Prioritization of pink salmon samples and analyses 2015/2016: TD 11

Alaska Department of Fish & Game
Gene Conservation Lab

March 2016 AHRP Meeting
Anchorage, AK

First possible results for PWS pink salmon adult-to-adult

- Odd year pink salmon samples for five streams
- First set of adult-to-adult parentage analyses
- Changes from original design and unanticipated run sizes:
  - Increased sampling effort and unusually high-abundances in 2013 and 2015
  - Larger than anticipated number of samples for potential analyses (~60,000 samples)
- Result: More samples available for analysis than current funding and laboratory capacity

Factors considered in prioritization

- Depth over breadth
- Only natural-origin fish required for F1
- High statistical power
- Cost

Power:
How often we expect to detect an effect

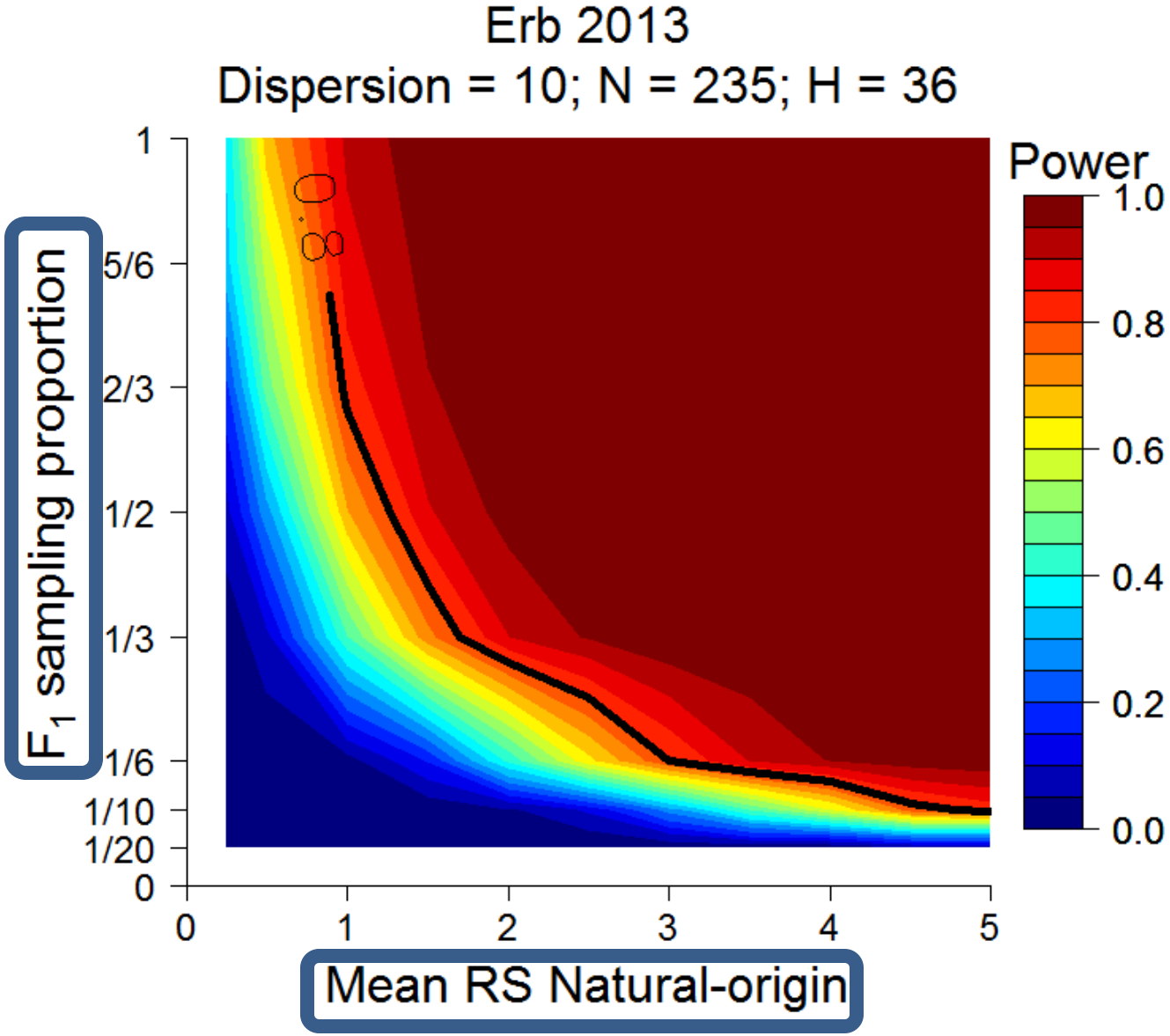
Power increases with…

- 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

Previous work



Estimating power

$$\widehat{RS}_{Natural} \sim {F_{1}}_{Natural} \Big/ {F_{0}}_{aerial} \times (1 - 0.5 p_{F_0 Hatchery})$$

pF_1 *sample*

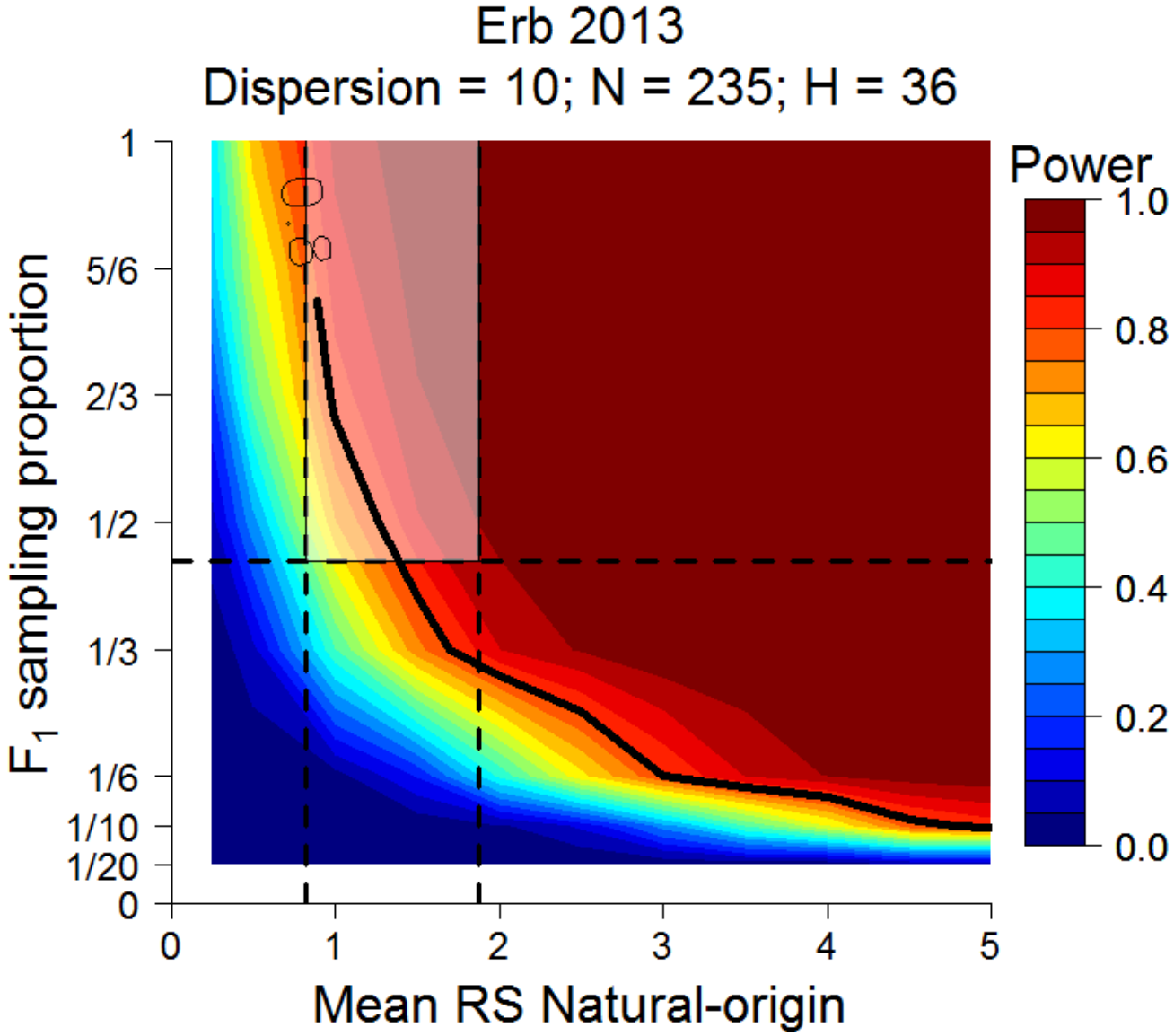
Lots of uncertainty in aerial survey data and in stream walk data!!!

Where

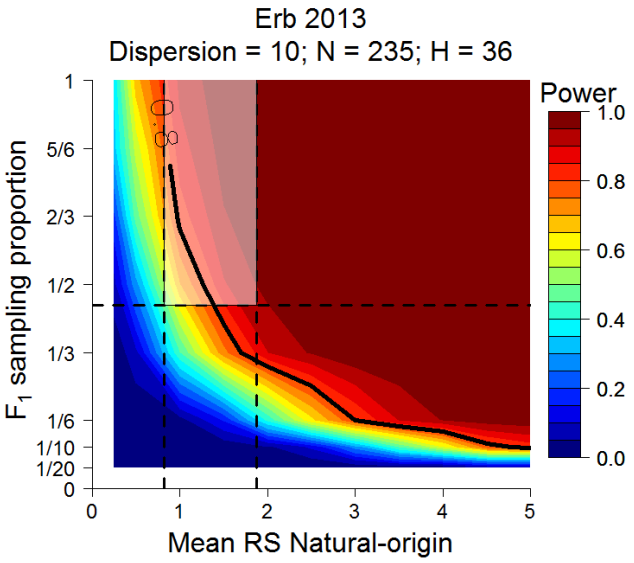
$${F_{1}}_{Natural} = (1 - p_{F_1 Hatchery}) \times n_{F_1 aerial}$$

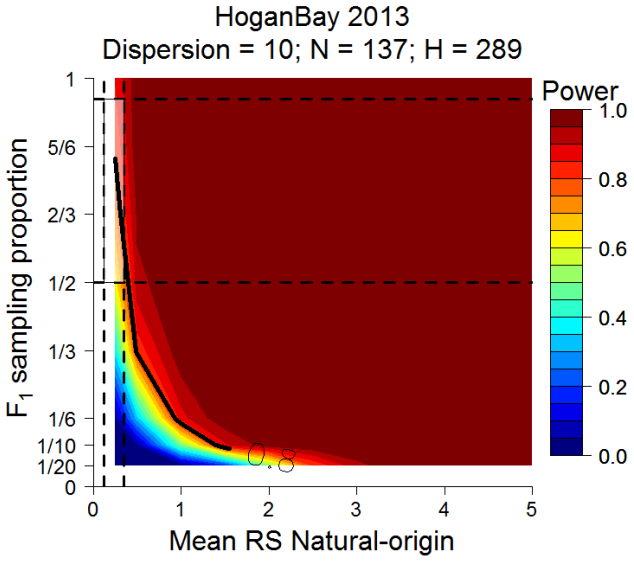
$$F_0 = n_{F_0 aerial}$$

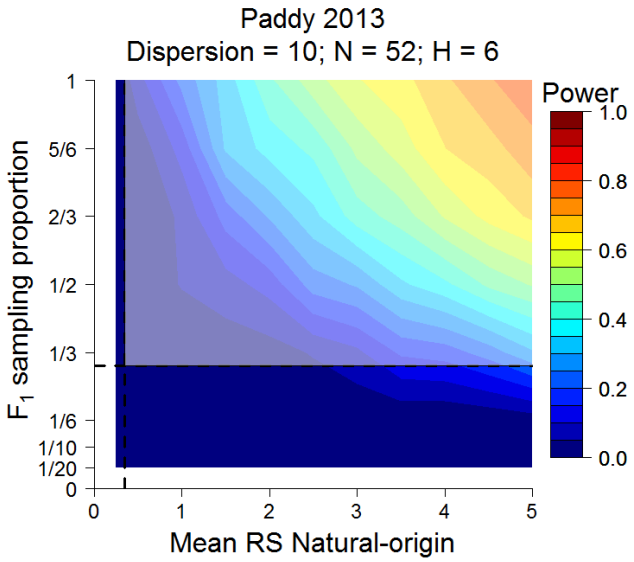
Estimating power

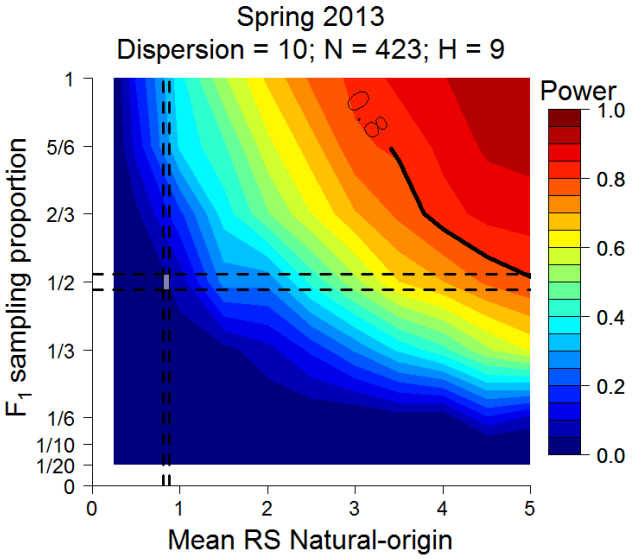


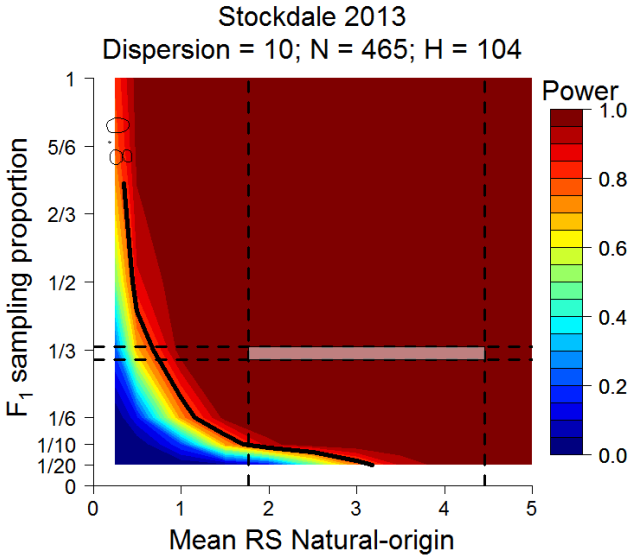
Estimating power











2013/2015 Samples available

GCL Priority	Project Component	Samples available: Otolith	Samples available: Genotype	Laboratory Genotyping Cost	2013 Stray rate	Likely Statistical Power	Rationale
1	Stockdale Creek Adult	8,602	~9,000	$288,000	10.2%	High	Intermediate stray rate and high power
2	Hogan Bay Adult	9,441	~5,000	$160,000	56.4%	High	High stray rate and high power
3	Erb Creek Adult	13,039	~12,000	$384,000	10.8%	Medium	Intermediate stray rate and medium power
4	Spring Creek Adult	12,469	~13,500	$432,000	1.5%	Low	Low stray rate but low power
5	Stockdale Creek 2014 Alevin	-	2,728	$87,300	10.2%	Likely Low	Only alevin stream
6	Paddy Creek Adult	8,710	~7,500	$240,000	15.3%	Very Low	Intermediate stray rate and very low power

Note: These numbers assume genotyping all 2013 adults regardless of origin (potential parents), but only natural-origin adults for 2015 (potential offspring). Numbers of natural-origin adults for 2015 were estimated assuming the same stream-specific stray rates as 2013. Laboratory genotyping costs with GCL's current genotyping technology are estimated at $32/fish.

Stockdale Creek timeline

Component	Start date	End date
Receive all samples from PWSSC	September 2015	October 2015
Separate heart from otoliths for Stockdale samples	October 2015	November 2015
New SNP markers available		February 2016
Read otoliths from 2015 Stockdale samples	November 2015	March 2016
Genotype 2013 & 2015 Stockdale samples	January 2017	March 2017
Parentage analysis on Stockdale samples	April 2017	September 2017
Report results of parentage analysis and RRS		March 2018

Our recommendation:

- Stockdale Creek 2013/2015
  - Adequate sampling of the 2013 parents
  - Intermediate stray rate (10.2% in 2013)
  - Intermediate population size yields high statistical power
  - Intermediate cost

Science Panel recommendation:

- Hogan Bay 2013/2015
  - Adequate sampling of the 2013 parents
  - High stray rate (56.4% in 2013)
  - Intermediate population size yields high statistical power
  - Lower cost

Wrote proposals for funding

NORTH PACIFIC RESEARCH BOARD

3. Cooperative Research with Industry **$400,000**

iv. Mariculture and wild-hatchery interactions

NPRB is interested in research on mariculture issues, including various aspects of the development of invertebrates and seaweeds for mariculture, sea ranching, and stock enhancement. Studies might focus on the survival of hatchery-reared individuals in the wild, on genetic surveys of populations to aid in broodstock development for hatchery culture, on multi-trophic aquaculture systems, and on ecological and genetic interactions between hatchery-reared and wild individuals. NPRB would encourage researchers to examine ongoing projects and avoid duplication (e.g., Alaska Department of Fish and Game projects on hatchery-wild stock interactions).

NOAA FISHERIES
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Estimated Total Program Funding: $5,000,000
Award Ceiling: $250,000
Award Floor: $50,000

The Saltonstall-Kennedy Grant Program

The goal of the SK program is to fund projects that address the needs of fishing communities, optimize economic benefits by building and maintaining sustainable fisheries, and increase other opportunities to keep working waterfronts viable. The FY16 solicitation seeks applicants that fall into seven priorities. The seven priorities are:

NPRB

- $289,435
- September 1, 2016-June 30, 2018
- Hogan Bay pink adults 2013/2015 and 2014/2016
- 829 (2013) and 1,417 (2015) F_0 (all)
- 5,754 F_1 (natural-origin)

NOAA – Saltonstall-Kennedy

- $250,000
- September 1, 2016-June 30, 2018
- Stockdale Creek pink adults 2014/2016
- 1,551 F_0 (all)
- 6,449 F_1 (natural-origin)

Timelines

Task	Funding	2016			2017				2018			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Stockdale 2014/2016	SK				1	2	3	3	4	5		
Hogan 2013/2015	NPRB		1	1	2	3	3	4	4	5		
Hogan 2014/2016	NPRB				1	2	3	3	4	5		

Stages of completion	1	2	3	4	5
	Fitness	Extraction	Genotyping	Data analysis	Draft Report	Final reporting

No guarantee of funding