Impacts of Introduced Alaska Blackfish

(*Dallia pectoralis*)

Lucas Byker

USFWS Habitat Restoration

Introduction

- Paratrooper with 10th Special Forces Group
- USDA Wildlife Services
- Bering Sea crab fishery observer
- ADFG Habitat Division- Soldotna
- Kenai Peninsula Borough
- USACE Regulatory Program
- USFWS Habitat Restoration- Anchorage

Blackfish?


"A MESMERIZING PSYCHOLOGICAL THRILLER" - Variety
"SEARING AND EMOTIONALLY POWERFUL" - The Hollywood Reporter
BLACKFISH
NEVER CAPTURE WHAT YOU CAN'T CONTROL


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Species Profile

Alaska Blackfish (*Dallia Pectoralis*)

- 4 to 12 inches in length
- Order Esocidae, Family Umbridae (Mudminnows)
- Begin spawning shortly after spring break-up, initiated by small upstream migrations
- Prime habitat includes slow-moving water and dense vegetation

(Lopez et. al., 2004)

Unique Adaptations

- Modified esophagus to breathe atmospheric oxygen
- Widened mouth and underbite to inhale prey/ scoop prey from mud
- Rounded pectoral and caudal fin for short bursts of speed
- Can survive in wet mud during periods of drought
- Denali NP study*
- Cheney Lake Study*

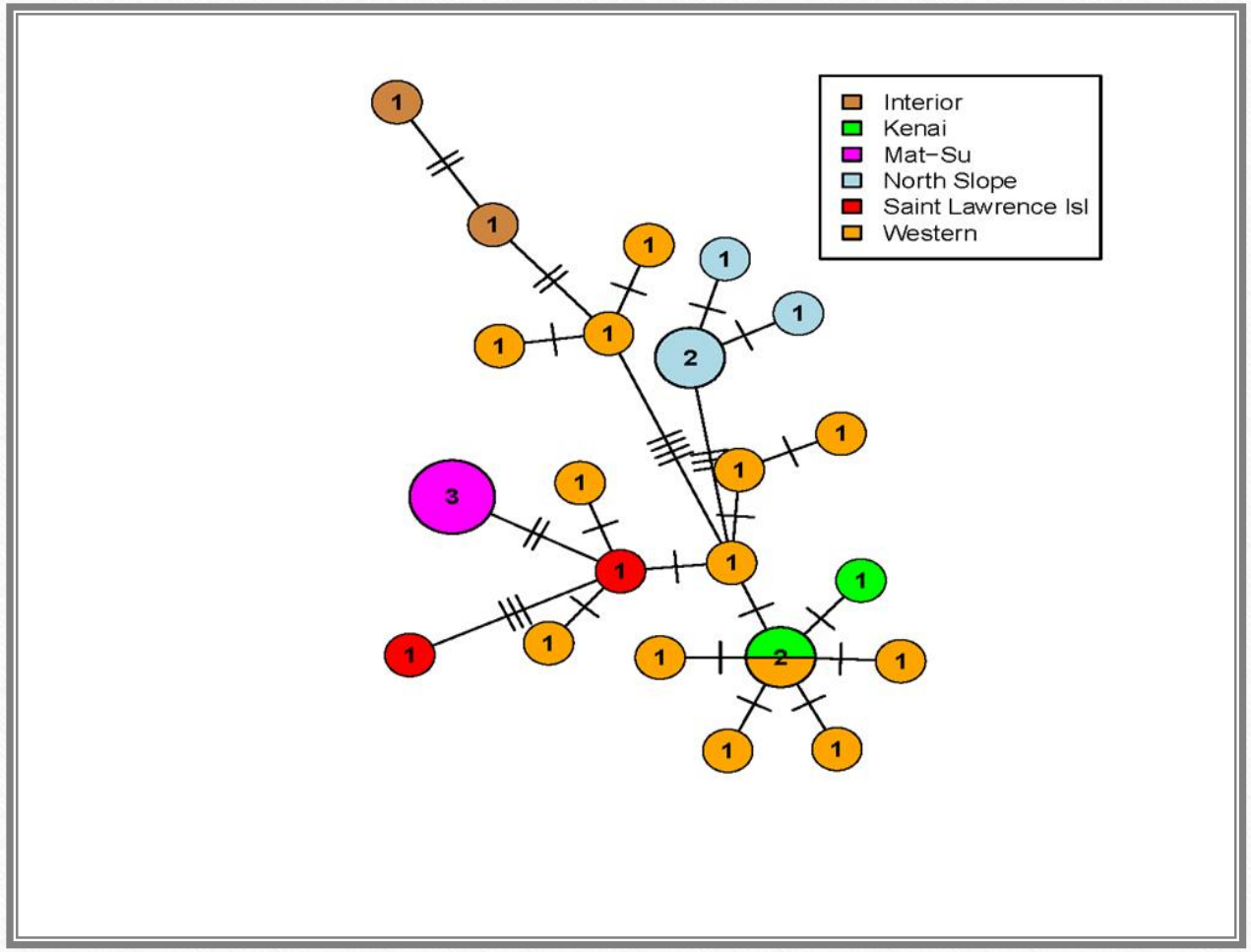
(Campbell et.al., 2014), (Kubly, 2016)

Native Range

- The Alaska Blackfish' native range extends across Western Alaska, from the base of the Alaska Peninsula to the north slope of the Brooks Range. Their range extends eastward into Interior Alaska via the Yukon and Tanana River Systems. There are also indigenous populations on several Bering Sea Islands as well as Northeastern Siberia (Page & Burr, 2011).

Introduced Range

- Introduced populations exist on the Kenai Peninsula, Anchorage Bowl, and the Mat-Su Valley
- First detections on the Kenai Peninsula occurred in the 1990s, introductions to the Anchorage Bowl and Mat-Su occurred in the 1950s.



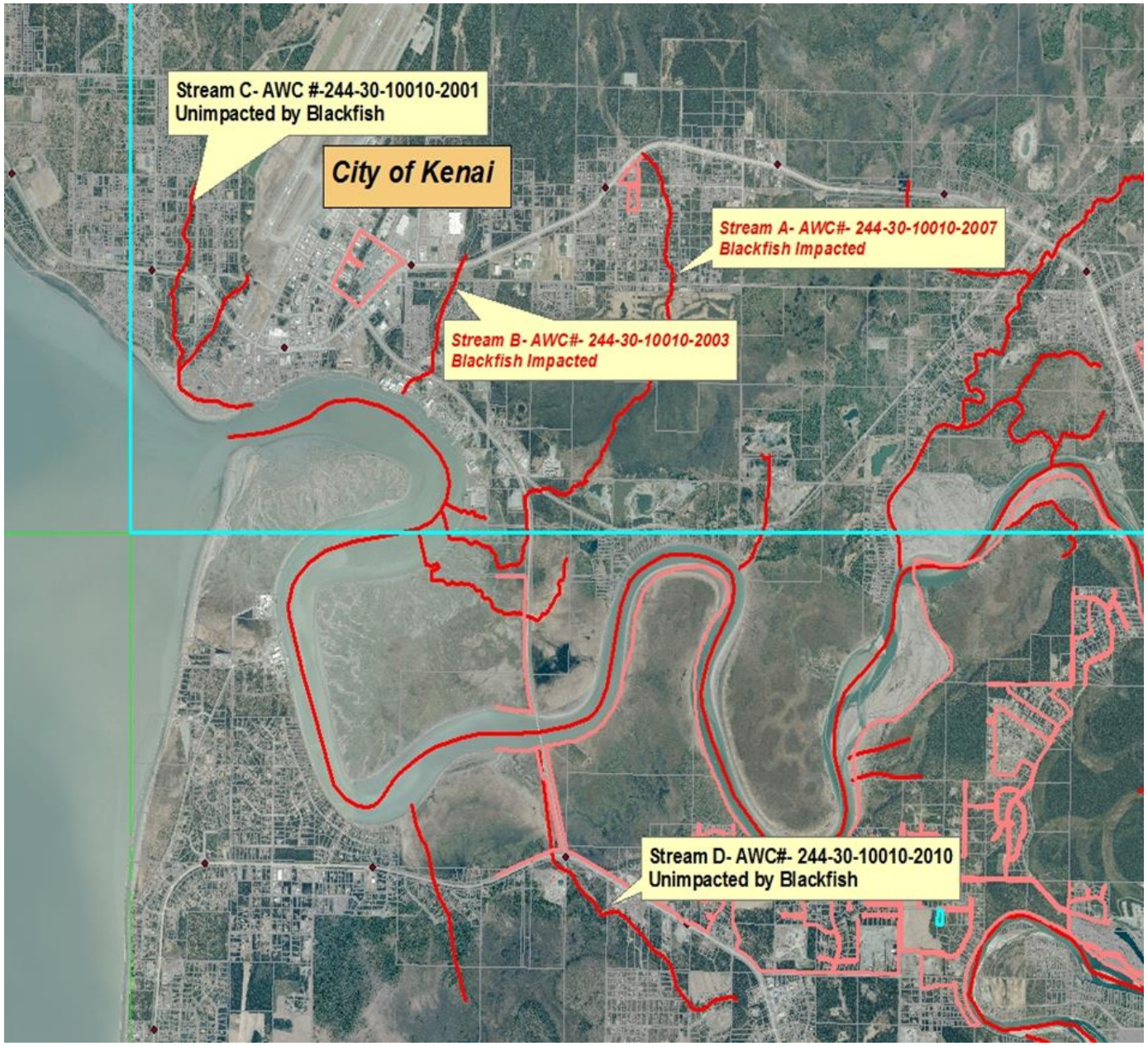
(M. Bowser, personal communication, 2019)

Haplotype Map

- Mat-Su population likely originated from an introduced population on St. Lawrence Island
- The Kenai population originated from Western Alaska

Study Area

- Alaska Blackfish are present in 2 streams in the Kenai River delta.
- Both streams are tidally influenced in their lower reaches.



Analysis of Fish Trapping Data

Catch Per Unit of Effort

- **CPUE = N/(Traps X Soak Hours)**
- **Used as an index of abundance**

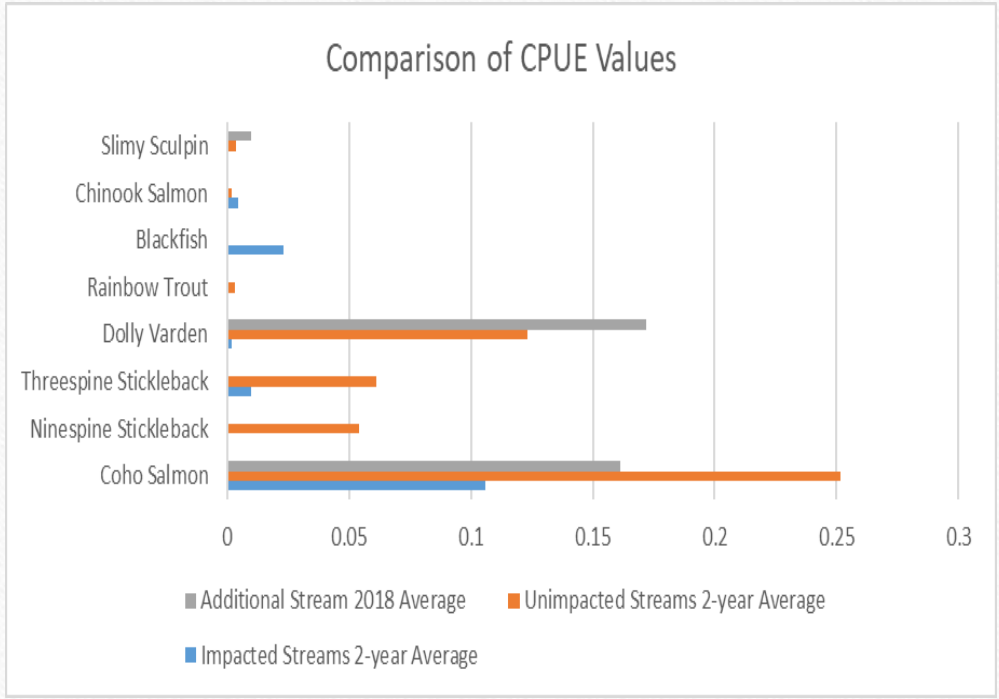
Fulton Condition Factor

- $K = \frac{W}{L^3} X$
- Used as a means to assess growth rate and health of juvenile coho salmon between blackfish impacted and unimpacted streams

(Murphy & Willis, 1996)

2-Year CPUE Data

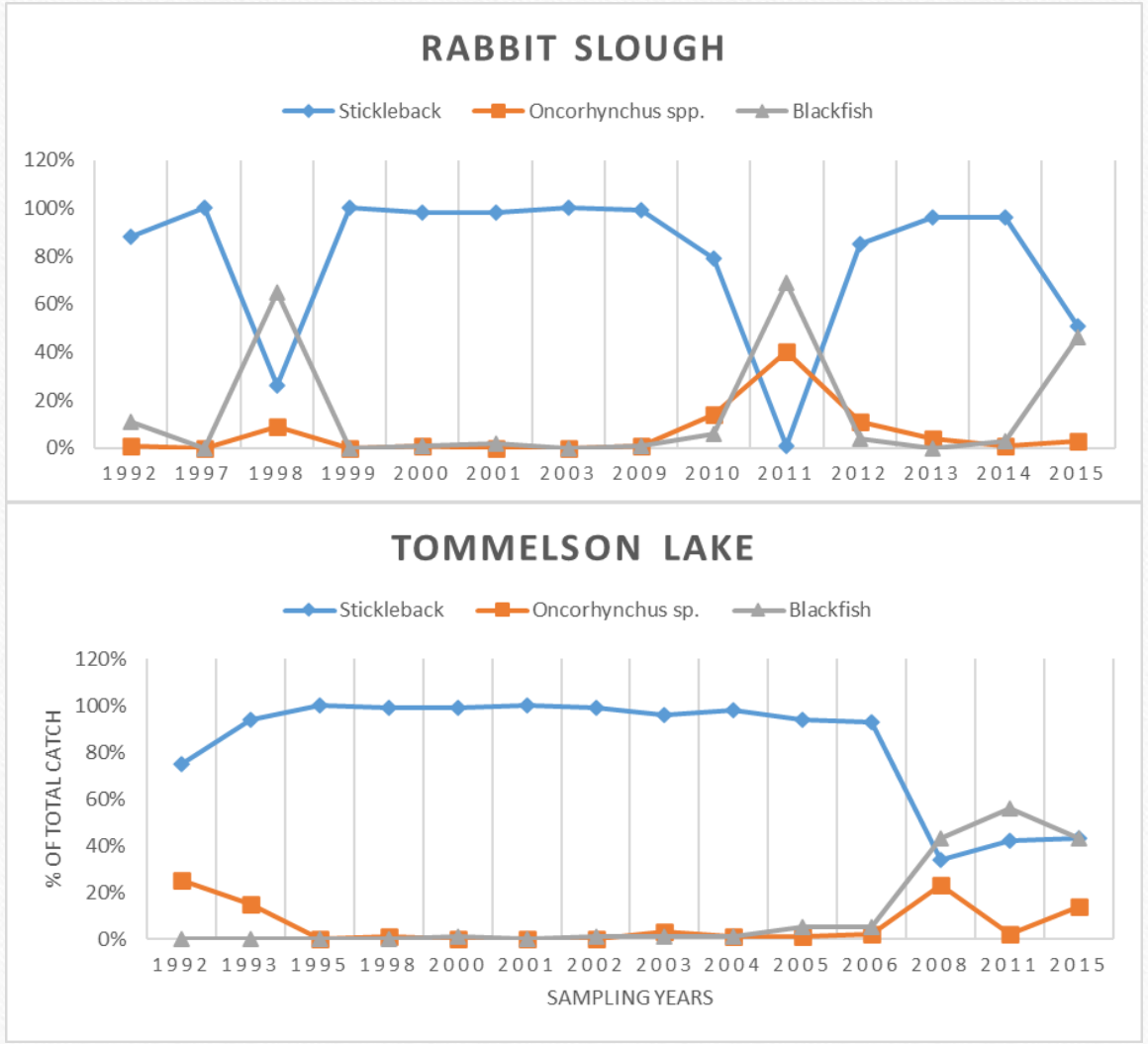
- Threespine sticklebacks were only caught in blackfish streams during spring spawning; few resident sticklebacks were captured.
- Dolly Varden in blackfish streams were only captured in fall, likely anadromous fish



Dr. Bell's CPUE Data

- Dr. Bell offered me 20+ years of fish trapping data from the Mat-Su
- His trapping efforts were focused on stickleback, and salmonids were not always speciated in his data
- Data showed multiple instances of stickleback population declines coinciding with rises in blackfish catch rates

(M. Bell, electronic communication, 2018)



Dietary Overlap

- A 2016 study on blackfish diet in the Anchorage bowl and a 2016 study on rearing salmon gut contents revealed that there is dietary overlap in 3 of the top 10 gut contents.
- Blackfish diet focuses on benthic species year-round, whereas juvenile salmon diet shifts to terrestrial sources for at least part of the year.

(Eidam et.al., 2016), (Rine et.al., 2016)

Hypotheses for reduced CPUE of Threespine Stickleback

- Dietary overlap
- Direct predation
  - Mass vs. frequency
  - Resident vs. anadromous
  - Lifestages of vulnerability

(Eidam et.al., 2016)

Hypotheses for reduced CPUE of Dolly Varden

- Dietary overlap
- Direct Predation
  - Resident vs. anadromous
  - Lifestages of vulnerability

But what about salmon?

- Lack of habitat overlap during vulnerable life stages
- Limited dietary overlap
- Blackfish habitat would primarily overlap with only juvenile Coho salmon

Bibliography

- Email lucas_byker@fws.gov for a full list of reference sources.