Changes to the number of sampled years and fitness streams in PWS and SEAK to maximize statistical power

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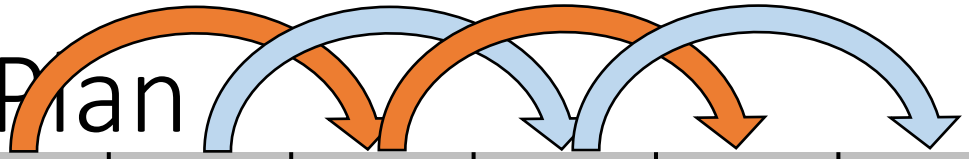
Gene Conservation Laboratory
Alaska Department of Fish and Game
AHRP Informational Meeting
March 9, 2022

Alaska Hatchery Research Program

1) What is the genetic structure of pink and chum in PWS and SEAK?
2) What is the extent and annual variability of straying?
3) What is the impact on fitness (productivity) of natural pink and chum stocks due to straying hatchery pink and chum salmon?

AHRP Fitness Study: PWS Pink Salmon

Original Plan



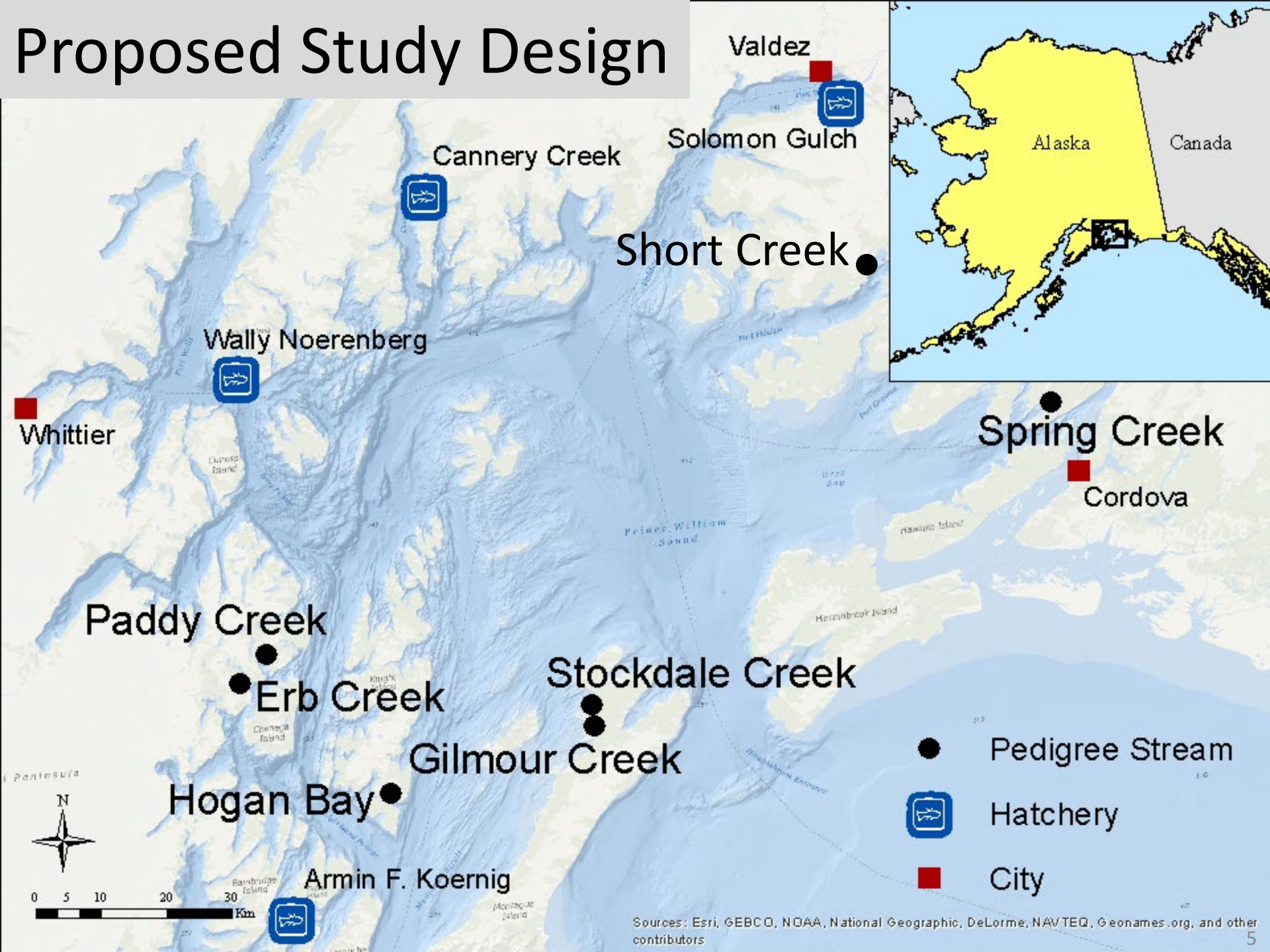
Stream	2013	2014	2015	2016	2017	2018
Short	P	P	P,O	P,O	O,G	O,G
Spring	P	P	P,O	P,O	O,G	O,G
Stockdale	P	P	P,O	P,O	O,G	O,G
Hogan	P	P	P,O	P,O	O,G	O,G
Paddy	P	P	P,O	P,O	O,G	O,G
Erb	P	P	P,O	P,O	O,G	O,G

P – parents
O – offspring
G – grand-offspring

Odd-lineage

Even-lineage

Proposed Study Design



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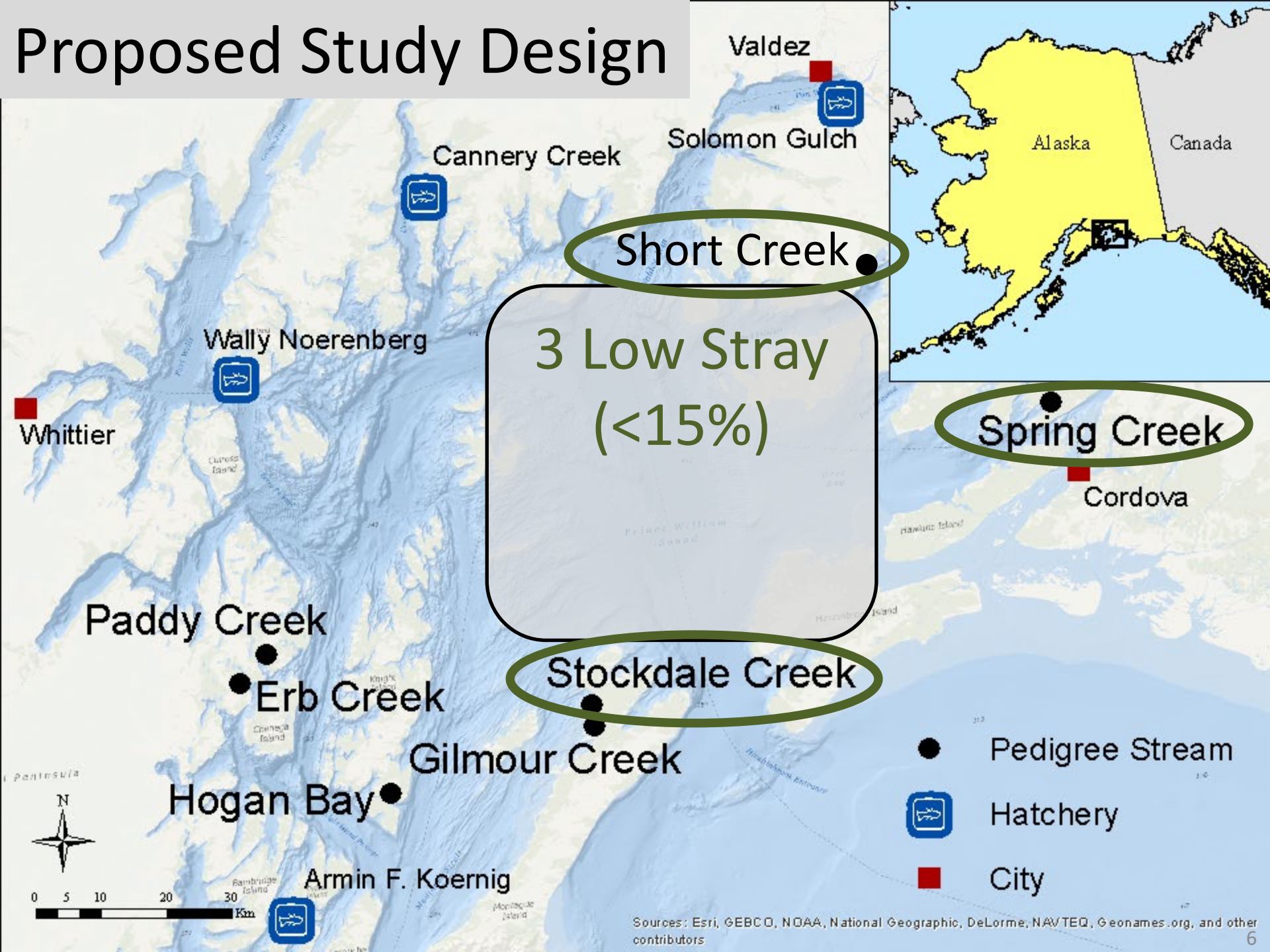
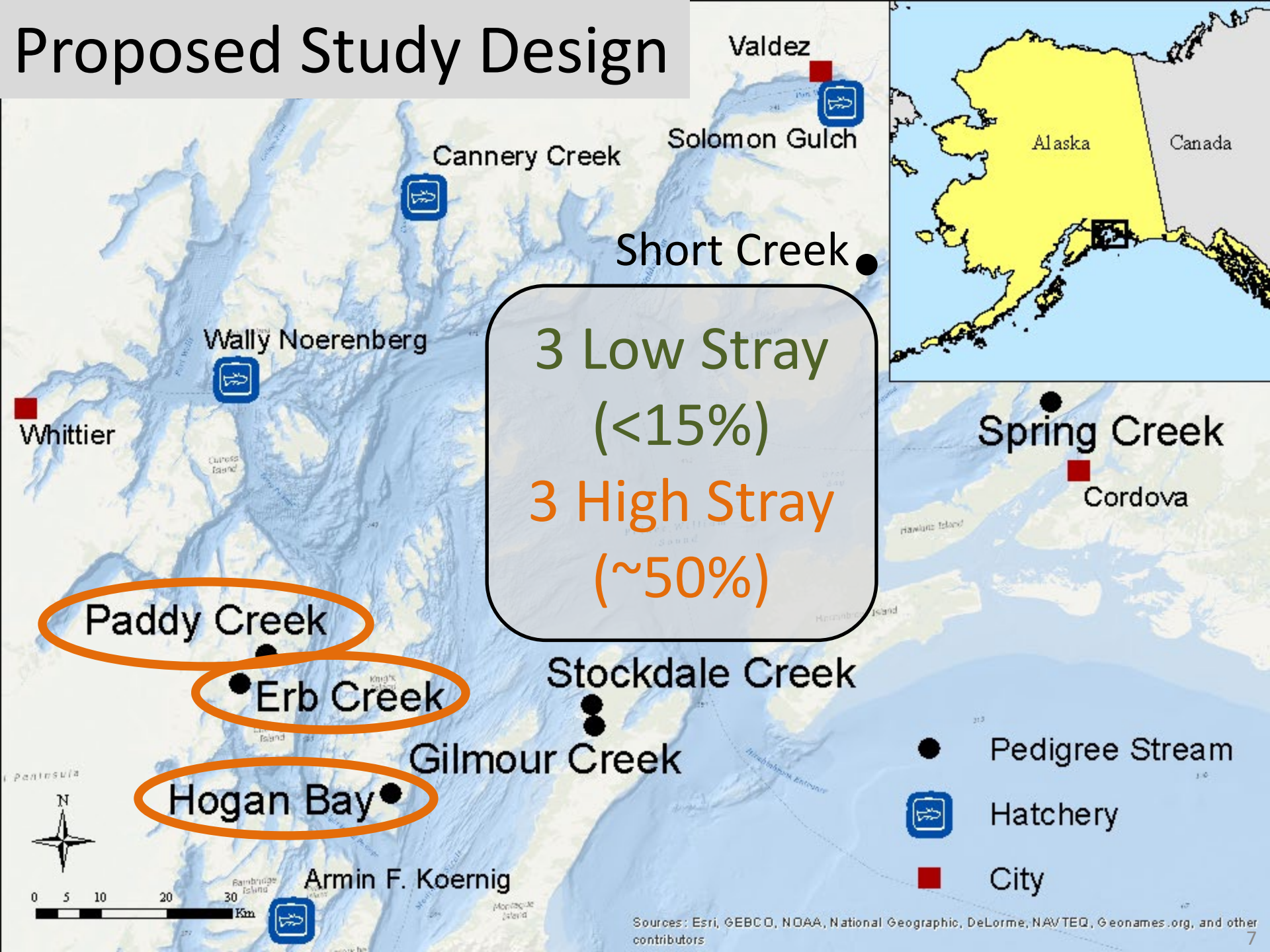


Proposed Study Design



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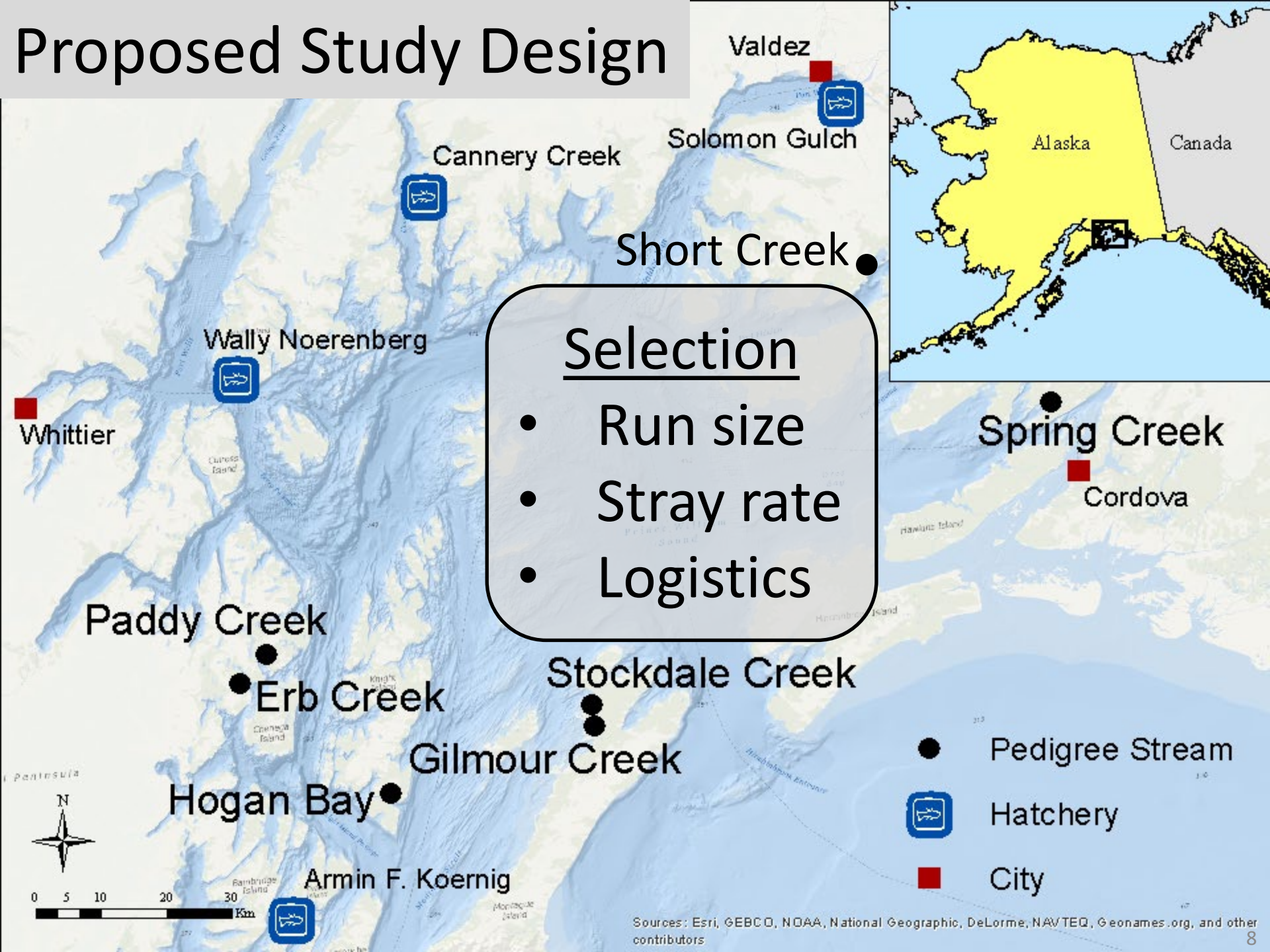
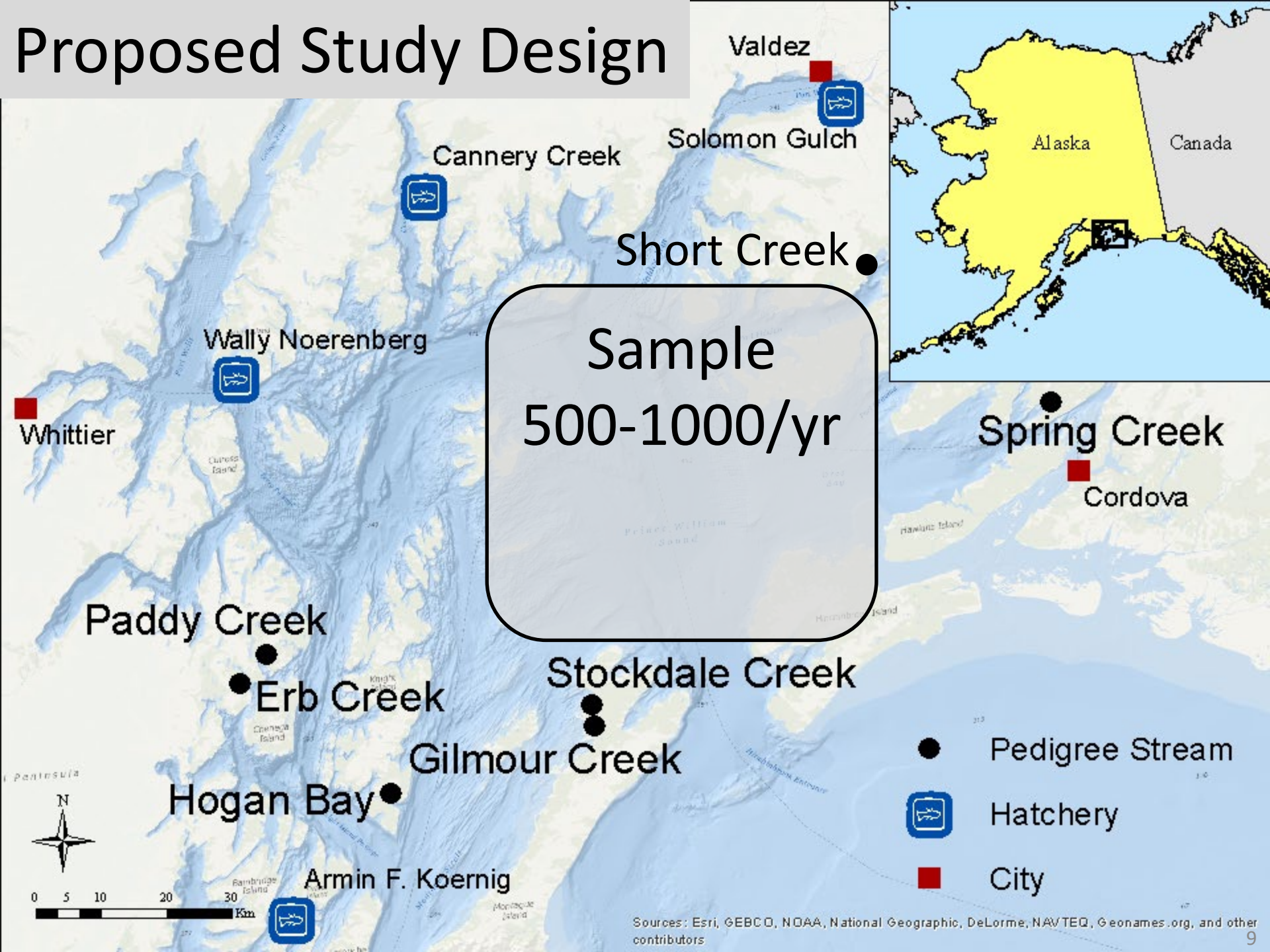
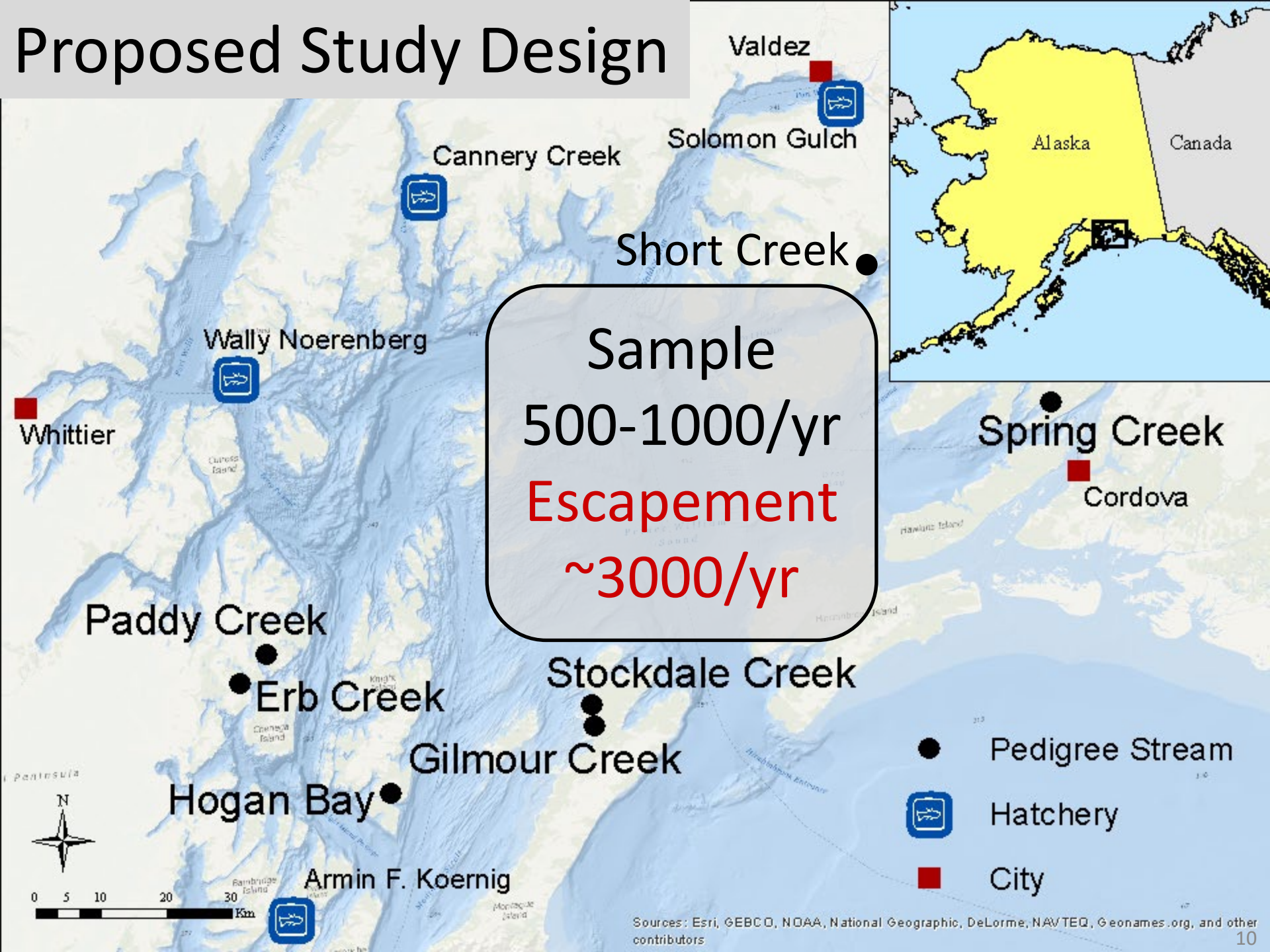


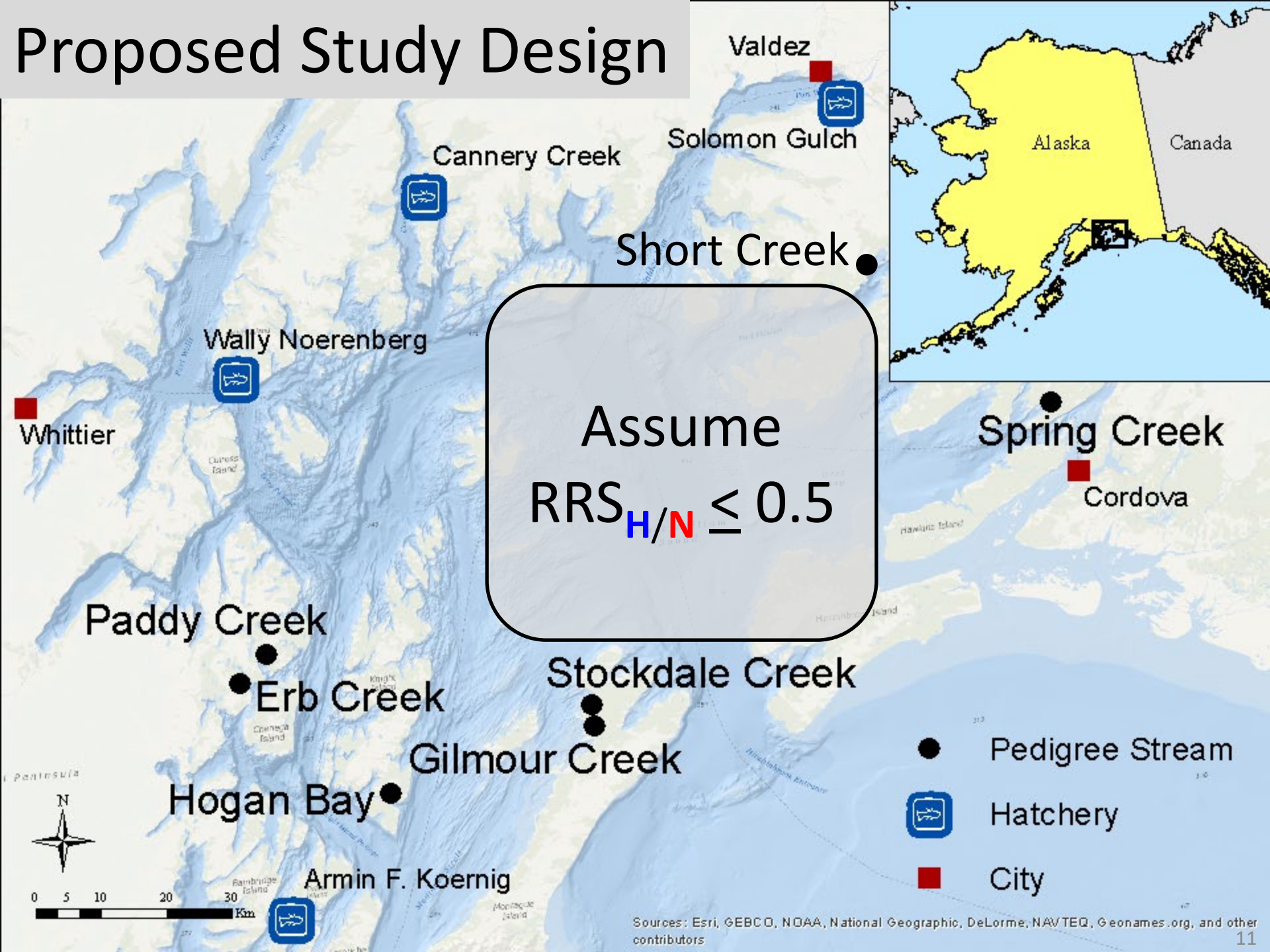
Proposed Study Design



Proposed Study Design

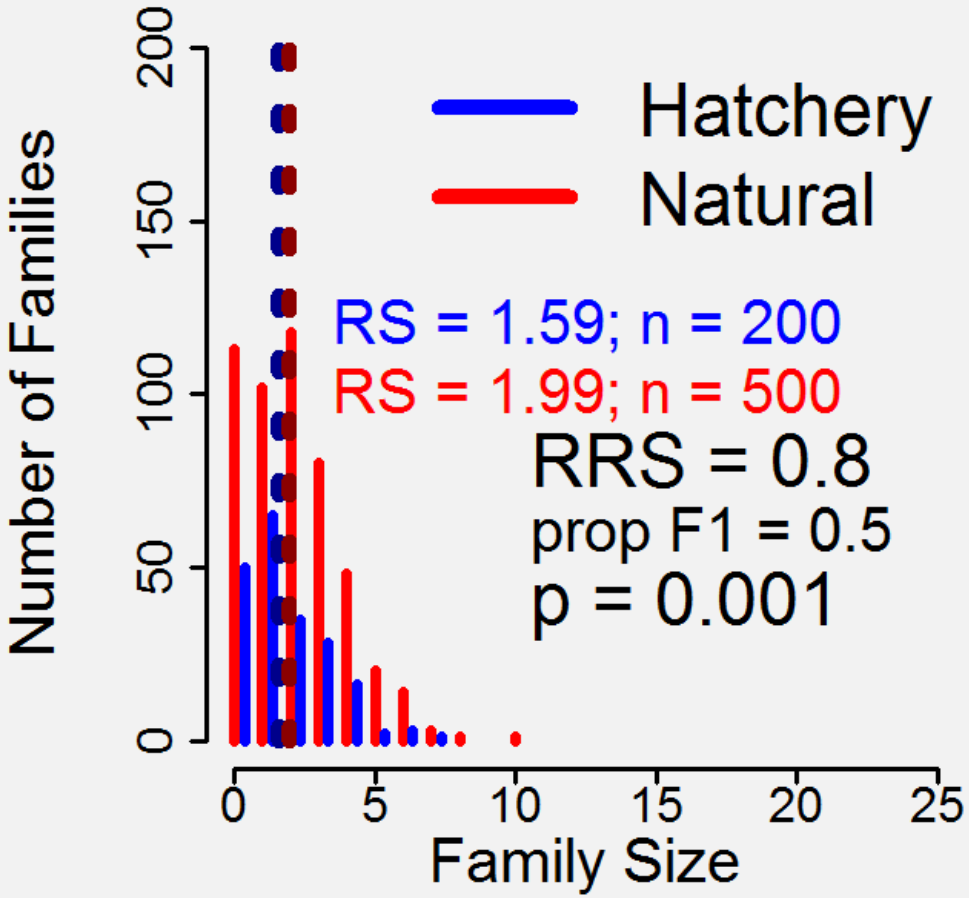


Proposed Study Design



Power:

How often we expect to detect an effect



Depends on:

- Number parents (F_0) sampled
  - Hatchery ~ f(stray)
  - Natural
- Proportion offspring (F_1) sampled
- Distribution of RS (productivity)
  - Mean
  - Dispersion
- RRS
  - Difference between H and N
  - Benchmark RRS = 0.5

Power:
How often we expect to detect an effect

Power increases with…

- In our control
  - ↑ Number families
  - Stray rate > 10%
  - ↑ Proportion offspring
- Out of our control
  - Distribution of RS
    - ↑ Mean
    - ↑ Dispersion
  - ↓ True RRS

Depends on:

- Number parents (F_0) sampled
  - Hatchery ~ f(stray)
  - Natural
- Proportion offspring (F_1) sampled
- Distribution of RS (productivity)
  - Mean
  - Dispersion
- RRS
  - Difference between H and N
  - Benchmark RRS = 0.5

Original Plan

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Spring	P	P	P,O	P,O	O,G	O,G
Stockdale	P	P	P,O	P,O	O,G	O,G
Hogan	P	P	P,O	P,O	O,G	O,G
Paddy	P	P	P,O	P,O	O,G	O,G
Erb	P	P	P,O	P,O	O,G	O,G

P – parents
O – offspring
G – grand-offspring

Odd-lineage

Even-lineage

Revised Plan

Stream	2013	2014	2015	2016	2017	2018	2019	2020
Short	P	Too few hatchery strays						
Spring	P	P	P,O	Too few hatchery strays				
Stockdale	P	P	P,O	P,O	P,O,G	O,G	O,G	
Hogan	P	P	P,O	P,O	P,O,G	O,G	O,G	
Paddy	P	P	P,O	P,O	O,G	P,O,G		O,G
Erb	P	P	P,O	P,O	O,G	P,O,G		O,G
Gilmour		P	Replace Short	P,O		O,G	O,G	

P – parents

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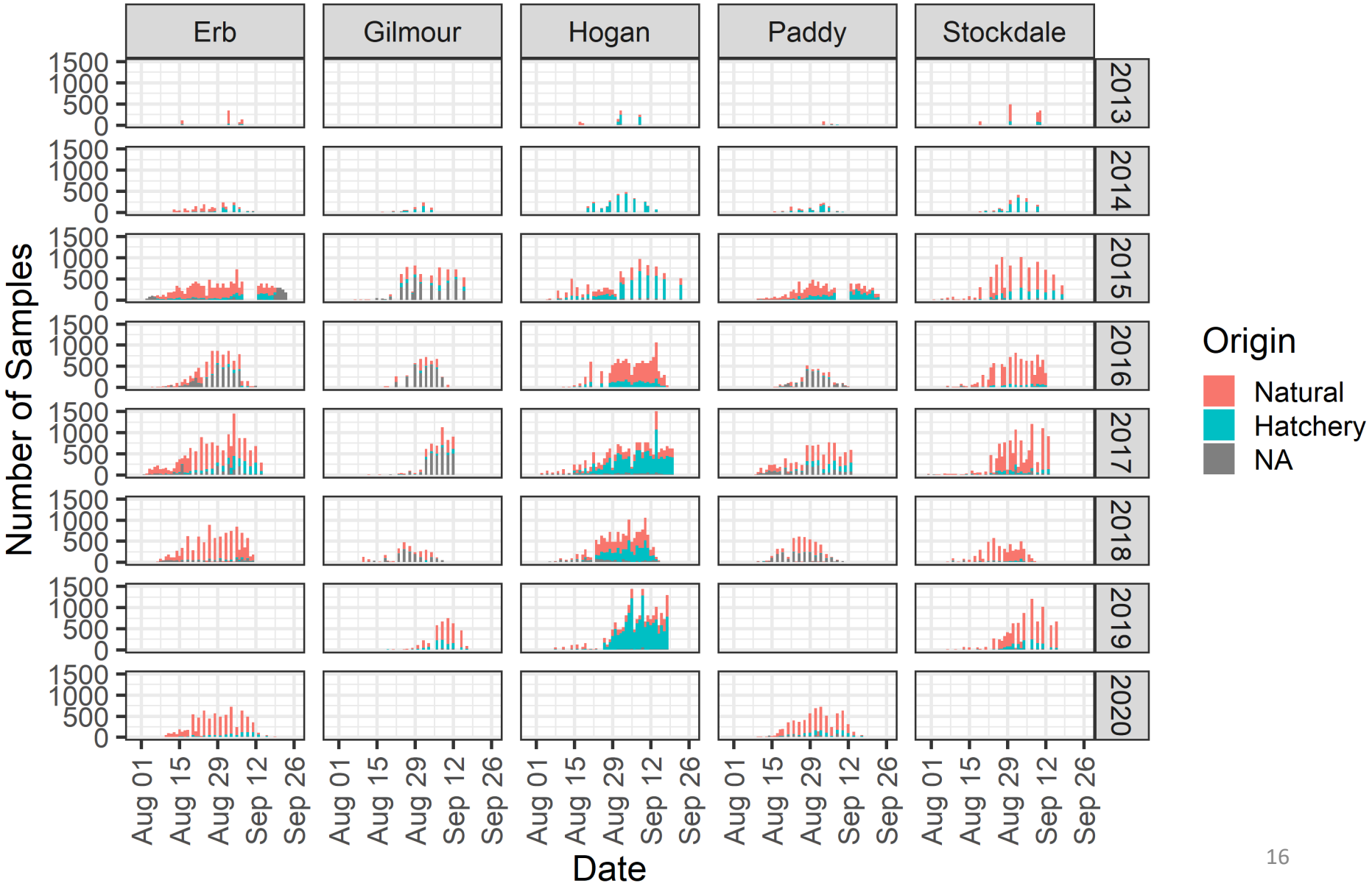
Odd-lineage

Even-lineage

Future Analyses

>235K samples!




Questions?
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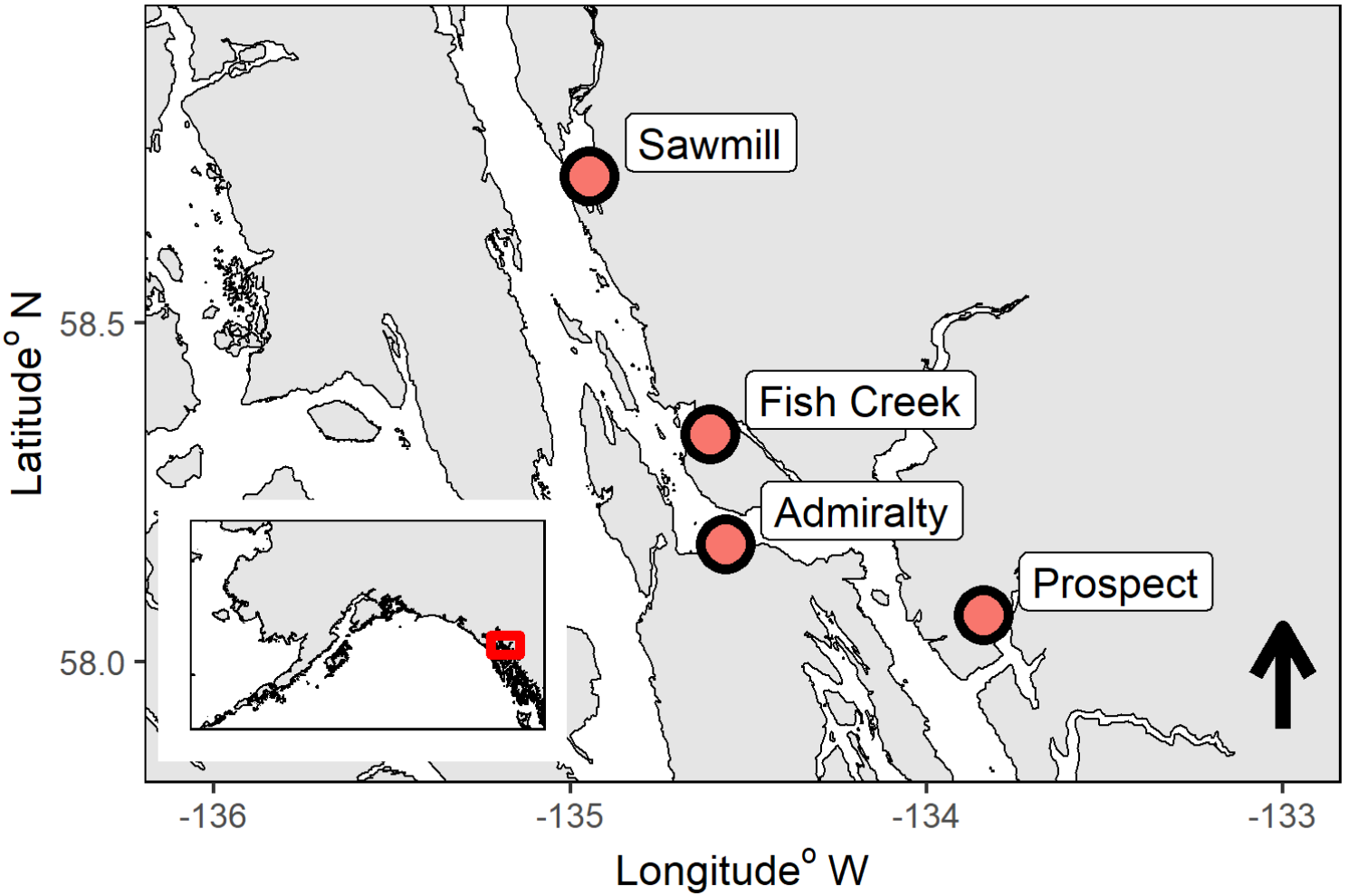
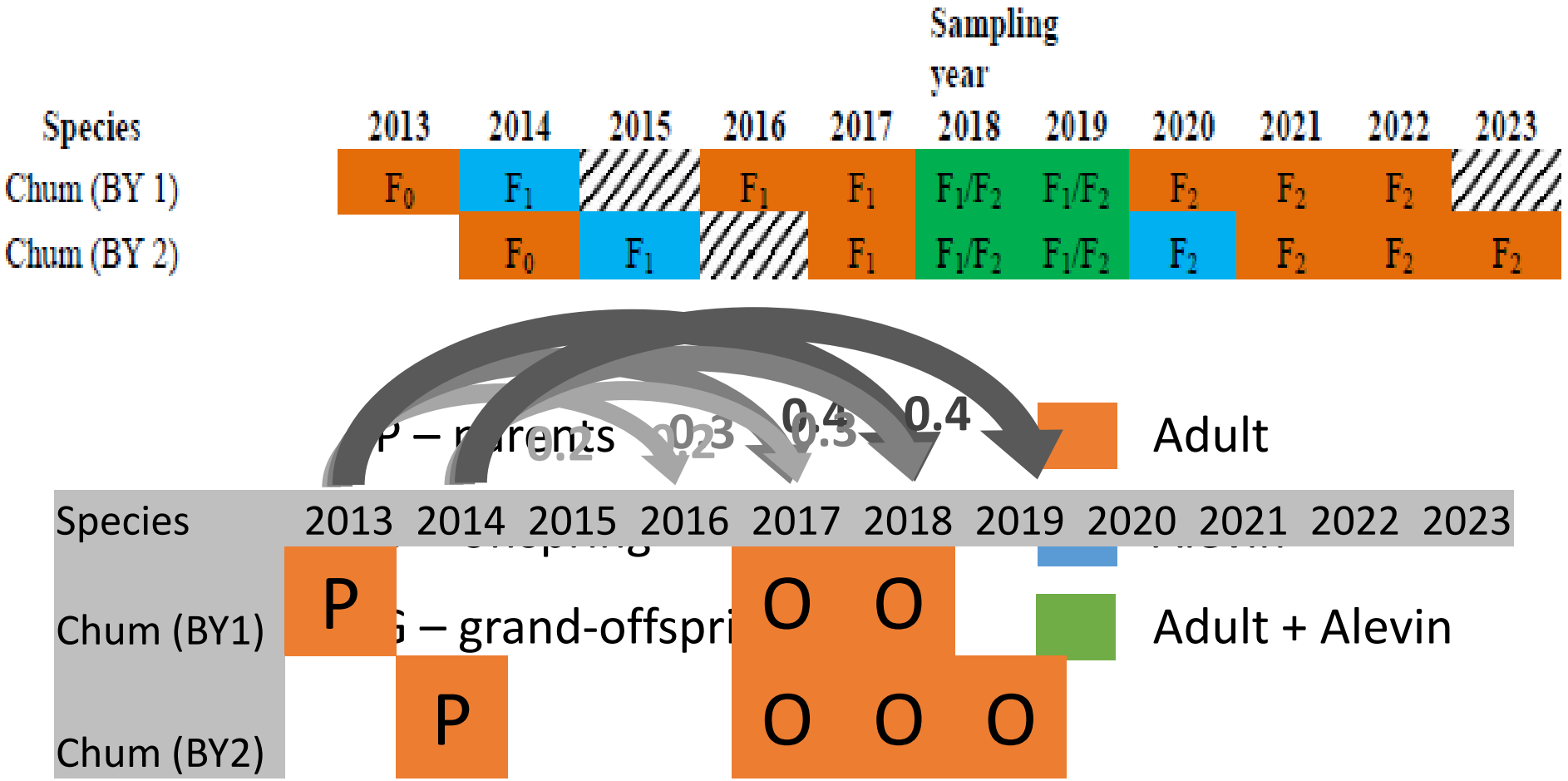
AHRP Fitness Study: SEAK Chum Salmon

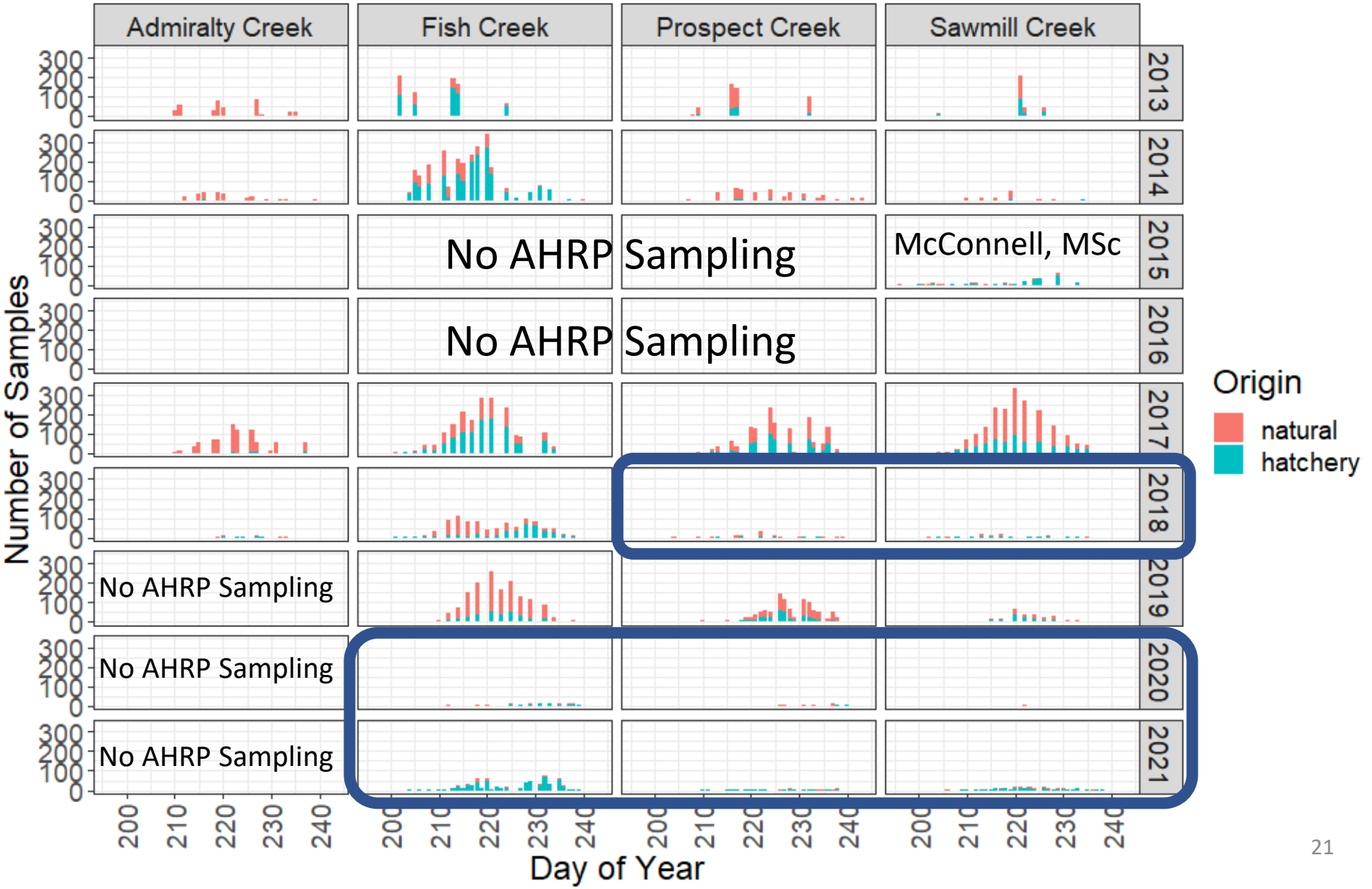
AHRP Streams in SEAK



Study Design: Original

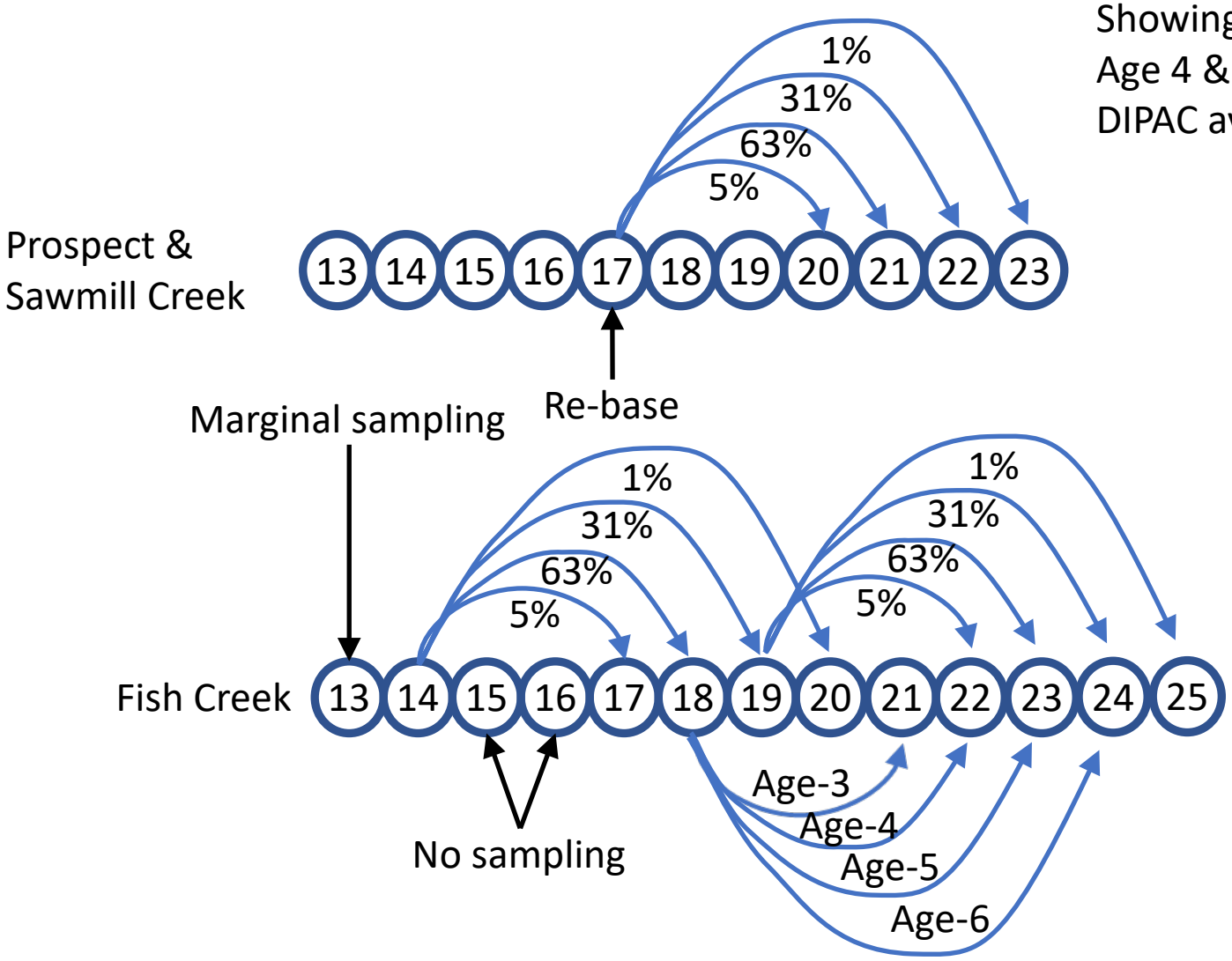


Samples Collected to Date



Study Design: Revised

Showing returns age 3 to 6
Age 4 & 5 are most common
DIPAC average 1989-2020



Questions?