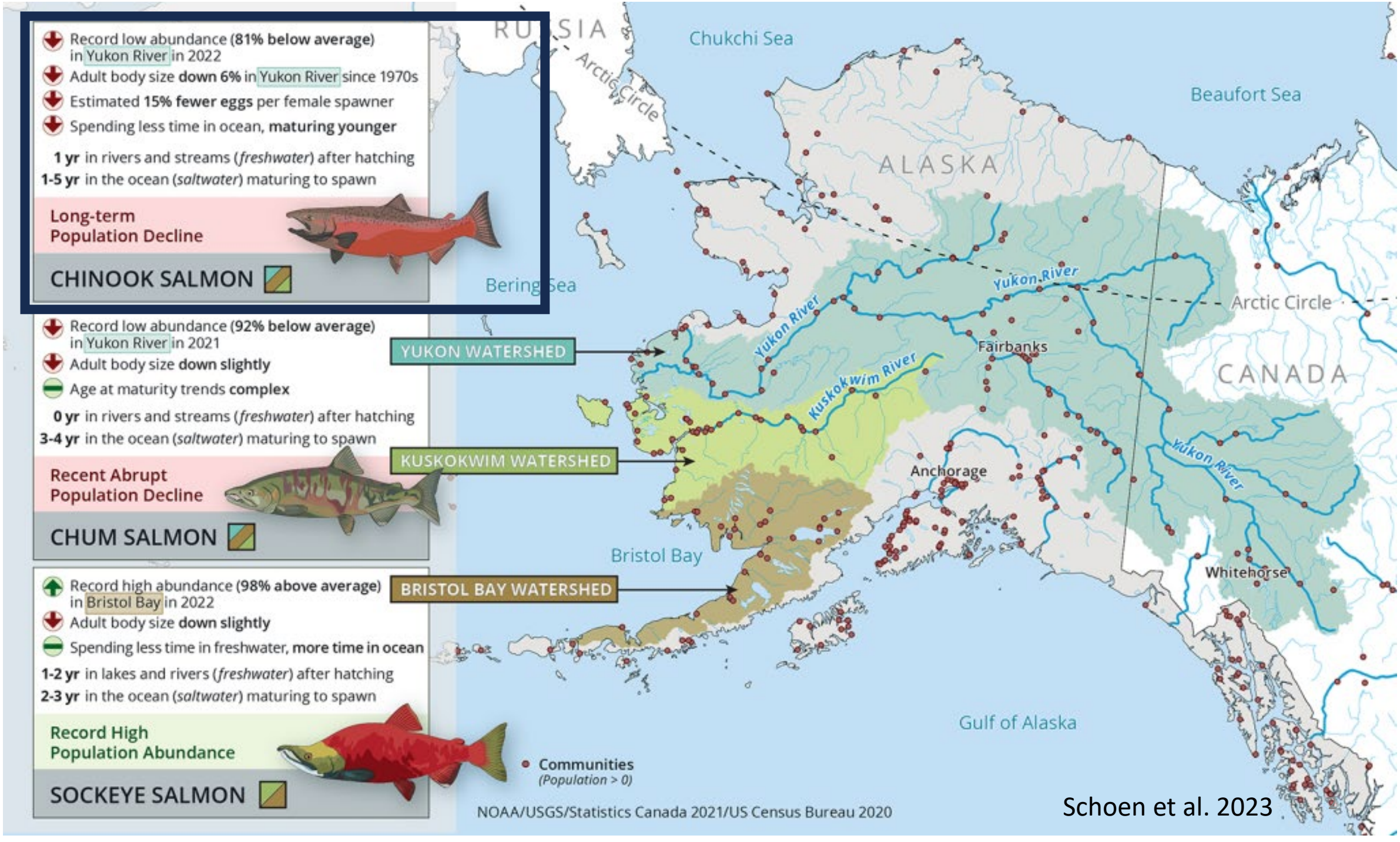
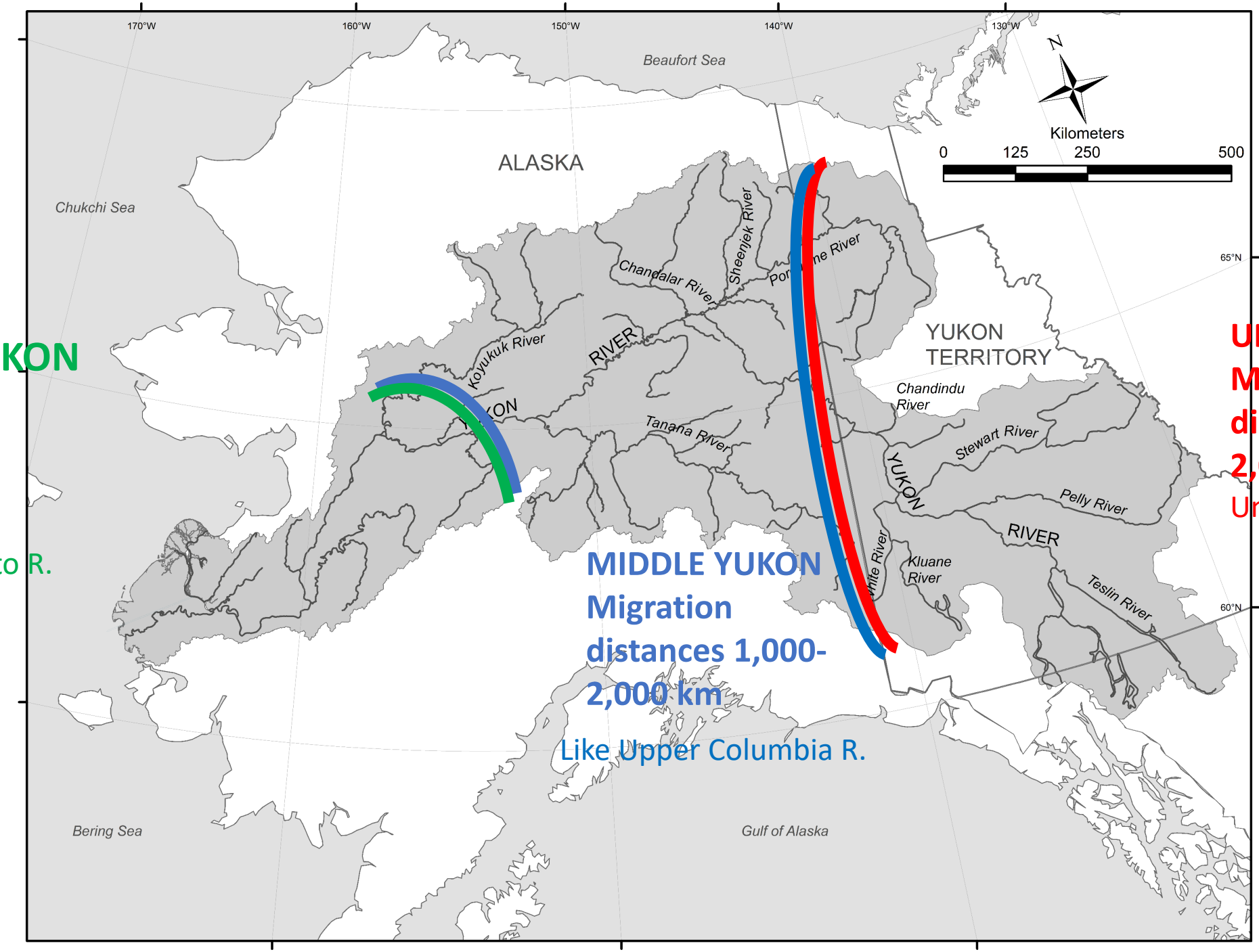
Thiamine Deficiency and Metabolic Stressors along a 2,000 Mile Chinook Journey

Kathrine Howard, Cody Pinger, Vanessa von Biela, Ben Gray, Elizabeth Lee, Serena Fitka, Catherine Moncrieff



Schoen et al. 2023



LOWER YUKON
Migration distances <1000 km
Like Sacramento R.

MIDDLE YUKON
Migration distances 1,000-2,000 km
Like Upper Columbia R.

UPPER YUKON
Migration distances 2,000-3,000 km
Unlike anything

Food

↓ ⟸ Thiamine B¹

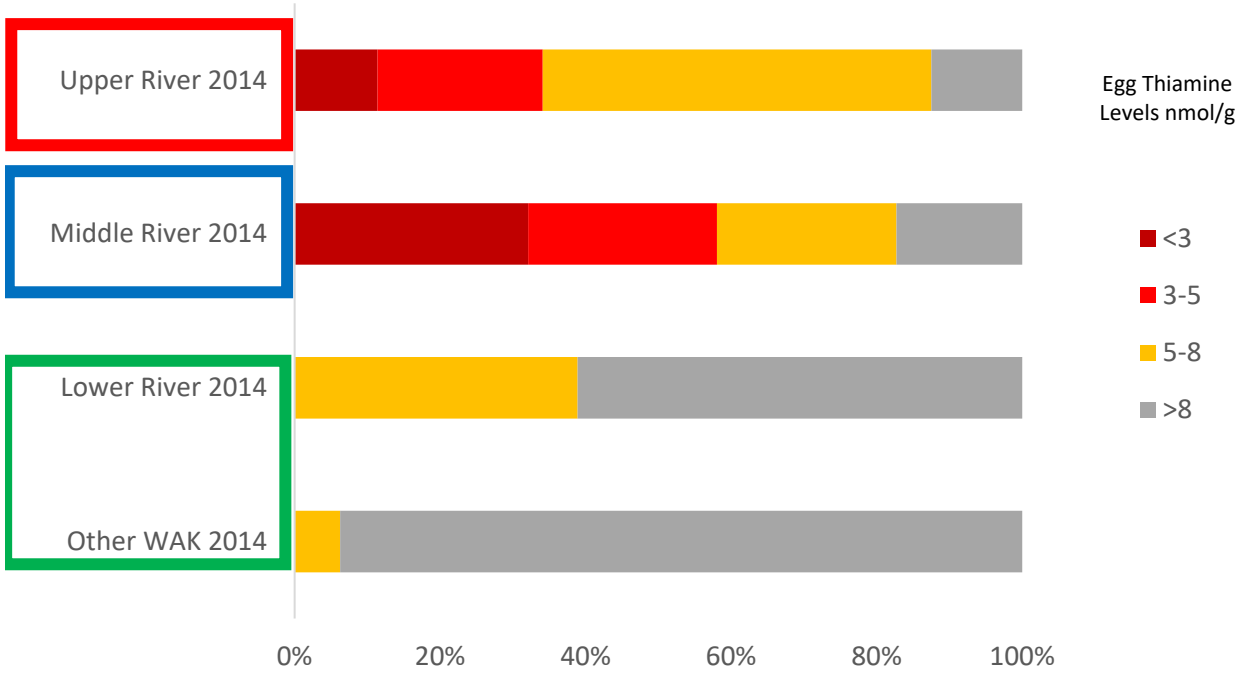
Energy

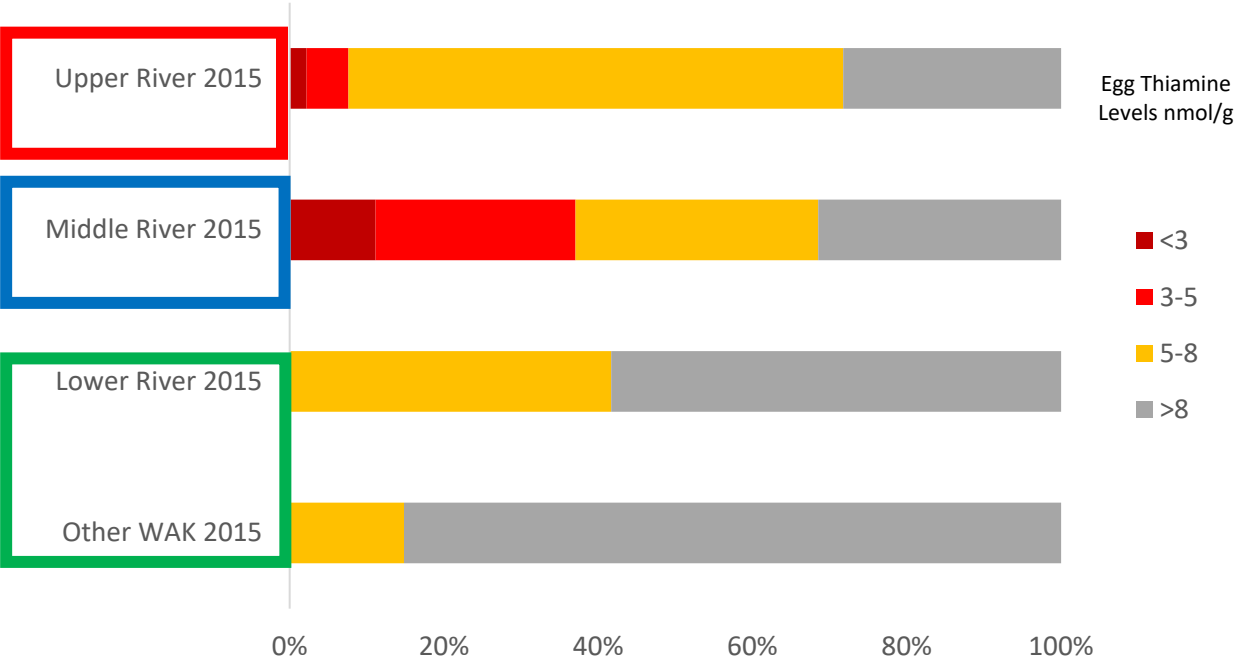
needed to survive

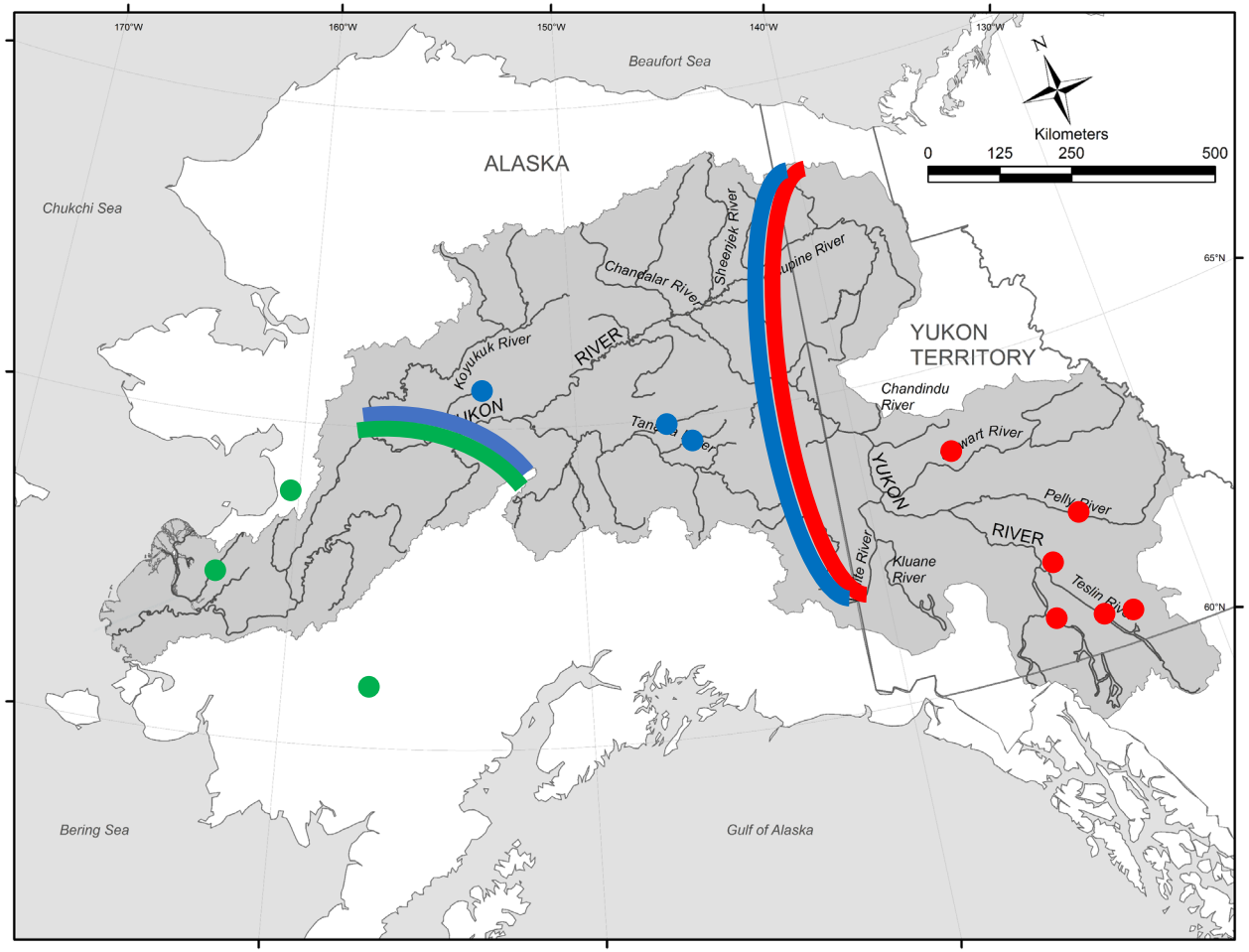
& do work

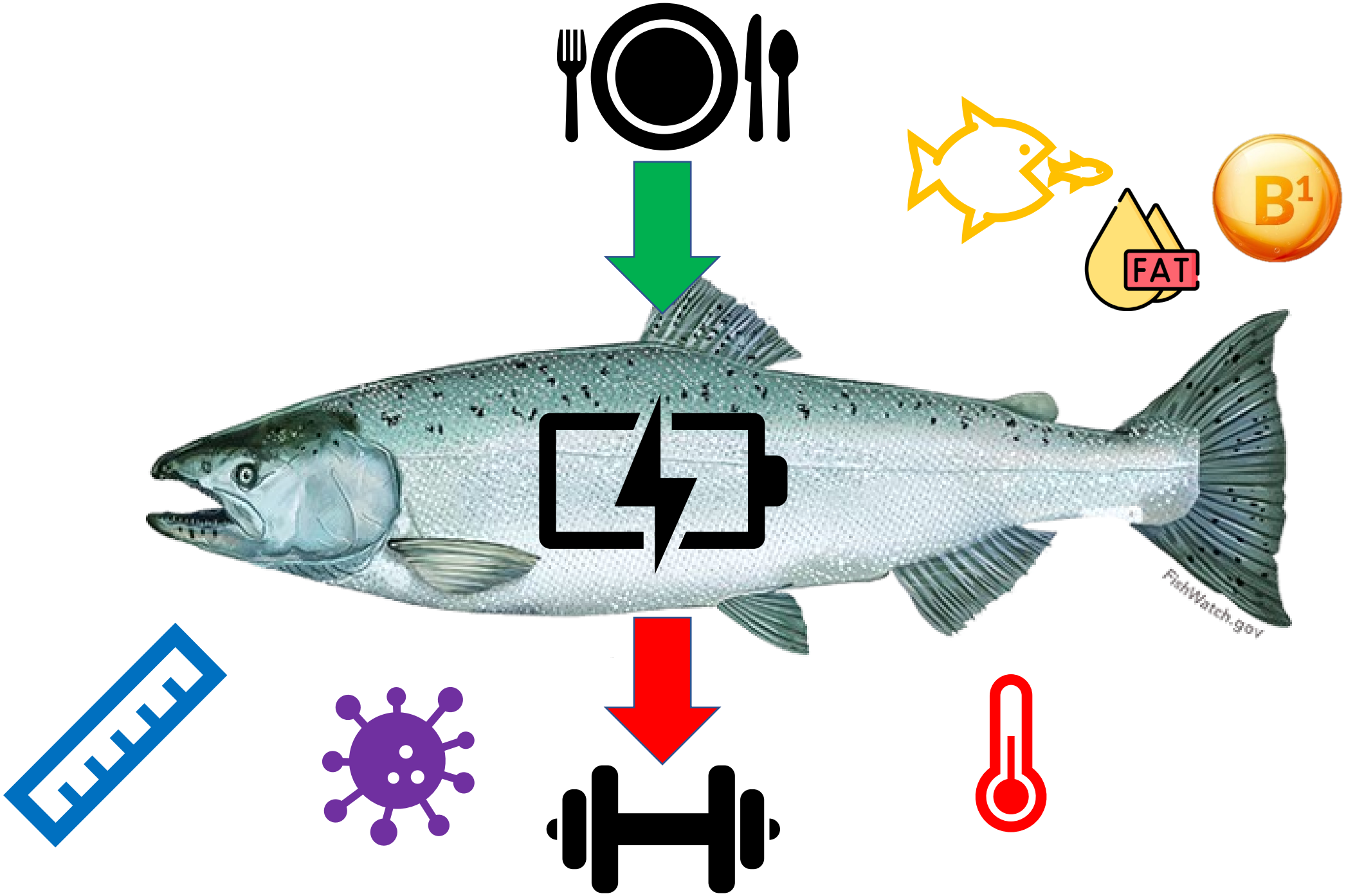



<3 nmol T/g	3-5 nmol T/g	5-8 nmol T/g	>8 nmol T/g


Upper River 2014
Middle River 2014
Lower River 2014
Other WAK 2014
0%
20%
40%
60%
80%
100%
Egg Thiamine Levels nmol/g
<3
3-5
5-8
>8

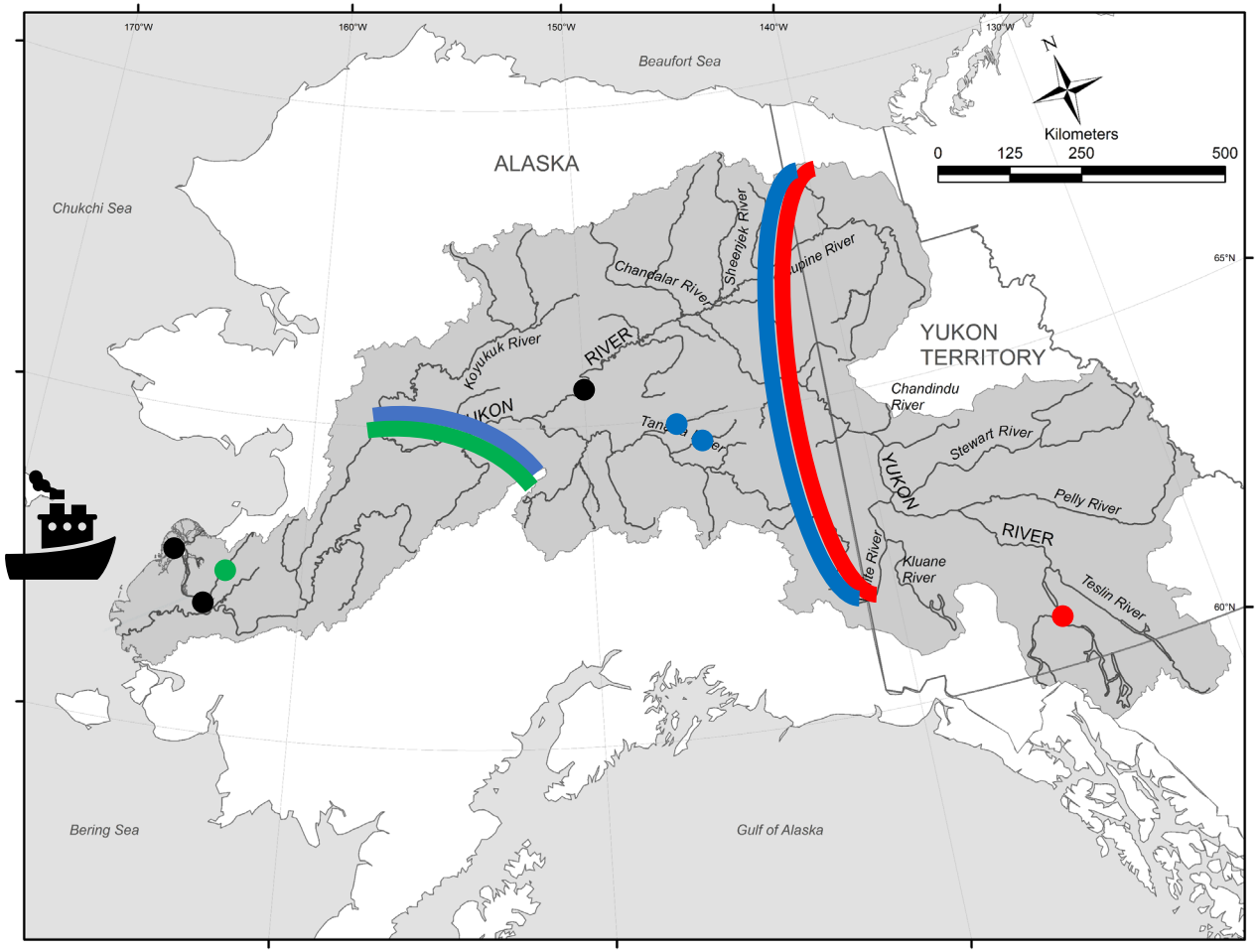

Upper River 2015
Middle River 2015
Lower River 2015
Other WAK 2015
0%
20%
40%
60%
80%
100%
Egg Thiamine Levels nmol/g
<3
3-5
5-8
>8


Beaufort Sea
Chukchi Sea
ALASKA
Bering Sea
Gulf of Alaska
YUKON TERRITORY
Kilometers
0
125
250
500
Koyukuk River
Chandalar River
Sheenjek River
Chandindu River
Pelly River
Kluane River
Teslin River
YUKON RIVER


FAT
B1
FishWatch.gov

Yukon Chinook Climate Drivers Project

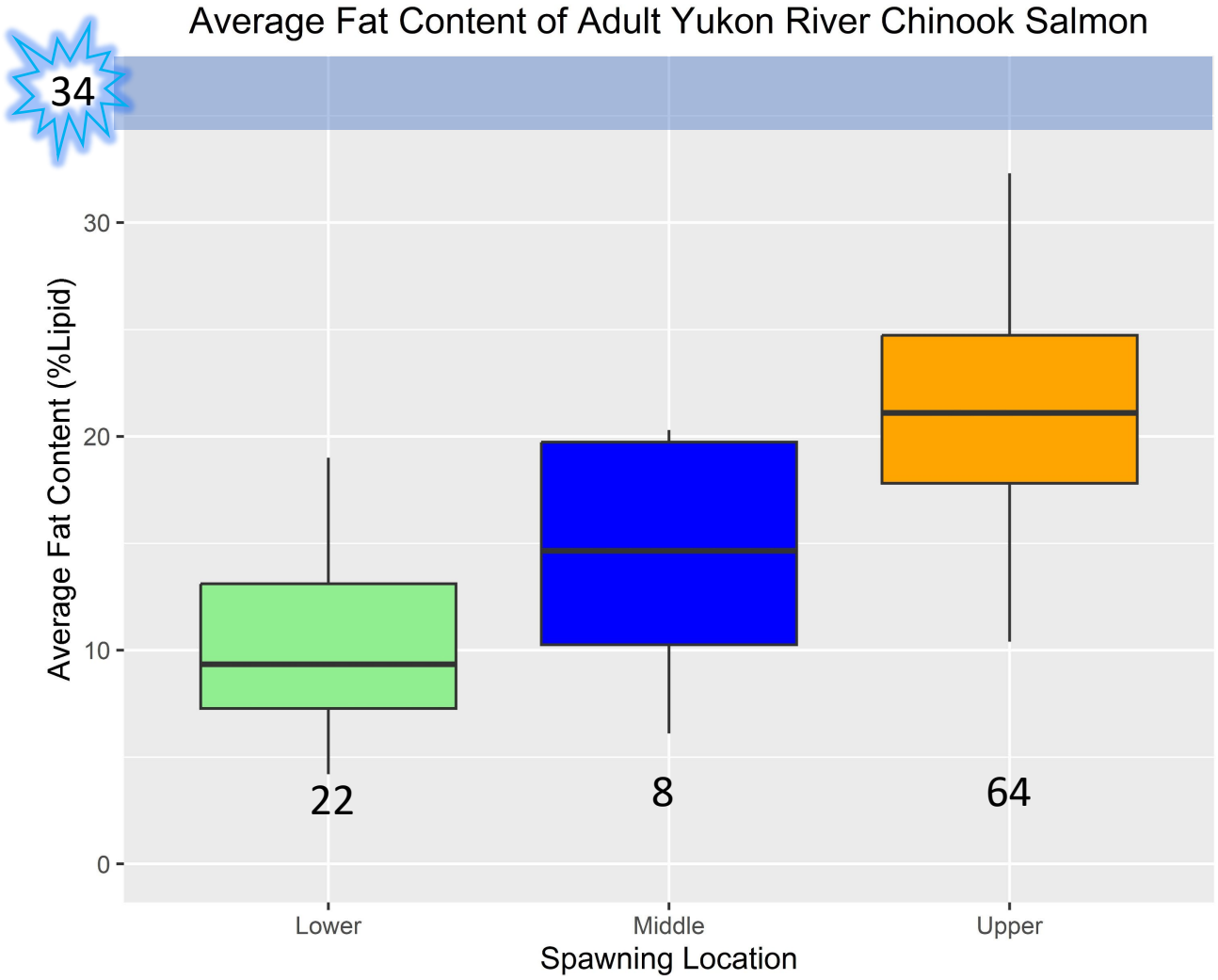
- Piggyback on existing programs to reduce any additional mortality
- Sample returning adults
  - Shortly after river entry
  - Mid-river (almost exclusively upper river stocks)
  - Spawning grounds in tributaries representing lower, middle and upper river spawning stocks
- Fat content; Egg and muscle tissue thiamine levels; HSP70; Ichthyophonus infection status
- Sample potential prey for thiaminase and ichthyophonus in marine waters
- Egg retention rates on spawning grounds
- Partnership with local and indigenous knowledge holders

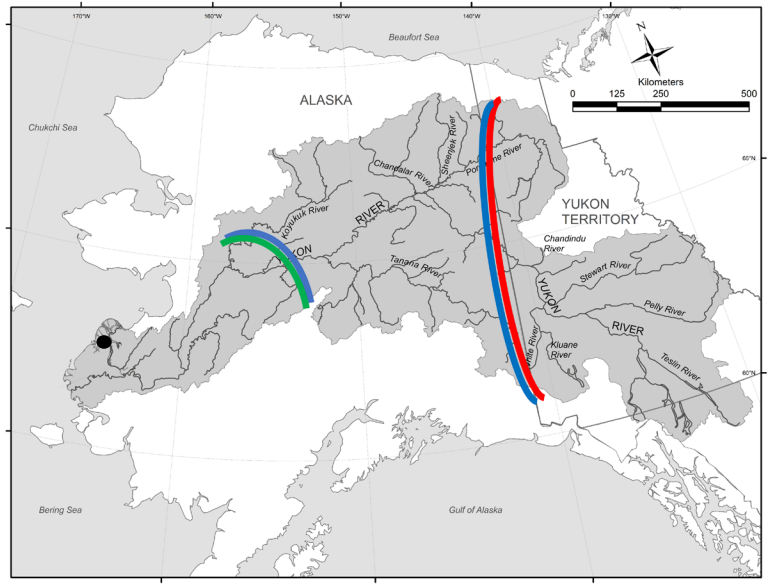


science for a changing world

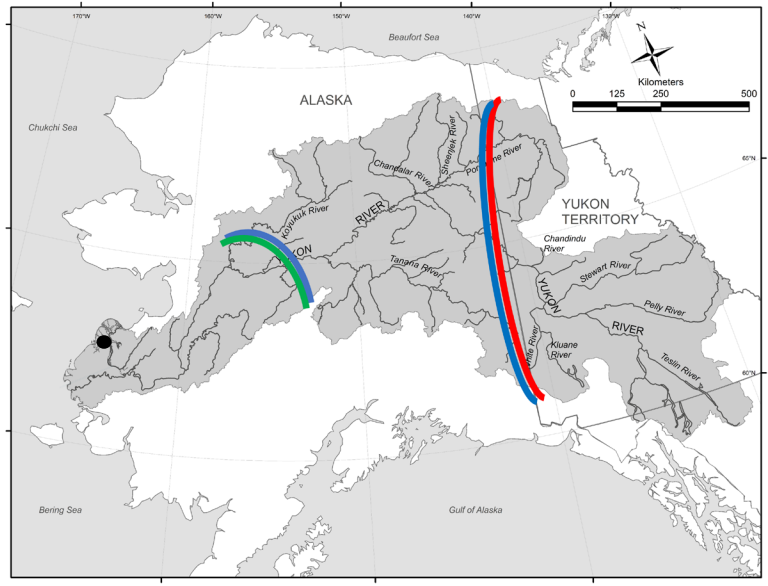
Yukon River Drainage Fisheries Association

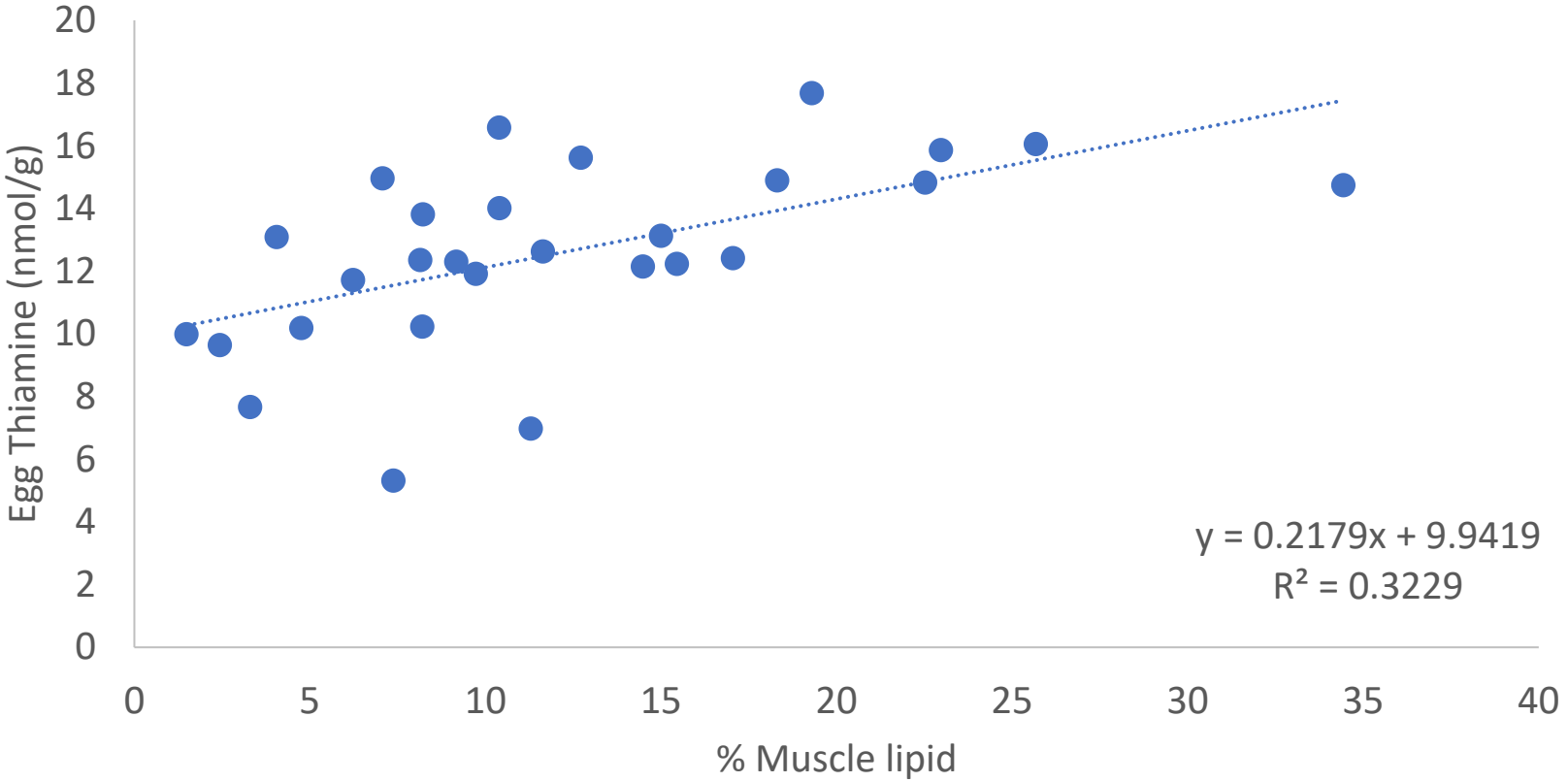
Fat Content After Ocean Exit

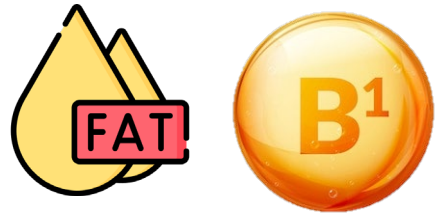




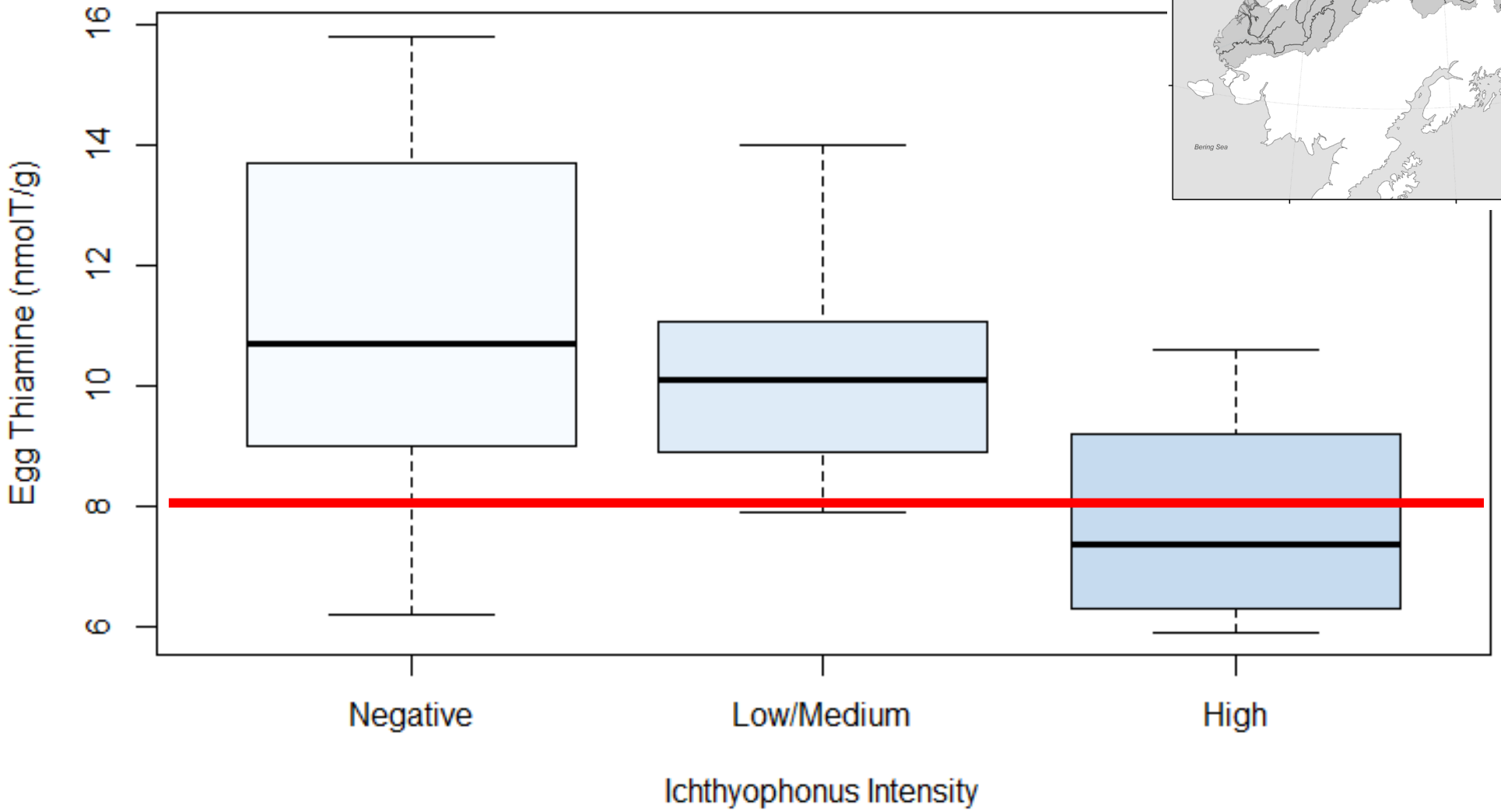
Fat Content x Egg Thiamine After Ocean Exit

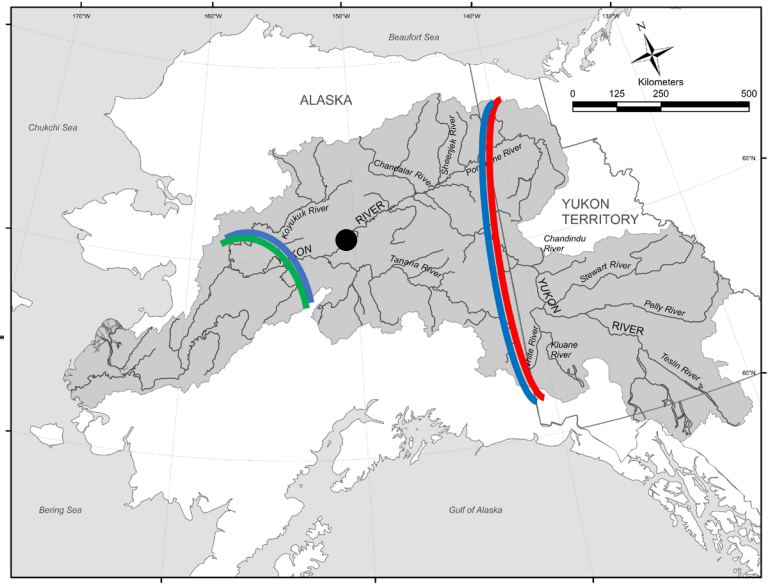


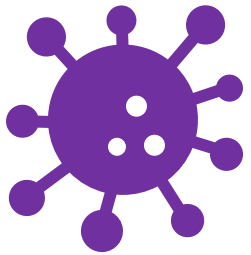


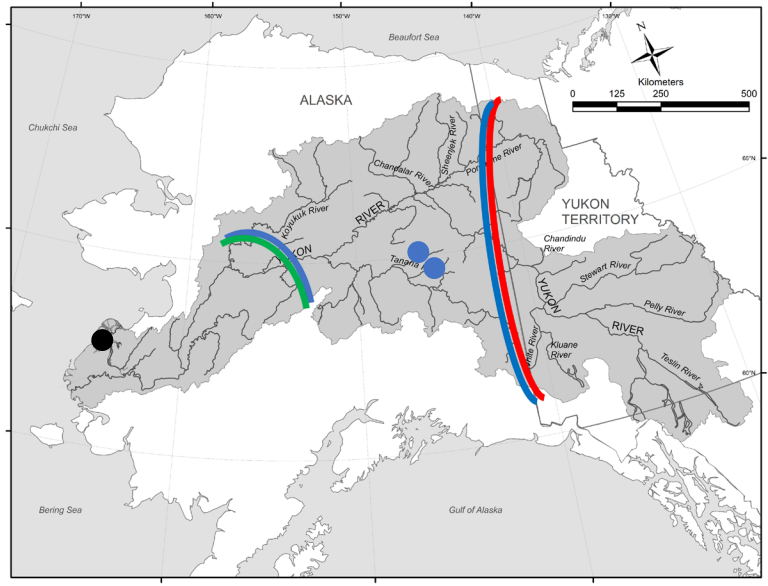


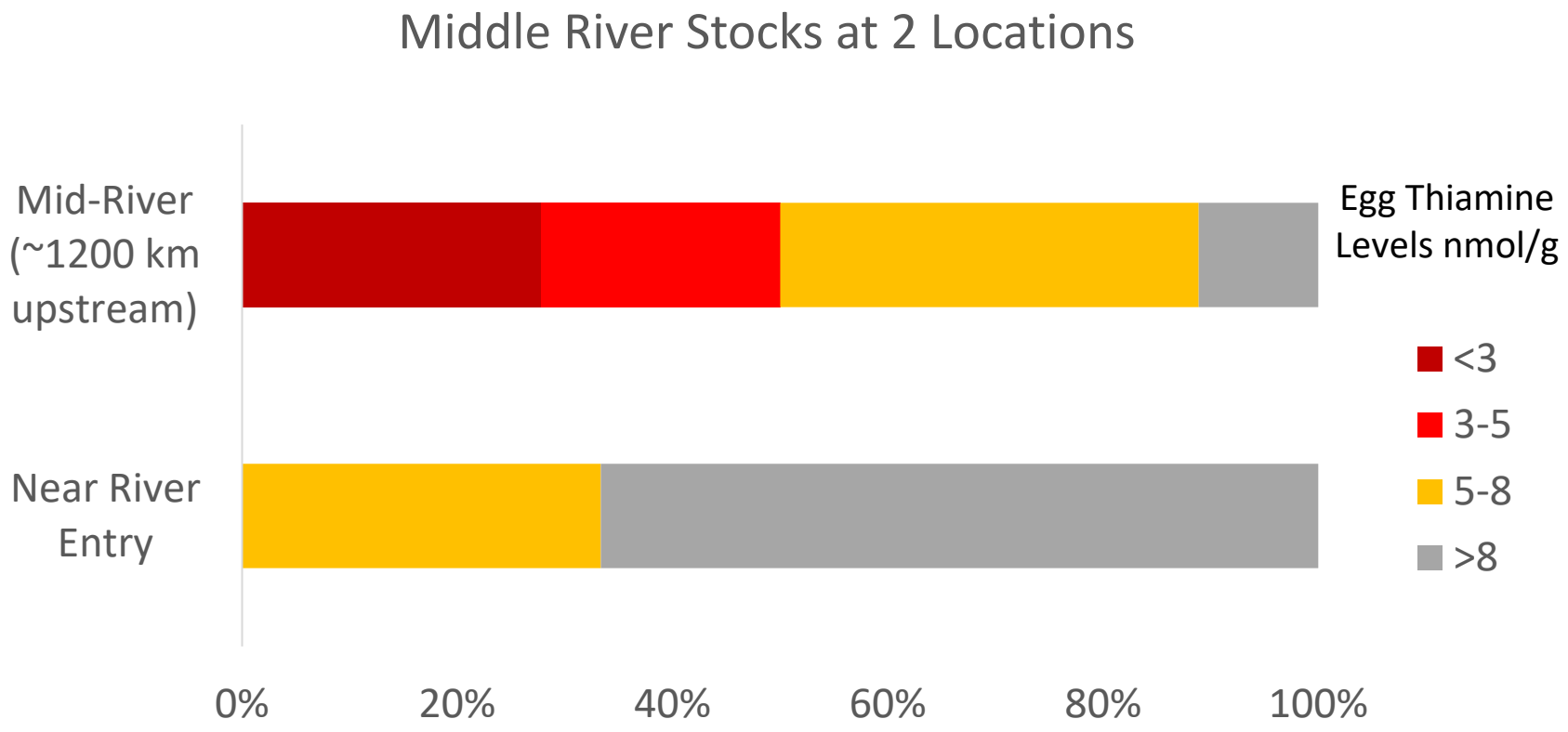
Egg Thiamine x Ichthyophonus (Mid-River)



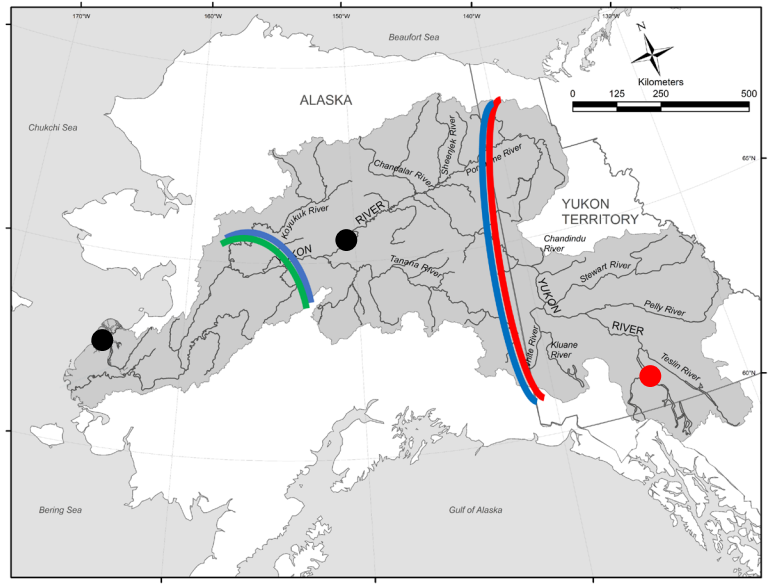




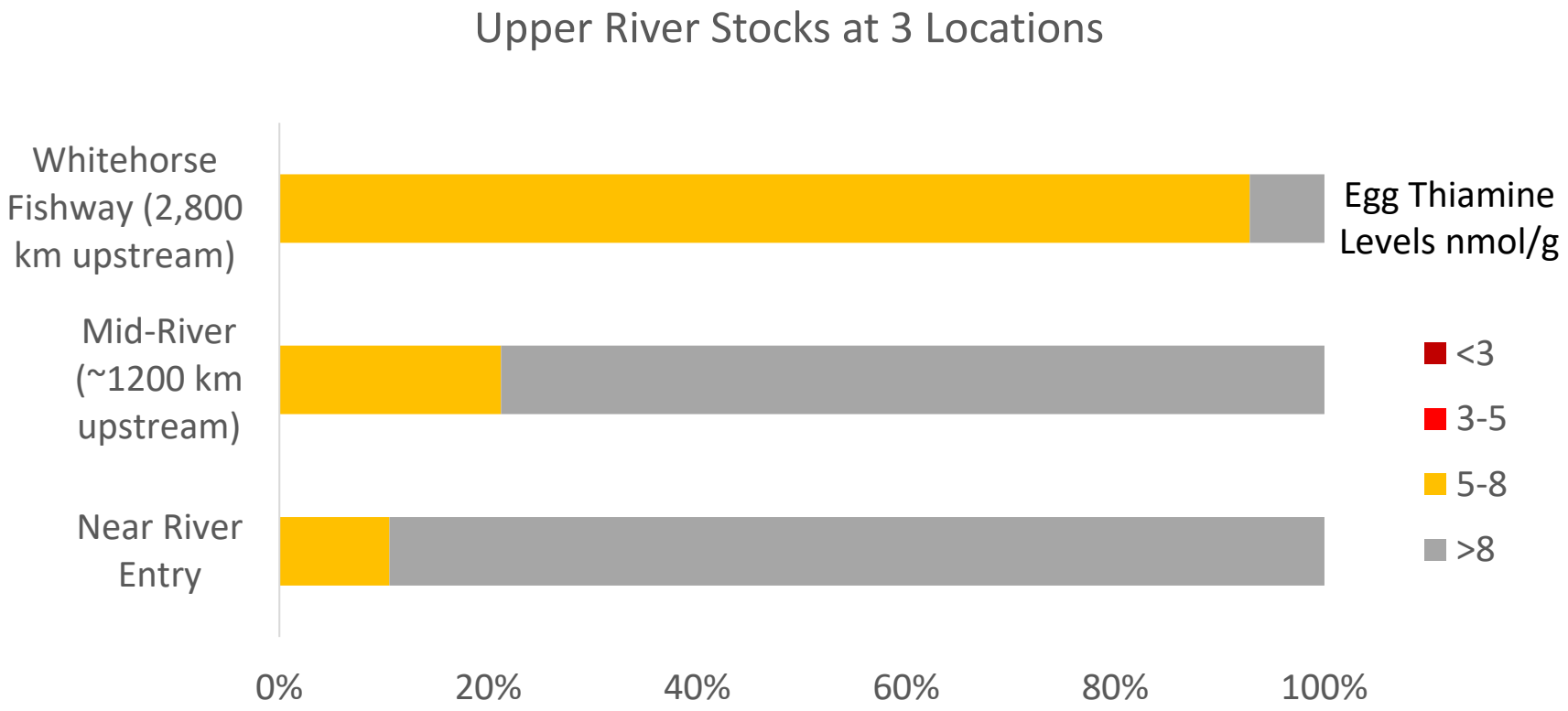

Beaufort Sea
ALASKA
Chukchi Sea
Kilometers
0 125 250 500
YUKON
TERRITORY
Chandindu River
Stewart River
Pelly River
RIVER
Kluane River
Tatshenshini River
Tanana
YUKON
Bering Sea
Gulf of Alaska


Middle River Stocks at 2 Locations
Mid-River (~1200 km upstream)
Near River Entry
0%
20%
40%
60%
80%
100%
Egg Thiamine Levels nmol/g
<3
3-5
5-8
>8


B1

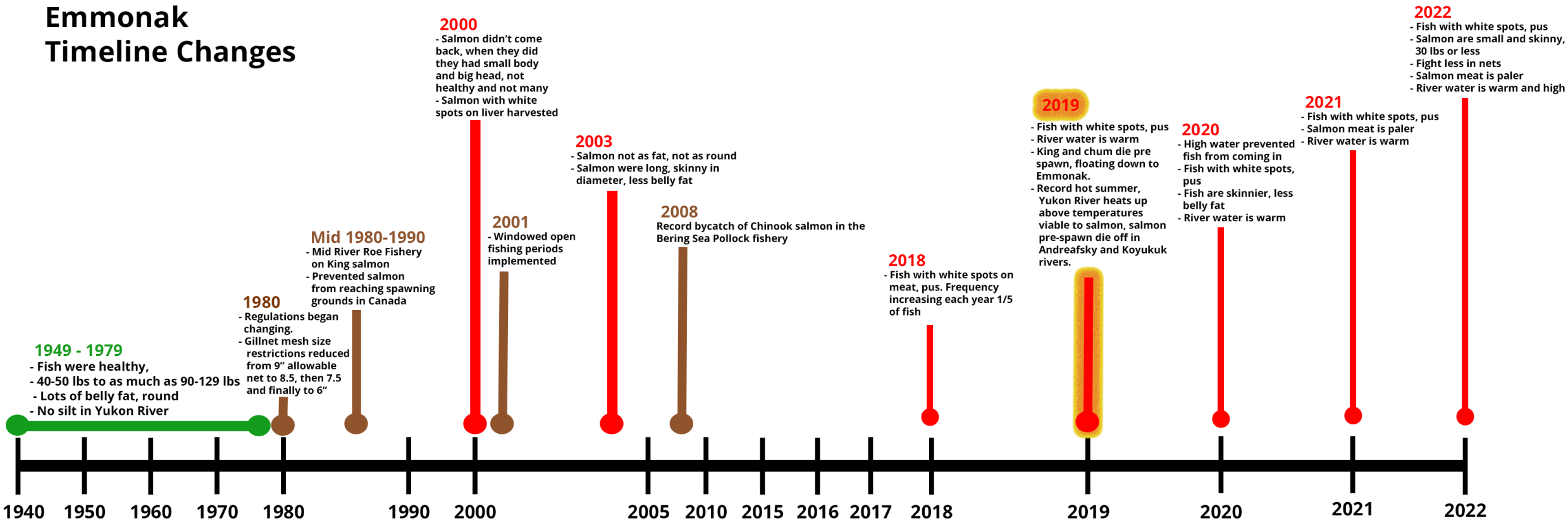

Beaufort Sea
ALASKA
Chukchi Sea
Kilometers
0 125 250 500
YUKON TERRITORY
Chandindu River
Stewart River
Pelly River
RIVER
Kluane River
Tatshenshini River
Tanana River
Bering Sea
Gulf of Alaska


B1


Upper River Stocks at 3 Locations
Whitehorse Fishway (2,800 km upstream)
Mid-River (~1200 km upstream)
Near River Entry
0%
20%
40%
60%
80%
100%
Egg Thiamine Levels nmol/g
<3
3-5
5-8
>8

Engaging Fishers

Emmonak
Timeline Changes



Baseline knowledge/observations

Management concerns/changes

Fish health concerns/changes

Catherine Moncrieff, Yukon River Drainage Fisheries Association

Thank you

Especially:

North Pacific Research Board – Projects #2211 and #2207

Whitehorse Hatchery Staff

ADF&G and USFWS field sampling crews

William Alstrom II

Ethan Alstrom

Francis Nollner

Drew Porter

ADF&G Gene Conservation Laboratory

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