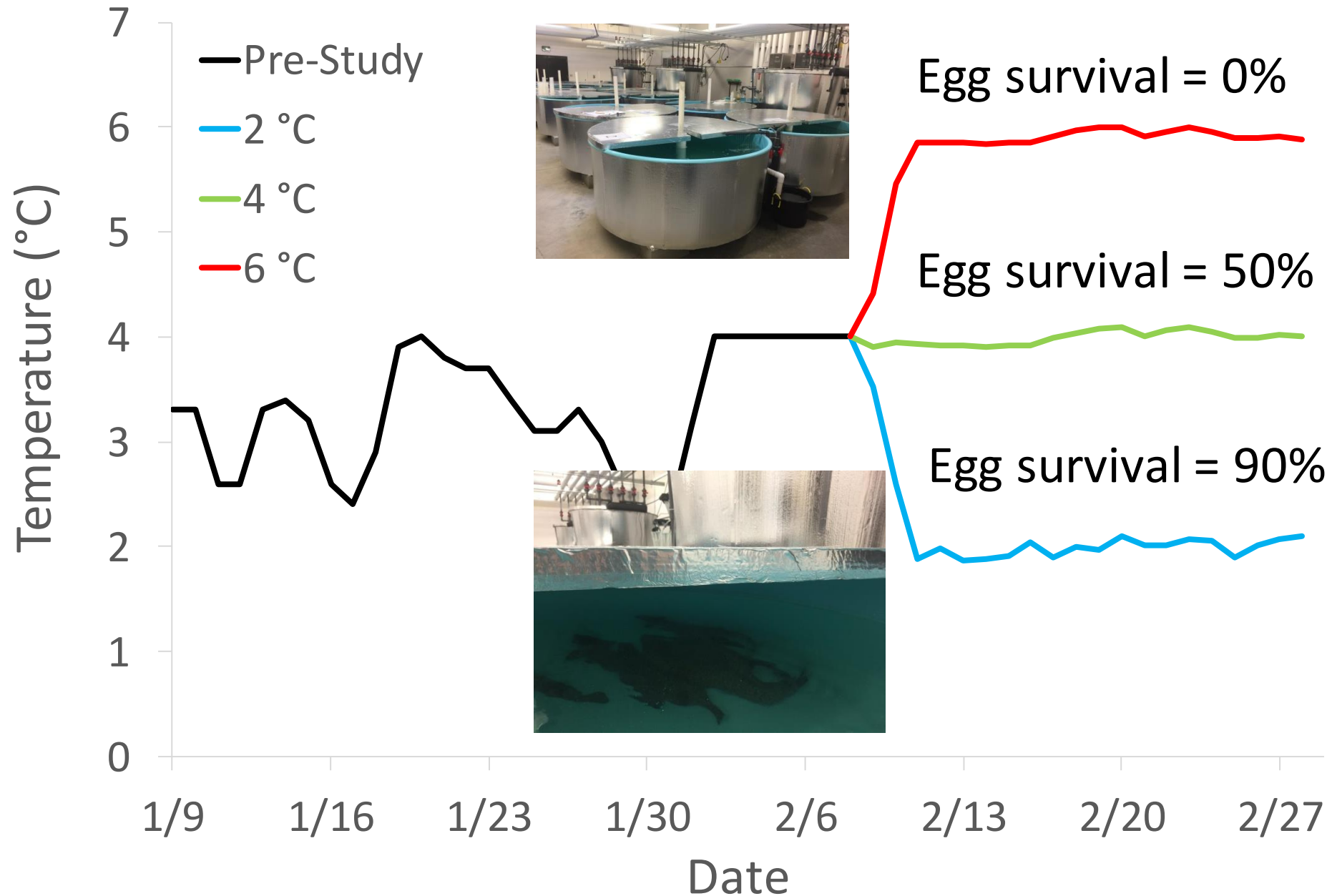


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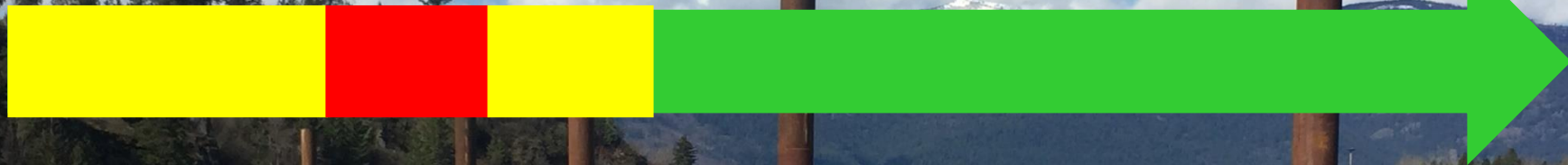


# Temperature Study at KTOI Hatchery



# Larval Transition and Benthic Juvenile

FEB MAR APR MAY JUN JUL AUG SEP OCT





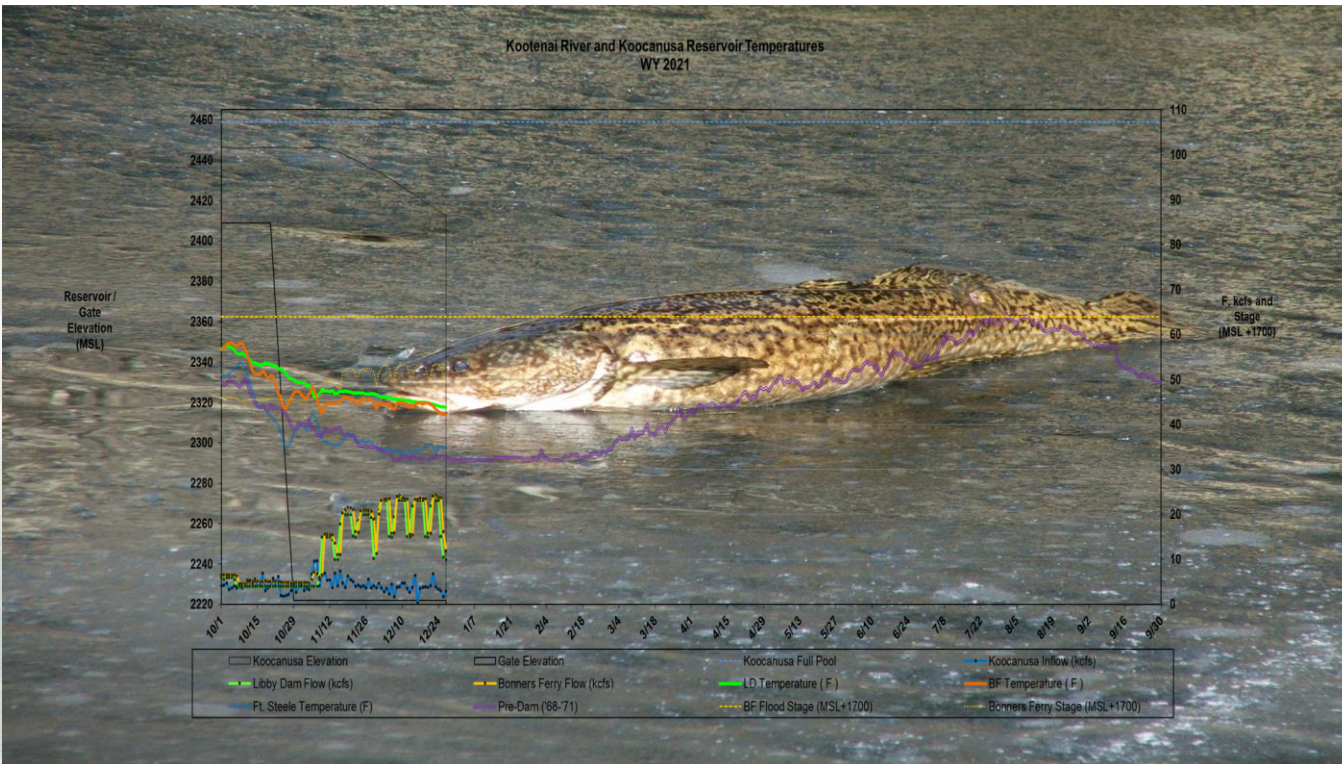
# Combination of actions to better match ecosystem function and Burbot Life Stage Needs



+



# Koocanusa Reservoir *and* Kootenai River Seasonal Isothermy



**Greg Hoffman**  
**Fishery Biologist**  
U.S. Army Corps of Engineers  
Seattle District / Libby Dam / Kootenai River

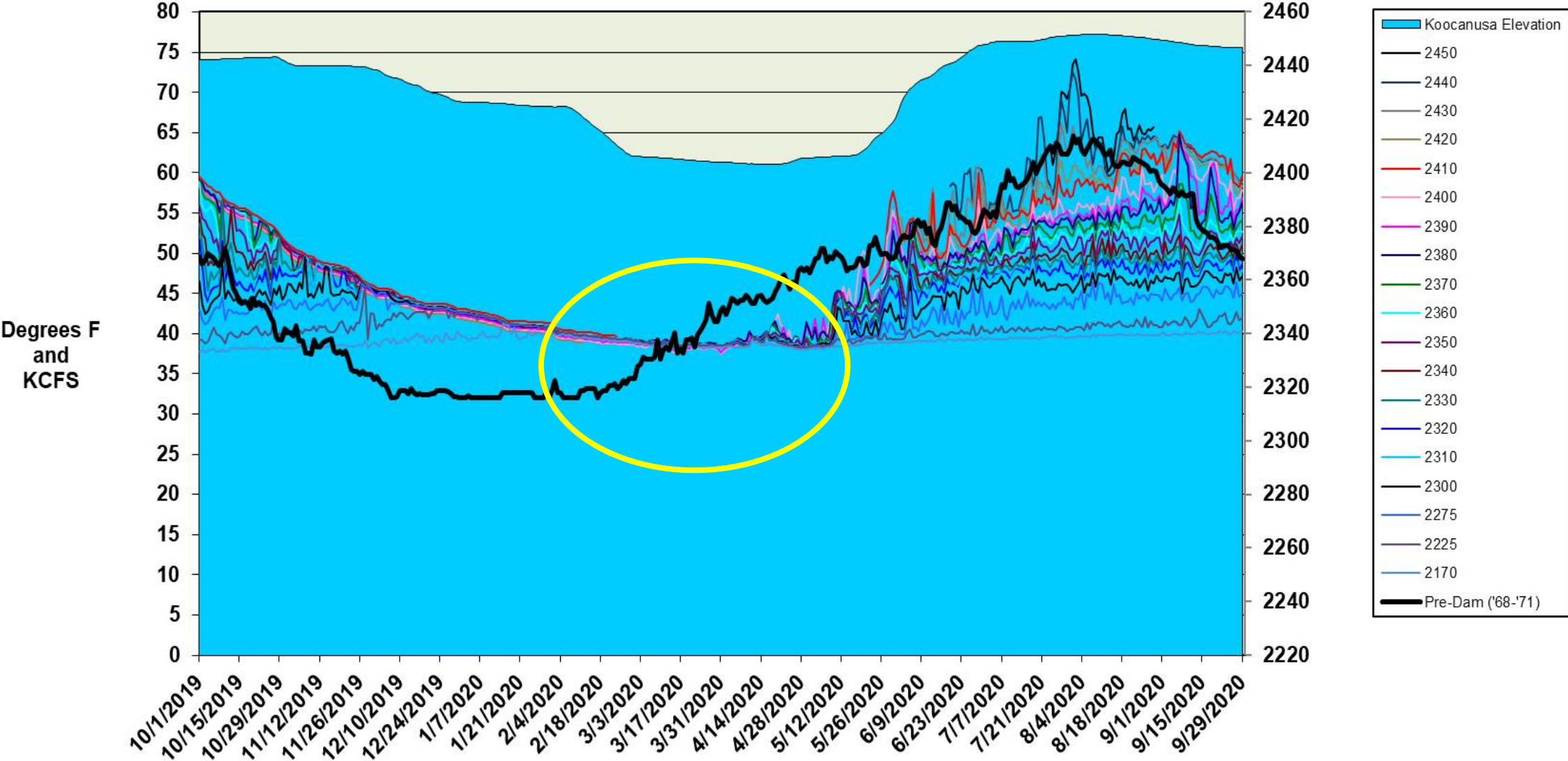


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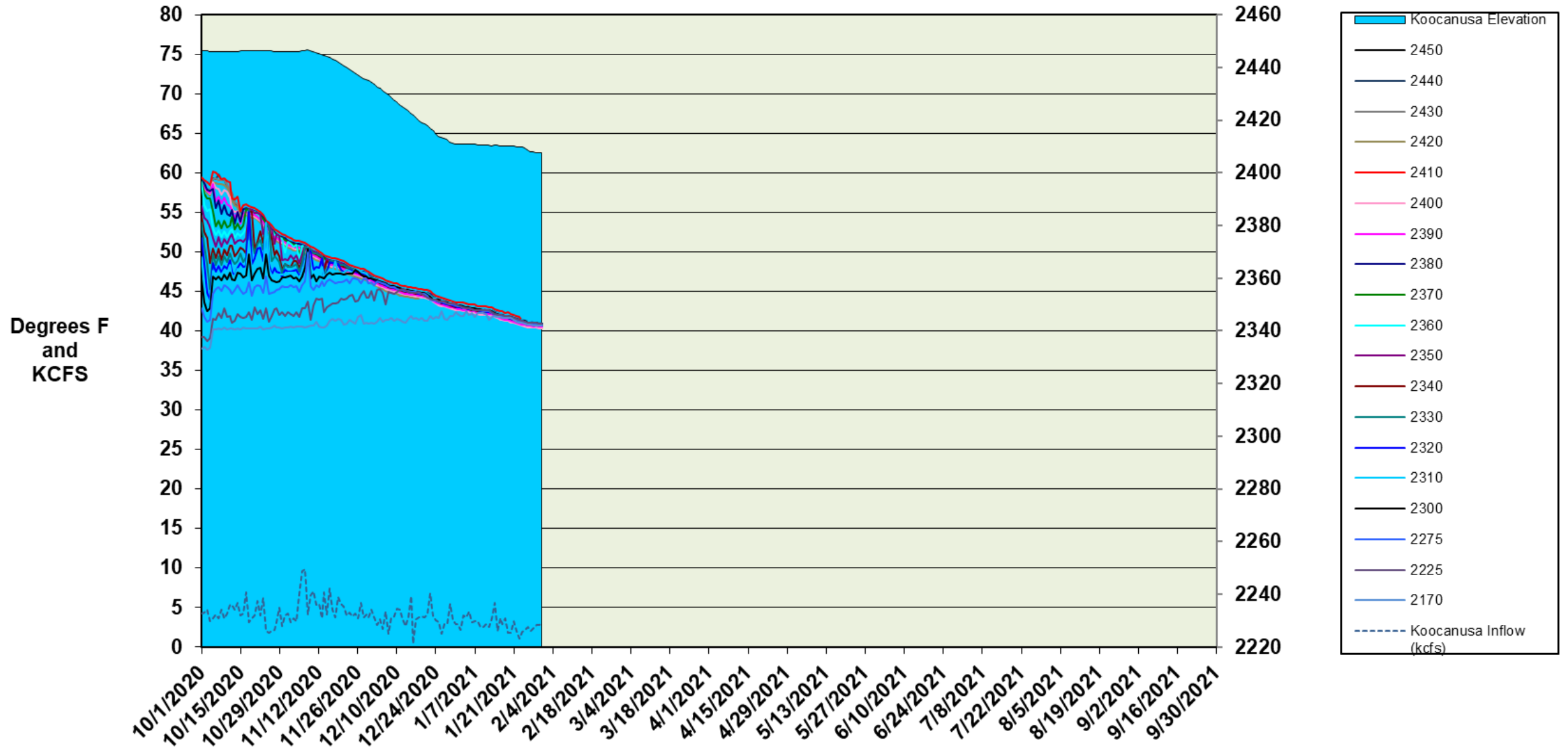
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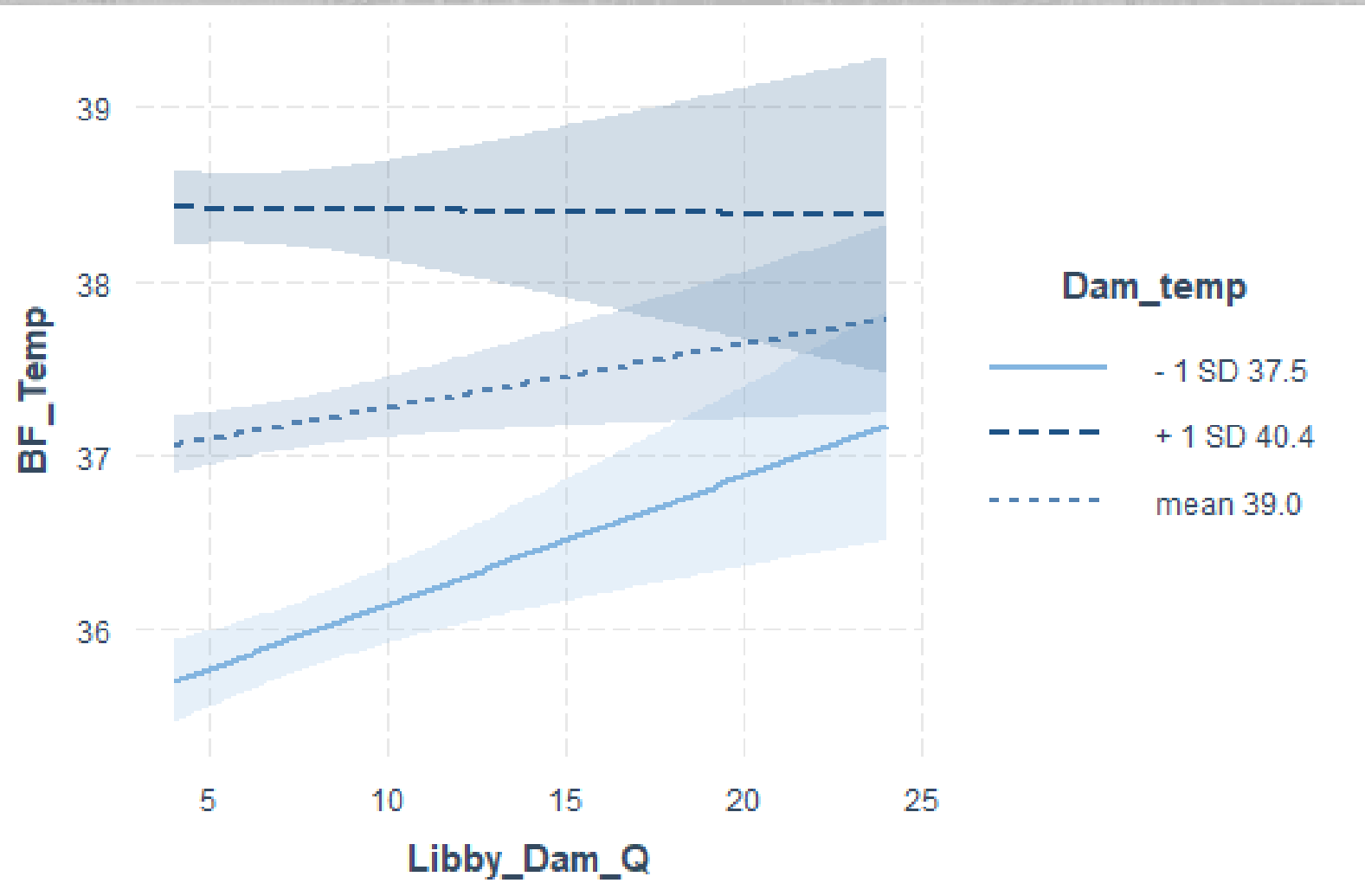


# Koocanusa Reservoir Temperatures Water Year 2020



# Koocanusa Reservoir Temperatures Water Year 2021





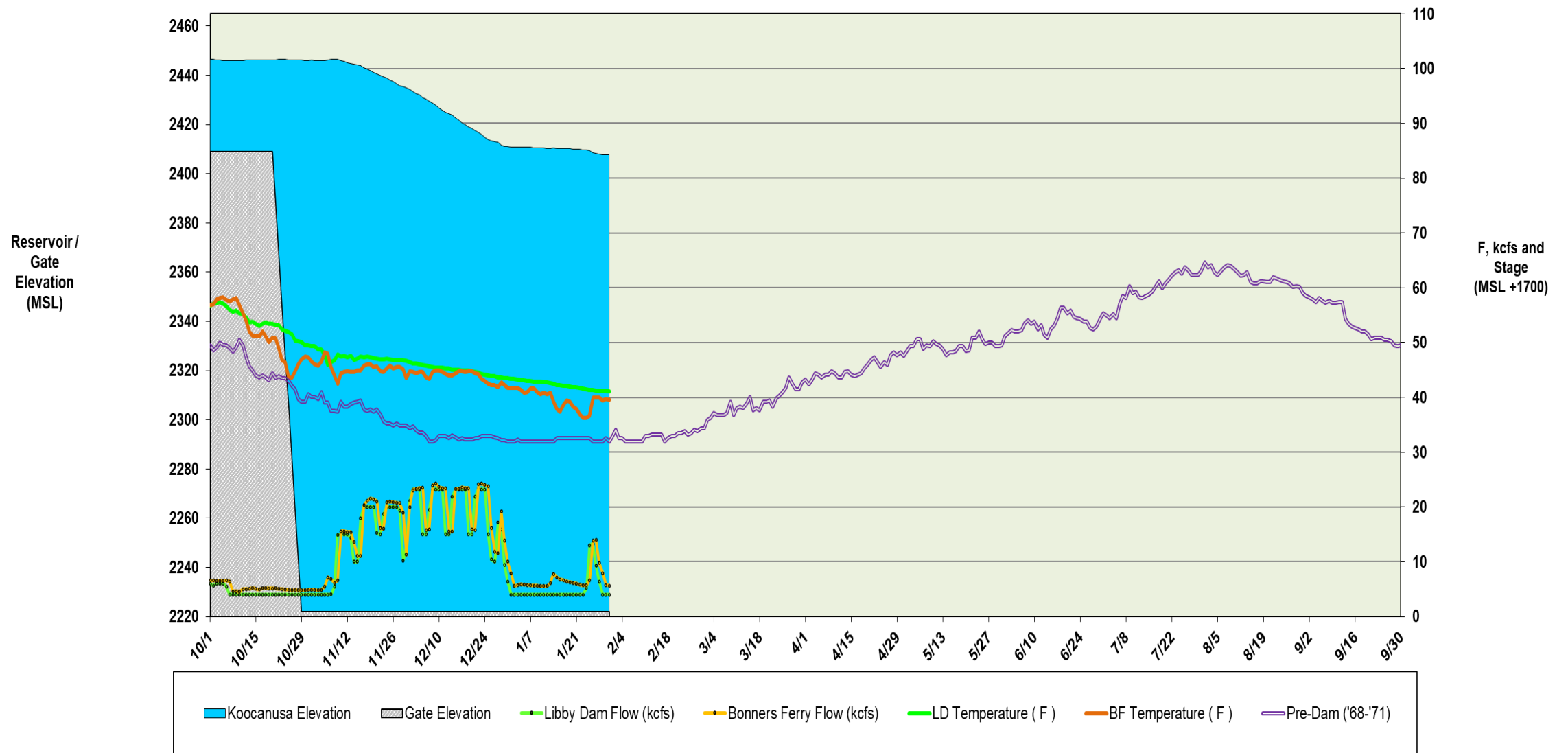
	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	-3.72725	3.27390	-1.138	0.2555
Libby_Dam_Q	1.05339	0.42910	2.455	0.0144
Dam_temp	1.04301	0.08391	12.429	<2e-16
Libby_Dam_Q:Dam_temp	-0.02611	0.01110	-2.352	0.0191

Dunnigan 2020

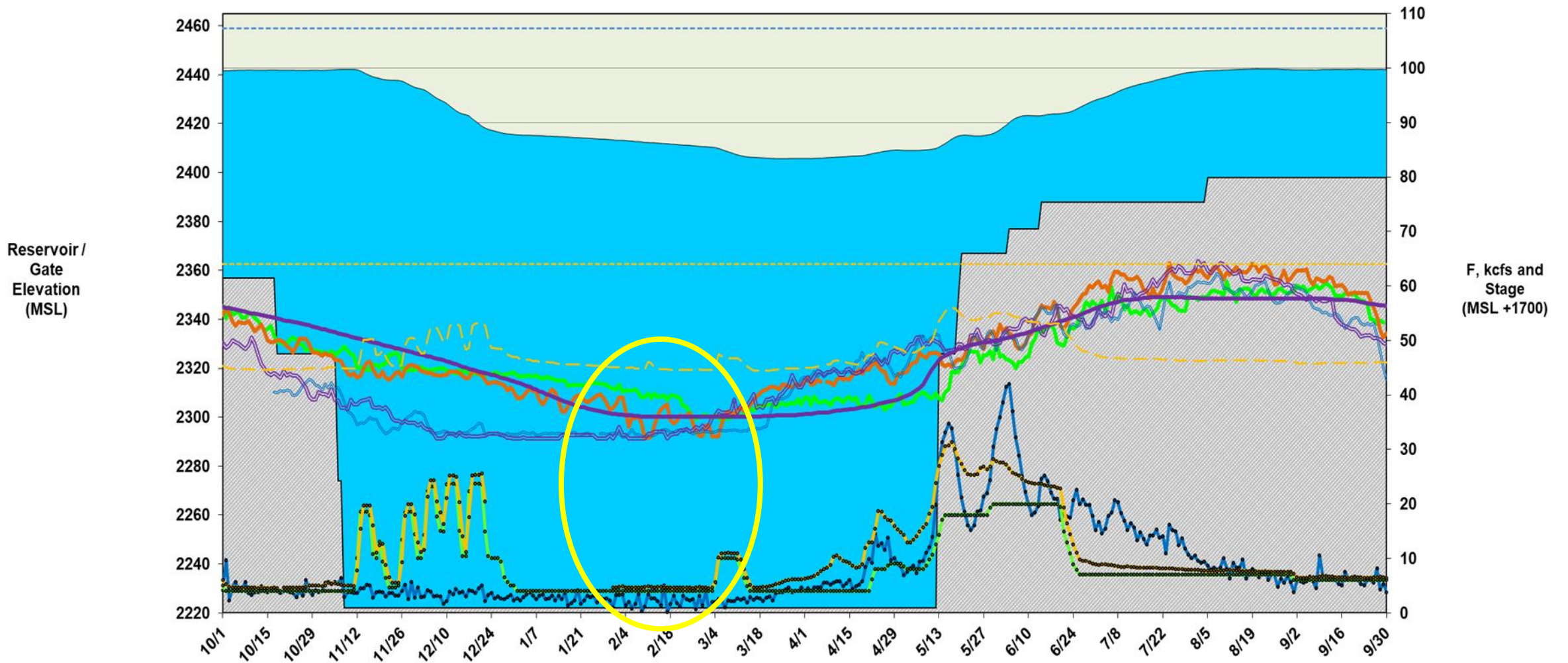


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### Kootenai River and Kocanusa Reservoir Temperatures WY 2021

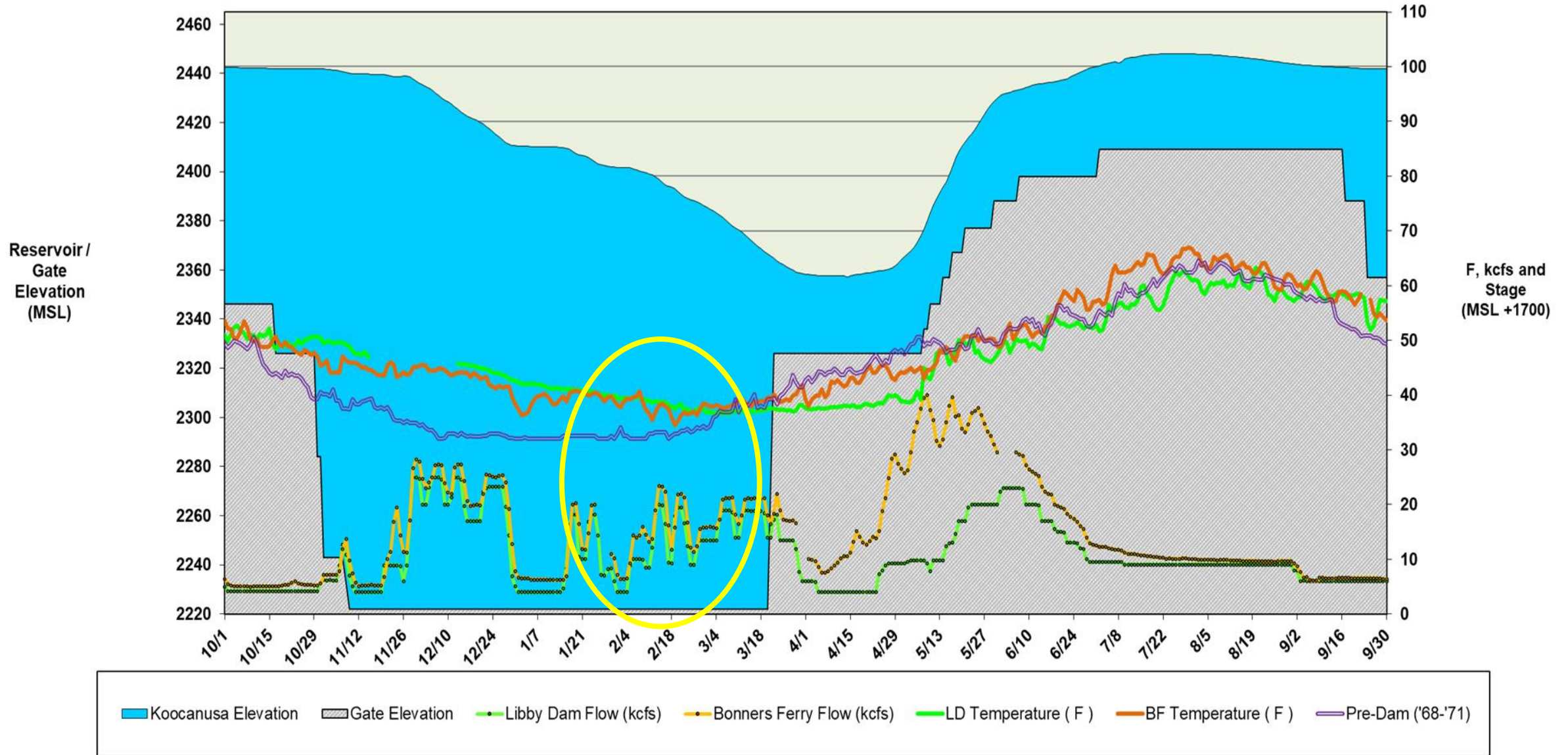


### Kootenai River and Koocanusa Reservoir Temperatures WY 2019



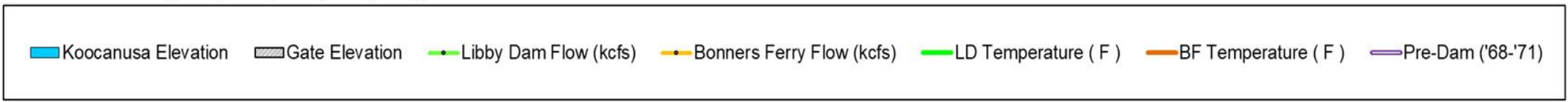
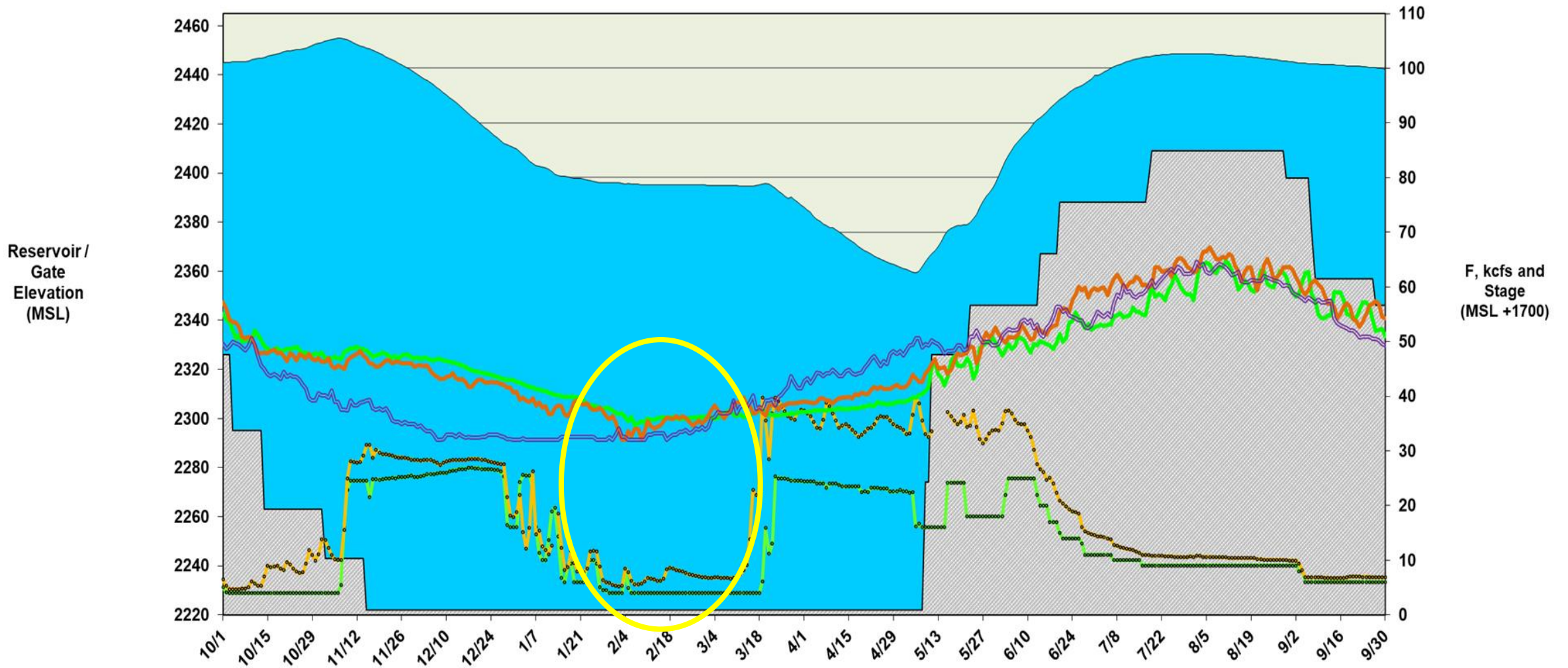
Koocanusa Elevation	Gate Elevation	Koocanusa Full Pool	Koocanusa Inflow (kcfs)	Libby Dam Flow (kcfs)
Bonnars Ferry Flow (kcfs)	LD Temperature ( F )	BF Temperature ( F )	Ft. Steele Temperature (F)	Pre-Dam ('68-'71)
SW Optimum	BF Flood Stage (MSL+1700)	Bonnars Ferry Stage (MSL+1700)		

### Kootenai River and Koocanusa Reservoir Temperatures WY 2018





### Kootenai River and Koocanusa Reservoir Temperatures WY 2017



# LIBBY DAM WINTER DRAWDOWN OPERATIONS 2021

3 February 2021  
TMT Meeting

Jon Moen  
USACE Seattle District



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# FEBRUARY 2021 WATER SUPPLY FORECAST AND OPERATIONS



- April-August inflow forecast for Libby Dam is 5.98 million acre-feet (MAF) (102% avg)
- This is the preliminary forecast for February. Forecast will be finalized 3 February 2021.
- The end of February elevation target is set at 2406.2 ft.

- Currently the elevation of Lake Koocanusa is 2407.5 ft and Libby Dam outflow is 4 kcfs.
- Expected Libby Dam operation is to maintain outflow at 4 kcfs minimums through February to meet the end of month target.
- Projected operation may be subject to change if unexpected conditions arise.

