Red King Crab EFP Proposal

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Catch Accounting for Trawl-Bycaught Red King Crab (*Paralithodes camtschaticus*) in the Bering Sea

- **Whole-haul census for red king crab in the factory** $\longrightarrow$ Assess sampling variance and make comparisons between actual number of red king crab and estimated catch: per haul, trip, vessel and ultimately the fleet

- **Vitality pilot study, on deck** $\longrightarrow$ Enhance our understanding of the variables that influence discard mortality and determine metrics that can be used in future studies to evaluate discard survival

Whole-haul census for red king crab in the factory

Motivation

- Red king crab (RKC) are infrequently caught compared to target species

- Sub-sample extrapolation estimates

Whole-haul census for red king crab in the factory

- Comparison of whole-haul crab count to observer sub-sample extrapolation estimate
- Collect basic biological data
- Haul-level covariates and environmental factors
- Analyze red king crab frequency distribution

Vitality pilot study

<u>Motivation</u>

- 80% assumed discard mortality

- RKC vitality metrics on-deck and in factory

Vitality pilot study

- 72-hour on-deck vitality assessment and monitoring

  - Injury, reflex impairment
  - **On-deck** vitality assessment
  - **In-factory** vitality assessment
  - RKC biological data
  - Haul characteristics
  - Metrics to predict mortality

Exemptions Requested:

National Standard 9 - Bycatch (50 CFR 600.350 (d) and 50 CFR 679.21(a)(2)(ii))

50 CFR 679.6 – Exempted fisheries

50 CFR 600.350 – National Standard 9 – Bycatch

50 CFR 679.21 – Prohibited species bycatch management
- § 679.21(a)(2)(ii), Immediate Return of Prohibited Species to Sea

§ 679.7(g)(2), Prohibition on biasing the observer's sampling procedure by pre-sorting RKC catch.
§ 679.28(b), Requirement that all catch must be weighed on a NMFS-approved scale.
§ 679.93(c)(1), Requirement that all catch by Amendment 80 vessels must be weighed on a NMFS-approved scale.

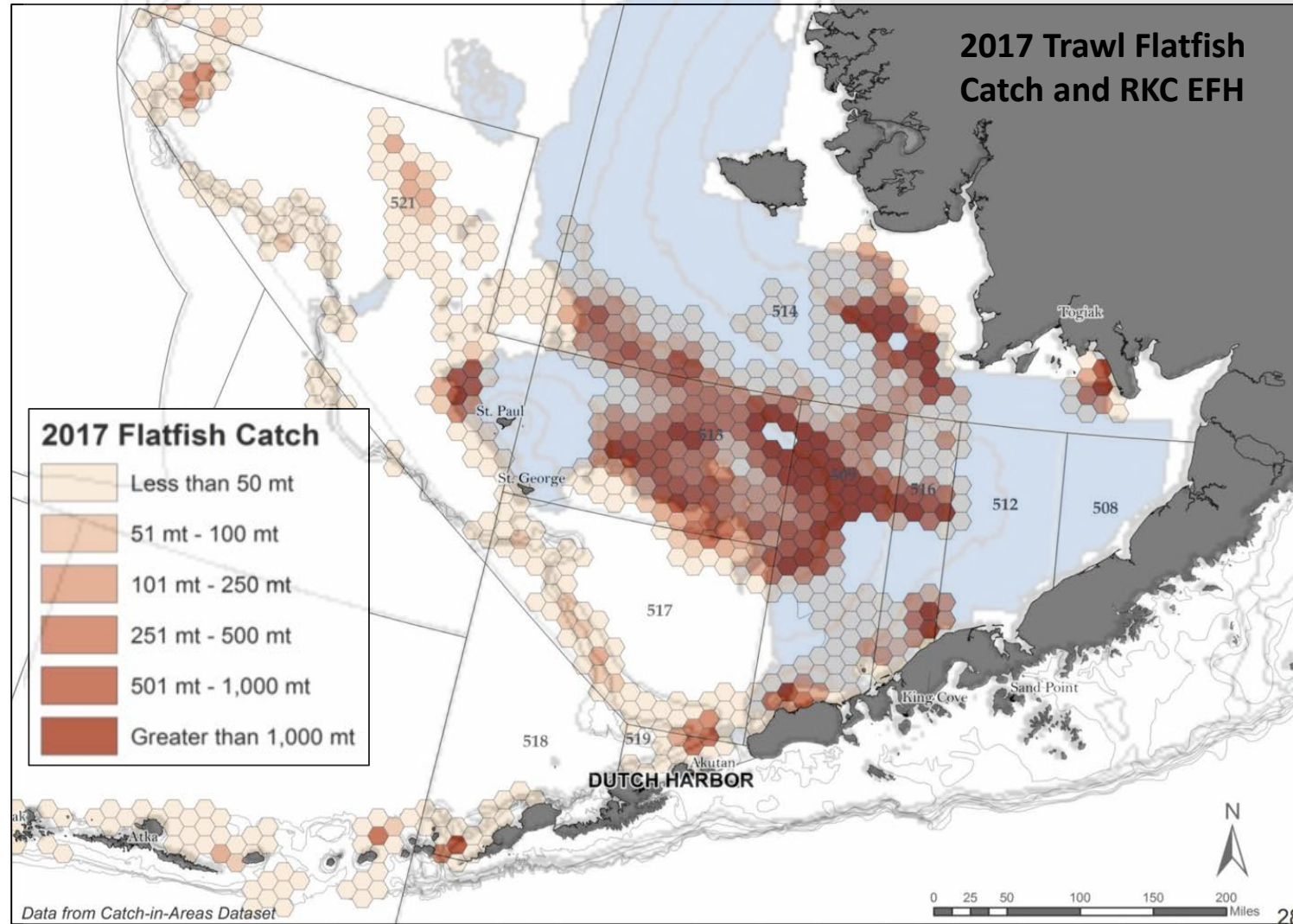***No additional crab PSC or changes to observer sampling***

Summary

- RKC Whole-haul accounting
  - Important dynamics in the relationship between trawl-caught target and PSC species

  - More informed use of data generated via observer sampling

  - Potential improvements in PSC rate estimation for NMFS and industry management for crabs and other species

- Vitality pilot study
  - Enhance our understanding of the variables that influence discard mortality and metrics that can be used to evaluate discard survival

  - Better field and laboratory studies in the future

*Sunrise over the Bering sea and Aleutian islands.*

Questions?

Supplemental slides:

2017 Trawl Flatfish Catch and RKC EFH

2017 Flatfish Catch
- Less than 50 mt
- 51 mt - 100 mt
- 101 mt - 250 mt
- 251 mt - 500 mt
- 501 mt - 1,000 mt
- Greater than 1,000 mt

Data from Catch-in-Areas Dataset

Simulation of 1000 haul events looking at sampling variance under the following parameters:

- 40,000 kg haul weight
- 5 samples
- 125 kg sample size
- 200 RKC in haul

Simulation ran with four different frequency distributions of red king crab as it's available for sampling
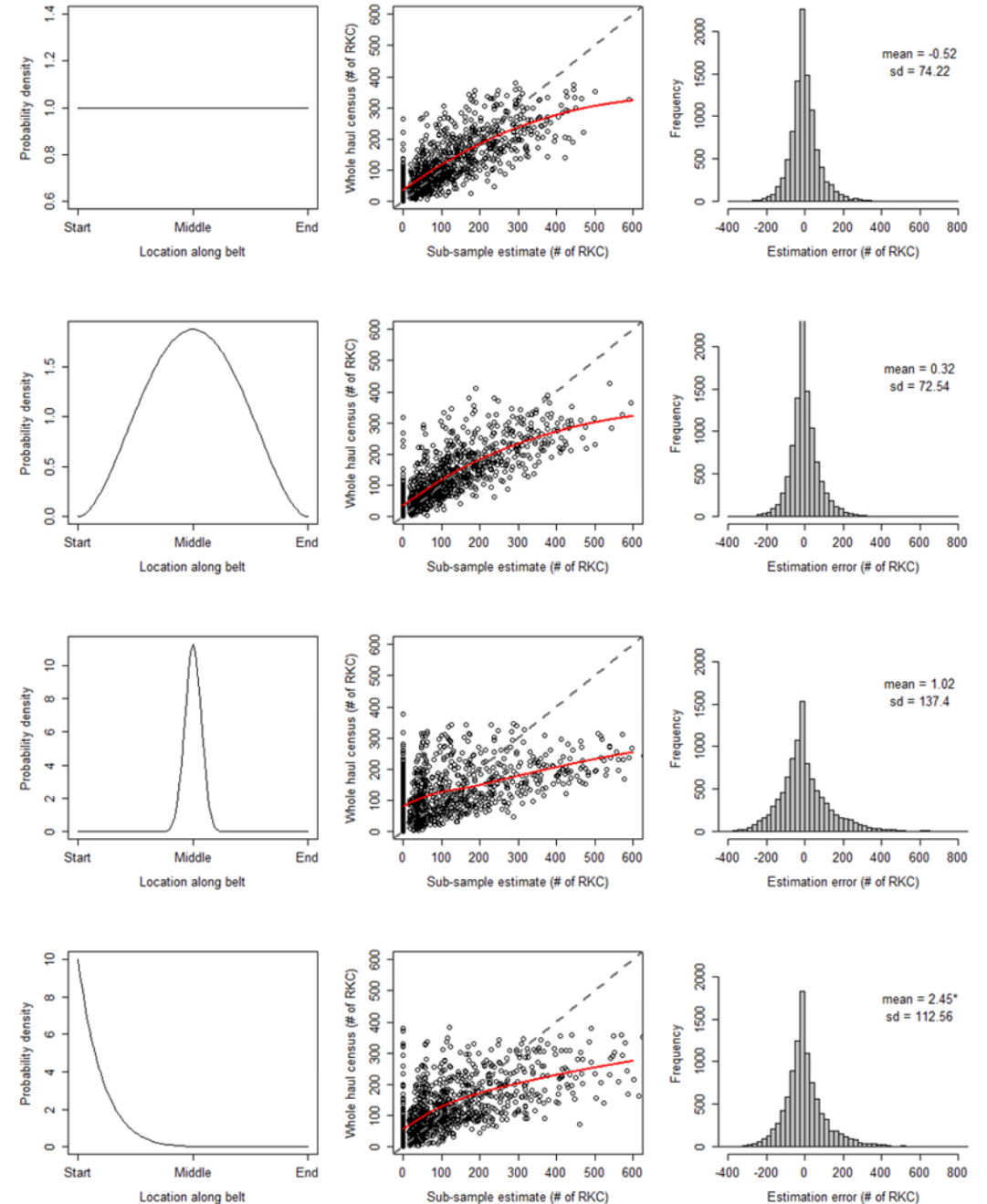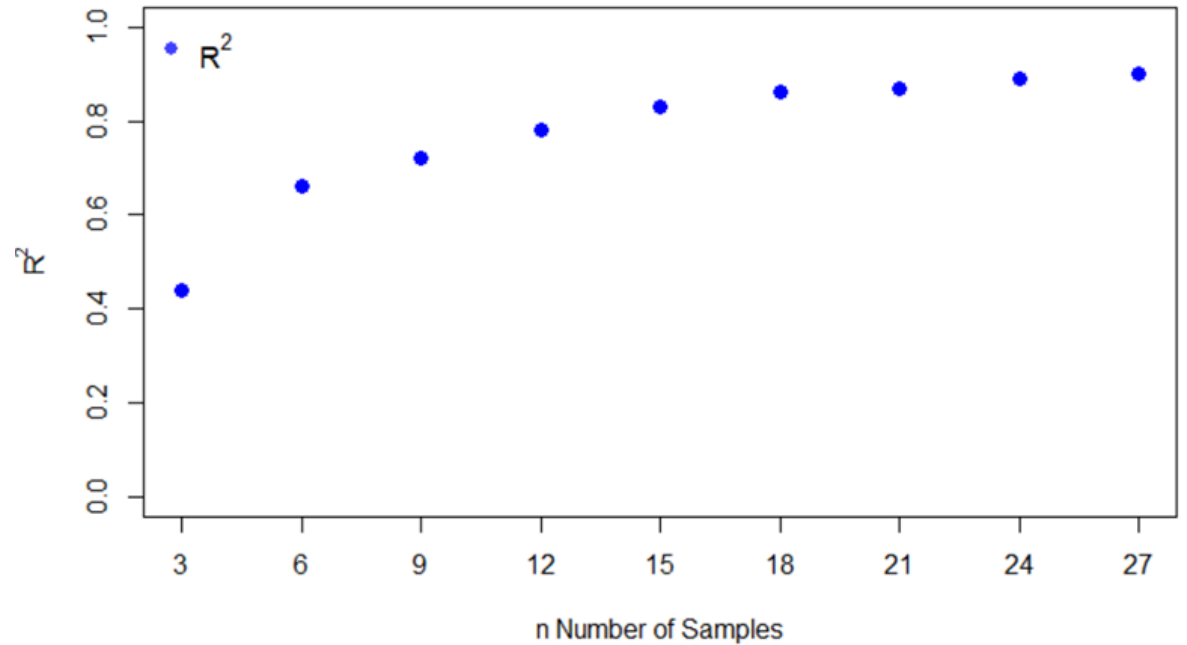
R simulation by Mr. Scott Smeltz

Simulation from previous slide with increasing number of 50 kg samples: 3 – 27 samples. Using linear regression, we plotted the R^2 values to look at a practical range of sub-samples to take that will give a better estimate for RKC PSC
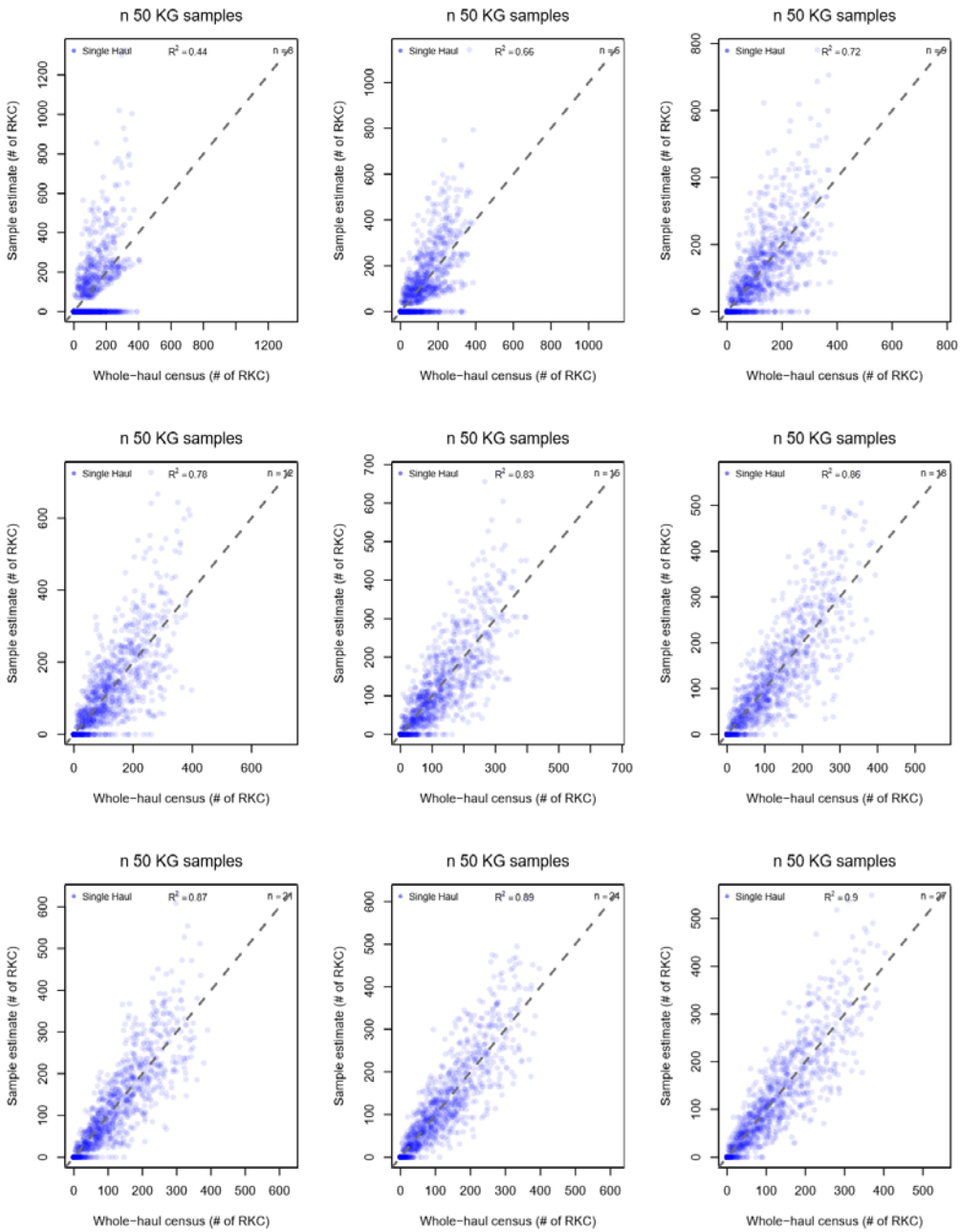
n.samples.mod <- lm (totalCrab ~ estCrab)

Vitality Assessments:

1) Mandible closure

2) Maxilliped control

3) Chela closure

4) Defensive posture

5) Skydiver leg flare

6) Self-righting in water

Injury Assessment:

1) Crab parts and pieces

2) Cracked or crushed legs, chelipeds, carapace, and/or rostrum

3) Lost or fresh autotomized limbs

Honorable mentions: Vitality metrics

1) Leg retraction

2) Dactyl reflex