



INTERNATIONAL PACIFIC
HALIBUT COMMISSION

Genetic Sex Identification of Pacific Halibut (*Hippoglossus stenolepis*) Commercial Landings

Anna Simeon¹, Dan Drinan², Lorenz Hauser², Timothy Loher¹, Lara Erikson¹, Ian J. Stewart¹ and Josep V. Planas¹

¹International Pacific Halibut Commission, Seattle, WA, USA. E-mail: anna.simeon@iphc.int

²University of Washington, School of Aquatic and Fishery Sciences, Seattle, WA, USA

Background

- Throughout the fishery's history, the sex ratio of commercially-caught Pacific halibut has remained unknown as landed individuals are eviscerated at sea and the sexes are otherwise indistinguishable. The sex ratio from the IPHC's fishery independent setline survey (FISS) has thus far been the only direct source of sex-ratio information.
- Differences in size between individuals landed commercially and on the FISS suggested a greater proportion of females in the fishery.
- Drinan et al. 2017 identified two sex-linked single nucleotide polymorphisms (SNPs) able to distinguish between males and females and described molecular assays to identify an individual's sex by these genetic signatures.

Study Objectives

- Develop multiplex assay for both sex-determining SNPs (twice the data for half the price)
- Directly determine the 2017 commercial catch sex ratio through SNP genotyping

Methods



10,137 fin clips collected by IPHC port samplers in 2017

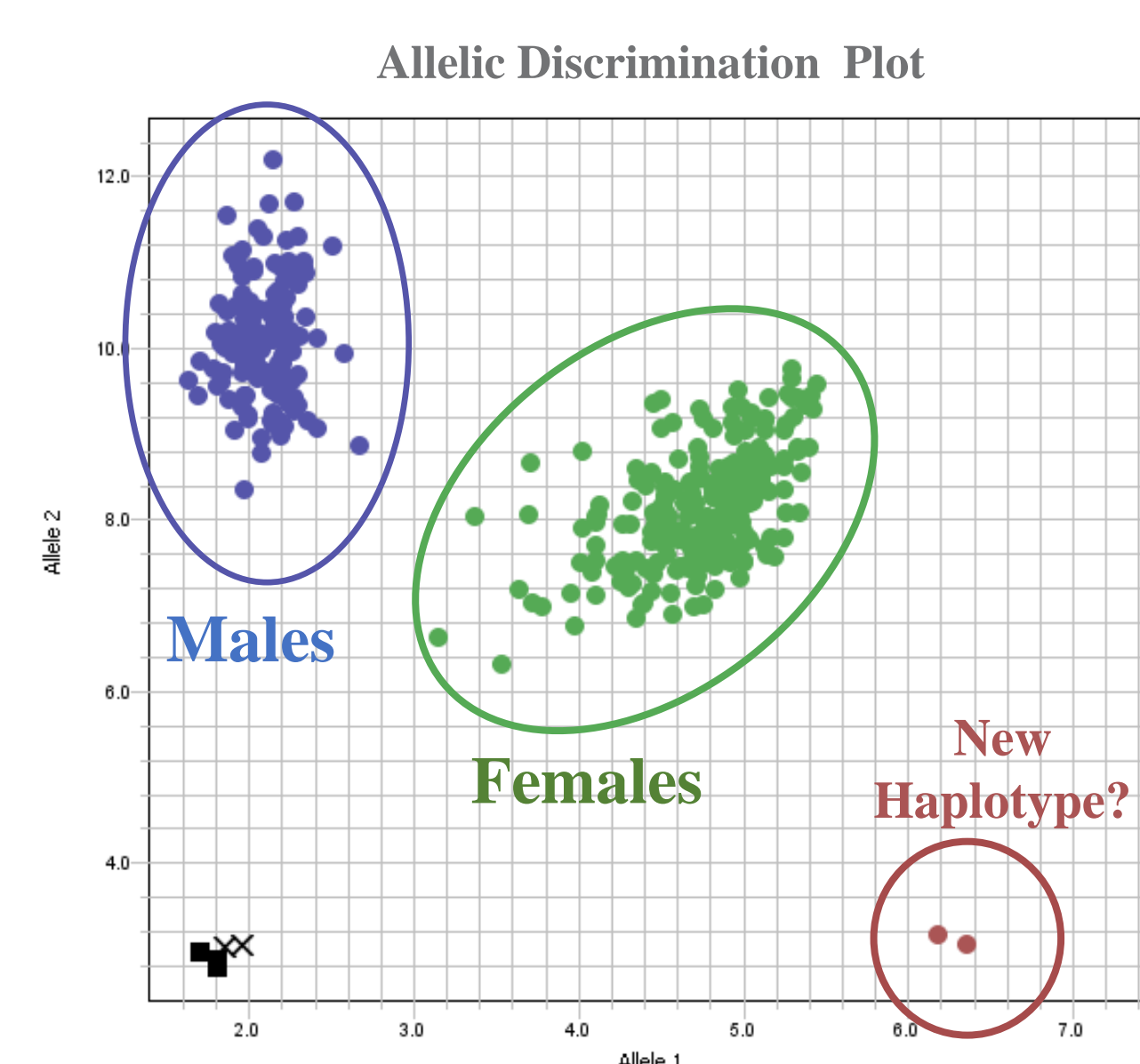
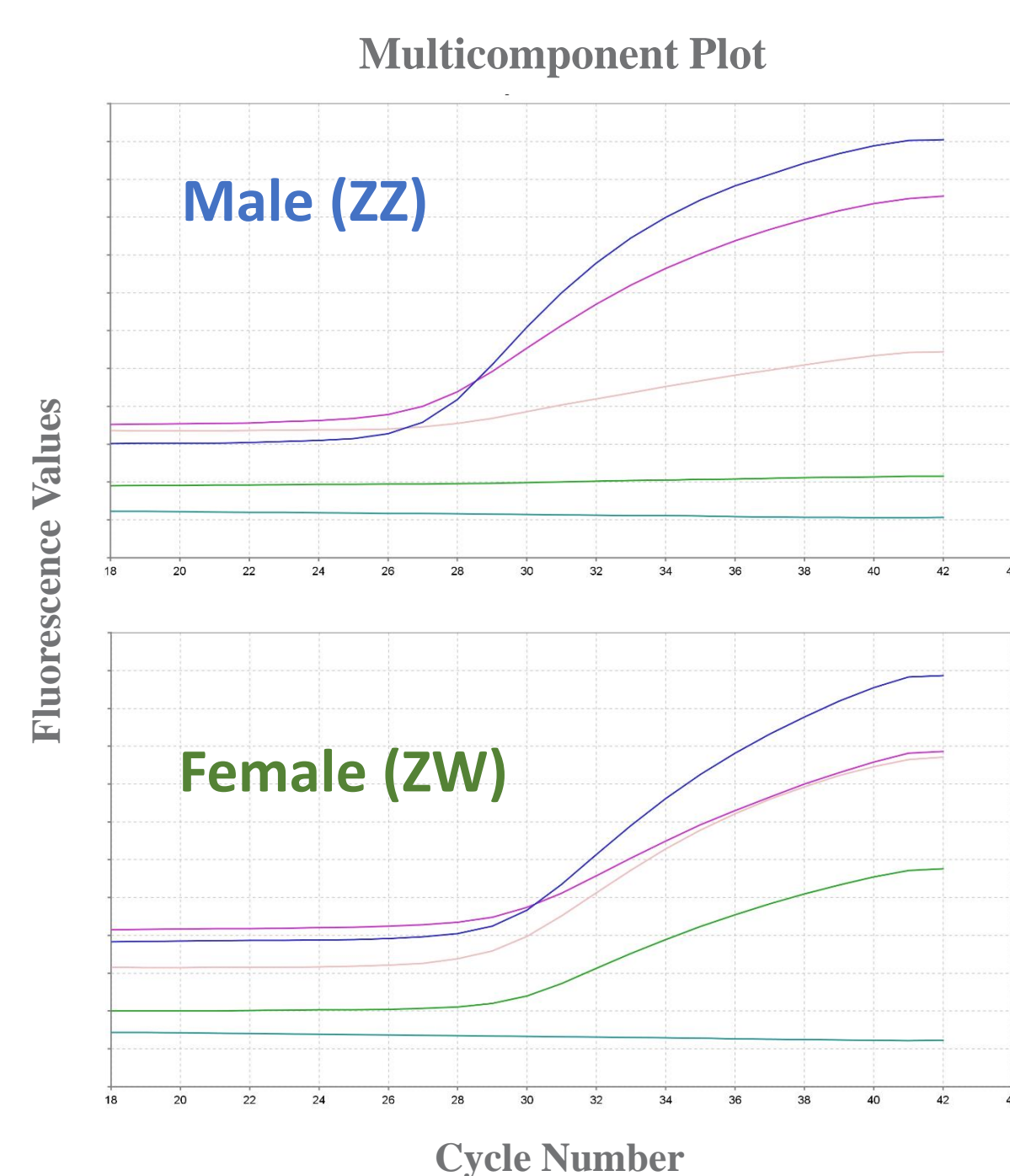


DNA isolated through simple, cost effective NaOH extraction



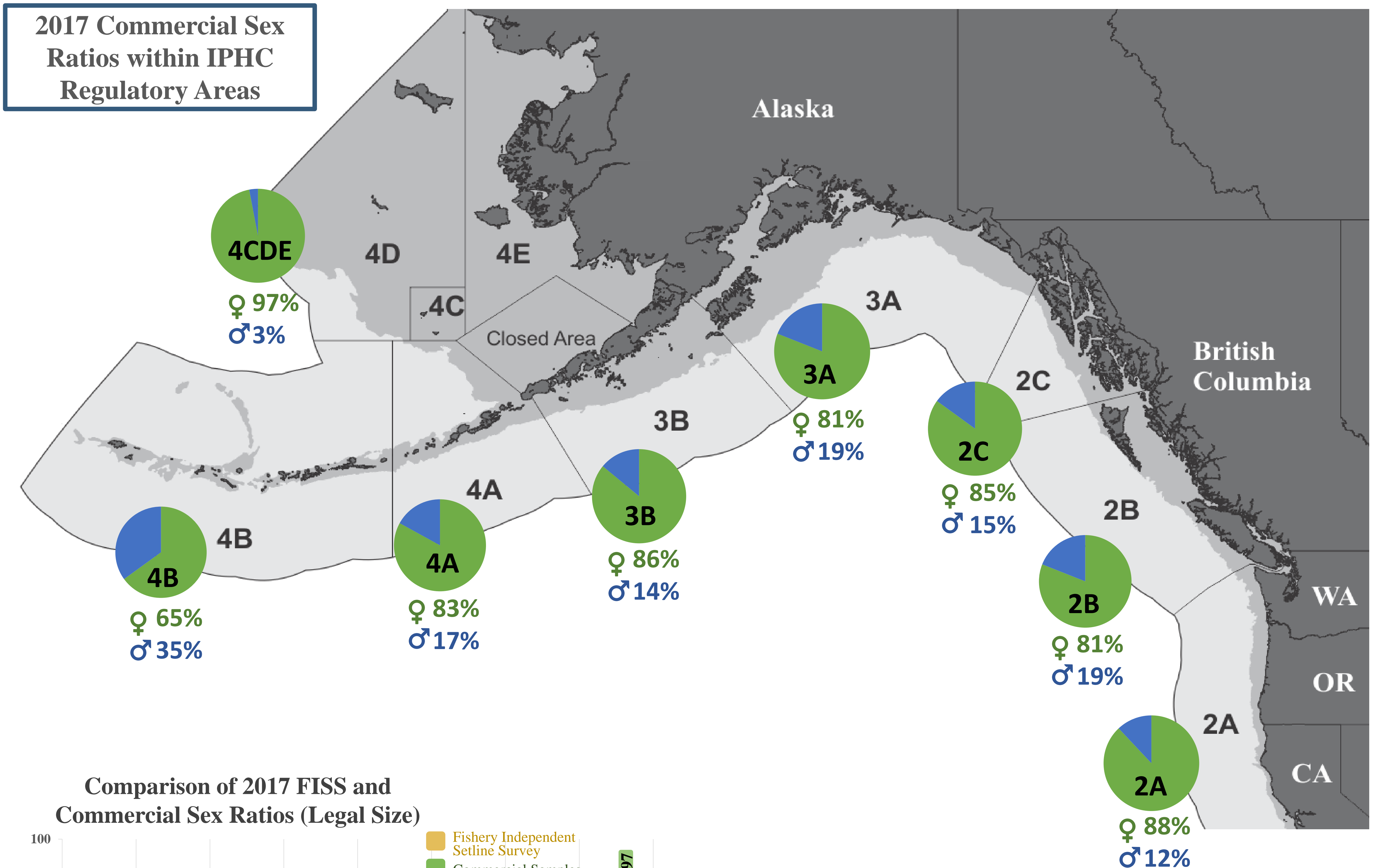
Sample genotyping via multiplexed TaqMan qPCR assay

- A multiplexed TaqMan assay was designed to genotype both SNPs (hs10183, hs23885) simultaneously using reporter dye pairs FAM/VIC and ABY/JUN and reference dye Mustang Purple. Target sequences were based on those described in Drinan et al. 2017.

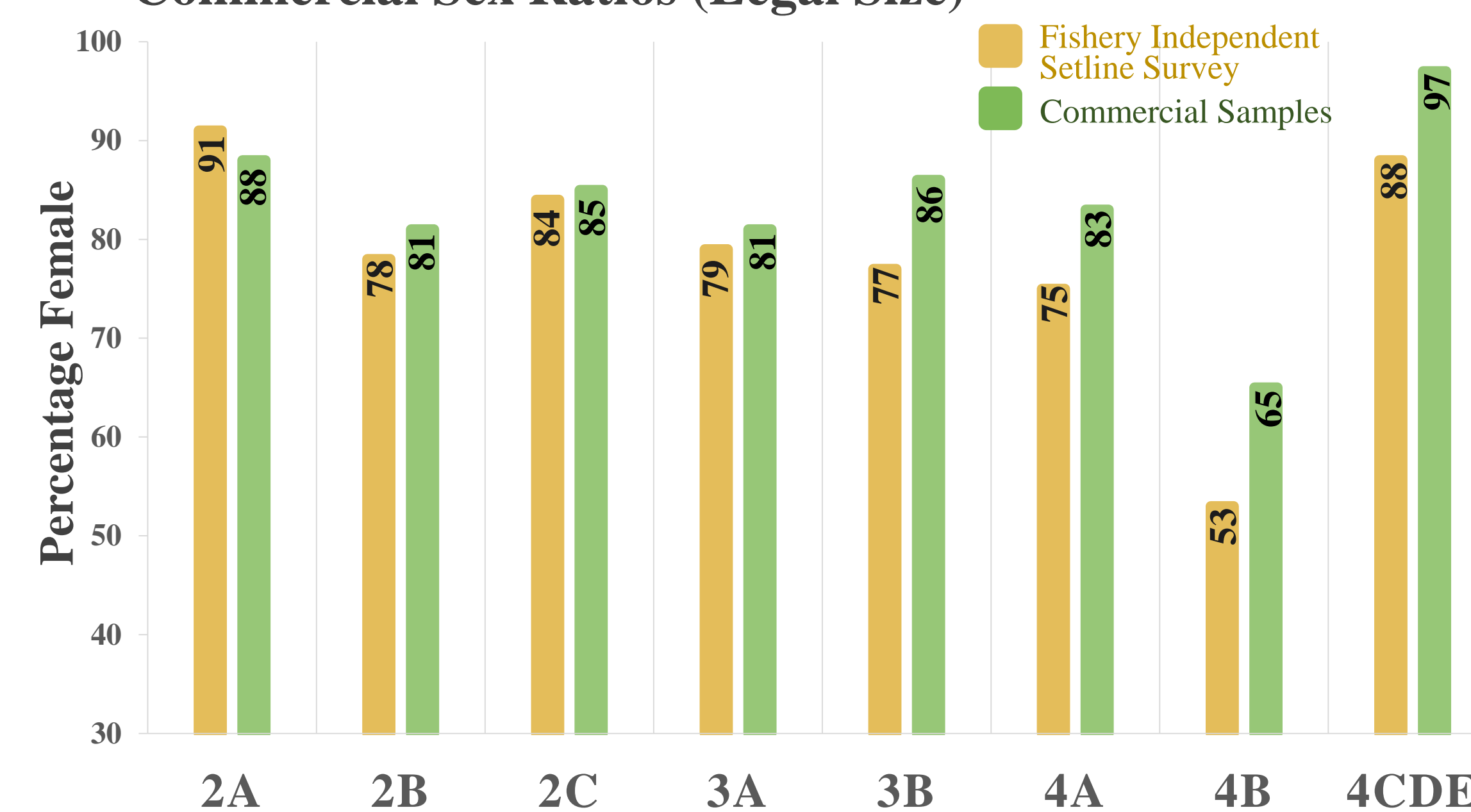


Results

2017 Commercial Sex Ratios within IPHC Regulatory Areas



Comparison of 2017 FISS and Commercial Sex Ratios (Legal Size)



- Female proportion of the commercial catch ranges from 81% in regions 2B and 3A to 97% in regions 4CDE.
- The higher proportion of females in commercial samples versus the FISS samples is likely due to their larger, targeted size.

With this technique, the sex ratio of the commercial catch will be monitored annually and used in future stock assessments.

References

- 1.5% of genotyped samples display a unique haplotype or combination of haplotypes that do not strictly correspond to either sex.
- May be caused by an additional SNP in the probe binding regions, chromosomal inversion, or something else. Additional sequencing of these regions (to be completed in 2020) will help clarify.

- Drinan D.P., Loher T., & Hauser L. (2017) Identification of Genomic Regions Associated with Sex in Pacific Halibut. *Journal of Heredity*. 109(3): 326-332.
- View more information and data at www.iphc.int