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



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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 Pran s es |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 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 | 0,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-li̊neage

## Proposed Study Design

- Erb Creek Stockdale Creek


Spring Creek
Cordova


## Paddy Creek

Gilmour Creek

- Pedigree Stream


## Proposed Study Design



Short Creek

Wally Noerenberg

Whittier

Paddy Creek

- Erb Creek


$$
\begin{aligned}
& 3 \text { Low Stray } \\
& (<15 \%)
\end{aligned}
$$



Armin F. Koernig

Pedigree Stream
Hatchery
City

## Proposed Study Design



## Spring Creek

Cordova
तamunt teme

Stockdale Creek
(~50\%)
Solomon Gulch

Short Creek.
3 Low Stray
(<15\%)
3 High Stray

Paddy Creek

## Erb Creek

## Hogan Bay ${ }^{\bullet}$

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Pedigree Stream
Hatchery
City

## Proposed Study Design

## Short Creek

## Selection <br> - Run size <br> - Stray rate <br> - Logistics

Paddy Creek

Solomon Gulch
Cannery Creek .


Gilmour Creek
arcas


Spring Creek
Cordova
तamunz fored

## Proposed Study Design

Short Creek

## Paddy Creek

- Erb Creek


## Sample 500-1000/yr



Gilmour Creek

- Pedigree Stream
$\Leftrightarrow$ Hatchery
- City


## Proposed Study Design

> Wally Noerenberg

Whittier

Paddy Creek

- Erb Creek


## Short Creek

Solomon Gulch
Cannery Creek

Sample 500-1000/yr Escapement ~3000/yr

Stockdale Creek Gilmour Creek

## Proposed Study Design



Paddy Creek

- Erb Creek


Wally Noerenberg Hogan Bay ${ }^{\bullet}$

Solomon Gulch
Cannery Creek

Assume $\mathrm{RRS}_{\mathrm{H} / \mathrm{N}} \leq 0.5$

Gilmour Creek

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- Pedigree Stream
$\Leftrightarrow$ Hatchery
City


## Power:

## How often we expect to detect an effect



## Power:

## How often we expect to detect an effect

Power increases with...

- In our control
- $\uparrow$ Number families
- Stray rate > 10\%
- 个 Proportion offspring
- Out of our control
- Distribution of RS
- $\uparrow$ Mean
- $\uparrow$ Dispersion
- $\downarrow$ True RRS

Depends on:

- Number parents $\left(F_{0}\right)$ sampled
- Hatchery ~f(stray)
- Natural
- Proportion offspring $\left(F_{1}\right)$ sampled
- Distribution of RS (productivity)
- Mean
- Dispersion
- RRS
- Difference between H and N
- Benchmark RRS $=0.5$


## Original Plan

| Stream | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Short | P | P | $\mathrm{P}, \mathrm{O}$ | $\mathrm{P}, \mathrm{O}$ | $\mathrm{O}, \mathrm{G}$ | $\mathrm{O}, \mathrm{G}$ |
| Spring | P | P | $\mathrm{P}, \mathrm{O}$ | $\mathrm{P}, \mathrm{O}$ | $\mathrm{O}, \mathrm{G}$ | $\mathrm{O}, \mathrm{G}$ |
| Stockdale | P | P | $\mathrm{P}, \mathrm{O}$ | $\mathrm{P}, \mathrm{O}$ | $\mathrm{O}, \mathrm{G}$ | $\mathrm{O}, \mathrm{G}$ |
| Hogan | P | P | $\mathrm{P}, \mathrm{O}$ | $\mathrm{P}, \mathrm{O}$ | $\mathrm{O}, \mathrm{G}$ | $\mathrm{O}, \mathrm{G}$ |
| Paddy | P | P | $\mathrm{P}, \mathrm{O}$ | $\mathrm{P}, \mathrm{O}$ | $\mathrm{O}, \mathrm{G}$ | $\mathrm{O}, \mathrm{G}$ |
| Erb | P | P | $\mathrm{P}, \mathrm{O}$ | $\mathrm{P}, \mathrm{O}$ | $\mathrm{O}, \mathrm{G}$ | $\mathrm{O}, \mathrm{G}$ |

P - parents
O - offspring
G - grand-offspring

Oddllinneage
Even-lioneage

## 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 s |  |  | rays |  |
| 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
O - offspring
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Odd-Iineage
Even-lineage

## Future Analyses




# AHRP Fitness Study: SEAK Chum Salmon 

## Map of SEAK Chum fitness streams



## Study plan



## Statistical power of study plan

- Need minimum ~100 parents of each sex/origin
- Ideally a high proportion of parents
- Hogan Bay 2013/2015
- Low sampling rate = few parent-offspring assignments
- Sample high proportion of offspring
- Consistent proportion for all return years
- Differences in age at return?


## Samples by origin, stream, and year



## Questions?



