# Updating bycatch genetics workflow

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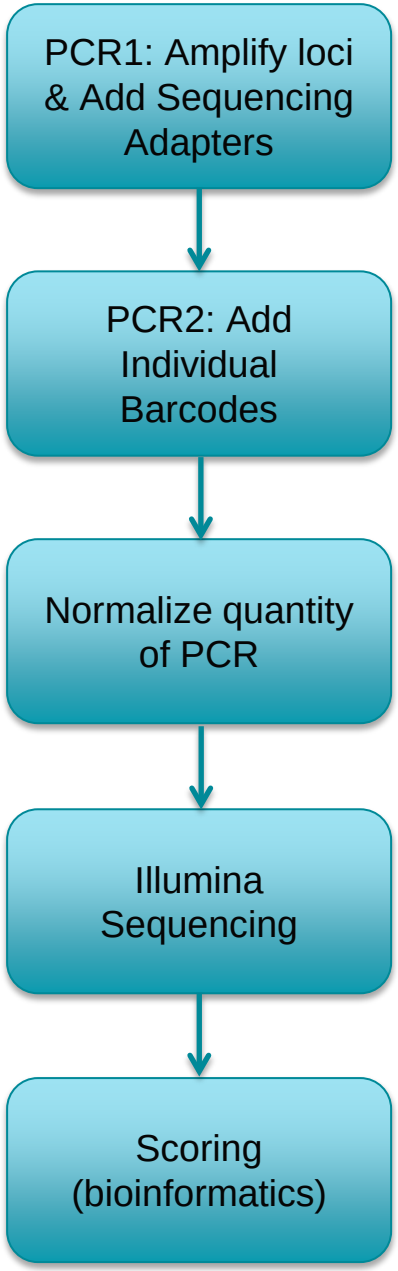
# Who I am

- UAF CFOS
  - PhD. work with Tony Gharrett and Megan McPhee.
  - Population genetics of sockeye salmon in SE Alaska.

- Skillset:
  - Population genetics, quantitative genetics, eDNA, R coding, molecular biology

# New Genotyping Chemistry

- Genotyping in the thousands by sequencing (GTseq)
- Amplify hundreds of loci for thousands of individuals in a single run.
- Concordance (TaqMan):
  - Chum – 99.88%



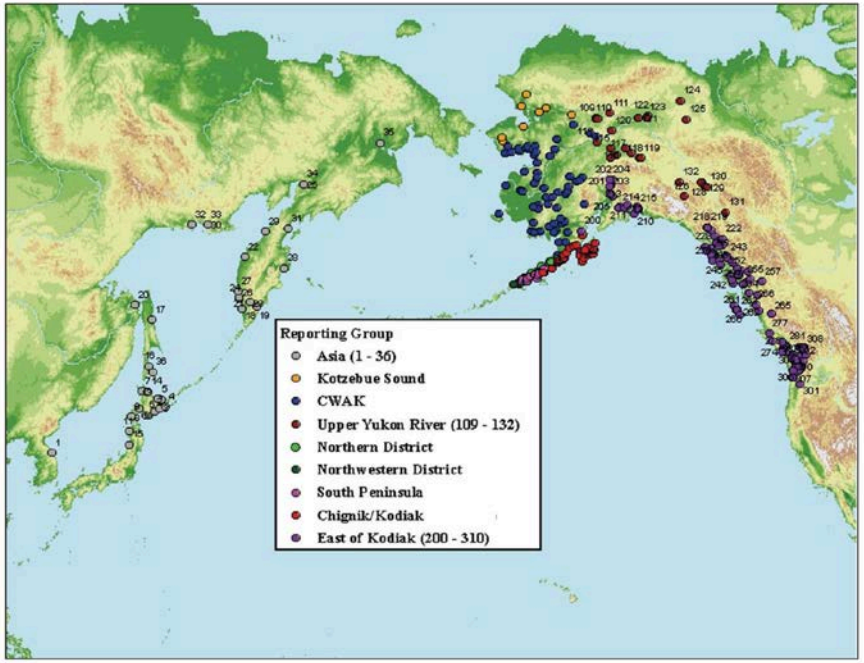
# New Chum Baseline

Old (11 microsatellites)

- 381 populations
  - 77 pops Yukon, Western, & Coastal AK

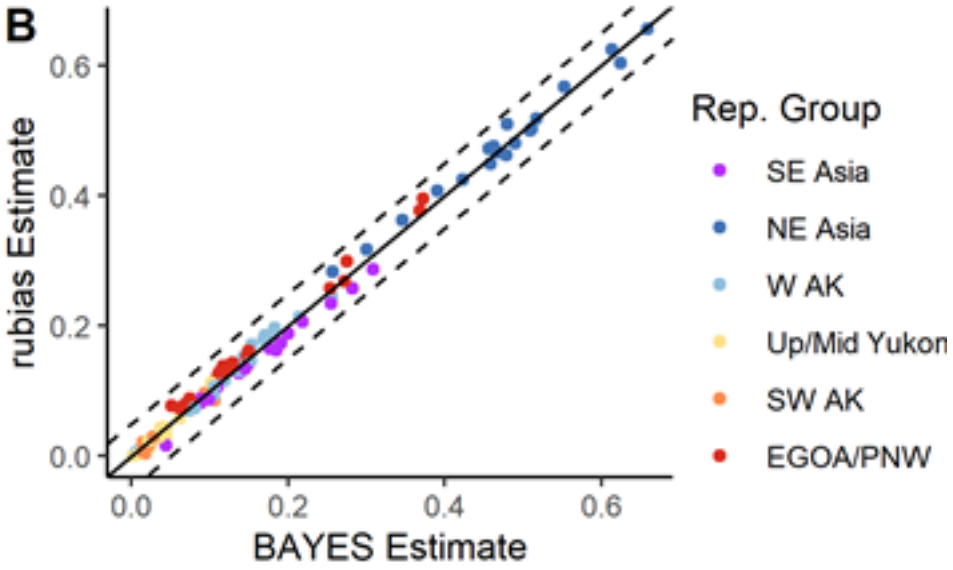
New (91 SNP loci)

- 310 populations
  - 163 pops Yukon, Western, & Coastal AK

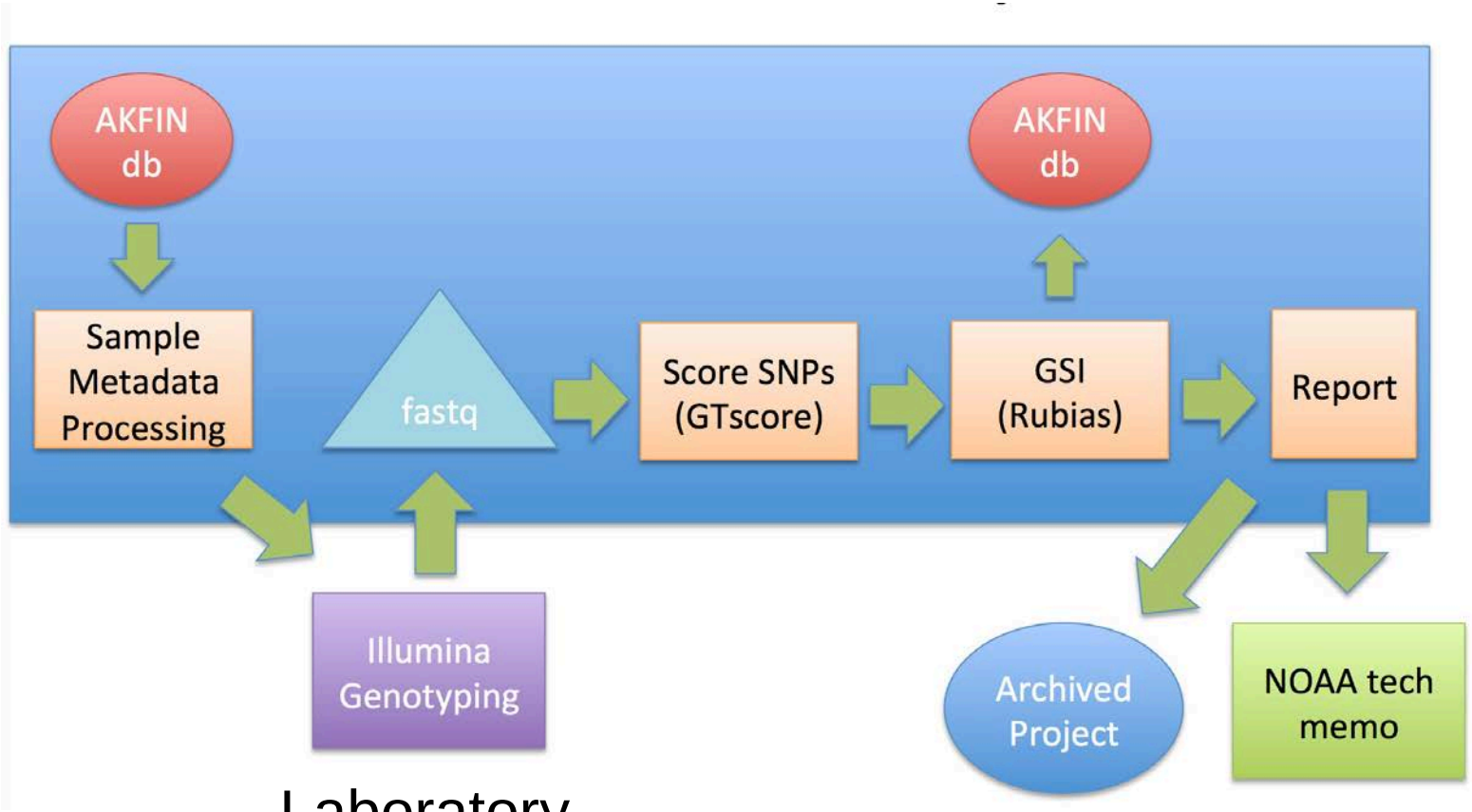


# Changing Analysis Methodology

- Bayes (Pella & Masuda 2001)
  - Windows gui
- *rubias* (Moran and Anderson 2019)
  - R library
  - Integrated into data analysis pipeline
  - 2018 Analysis:
    - 0.94% (0.71%SD)



# Data Analysis Pipeline



# AKFIN database

Alaska Fisheries Information Network

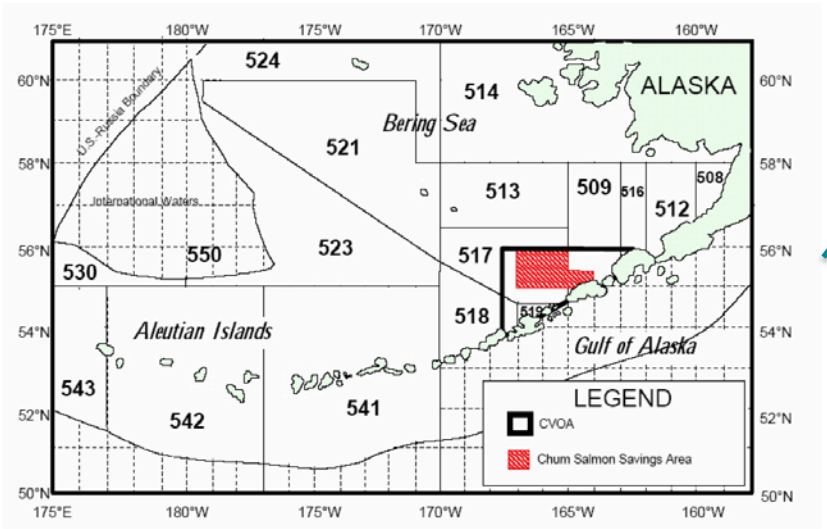
Established under direction of Pacific States Marine Fisheries Commission (PSMFC)

Goal:

- Link observer records to genetic and age information (confidentially)
- Facilitate data exploration and spatio-temporal modeling (PCCRC funded project).

# AKFIN database: Trivial example

- Do static closures preserve the same stocks of fish from year to year?




www.npfmc.org

| year | MixSize |
|---|---|
| 2011 | 1784 |
| 2012 | 129 |
| 2013 | 1849 |
| 2014 | 1037 |
| 2015 | 1143 |
| 2016 | 2853 |
| 2017 | 3333 |
| 2018 | 2111 |
| 2019 | 1242 |

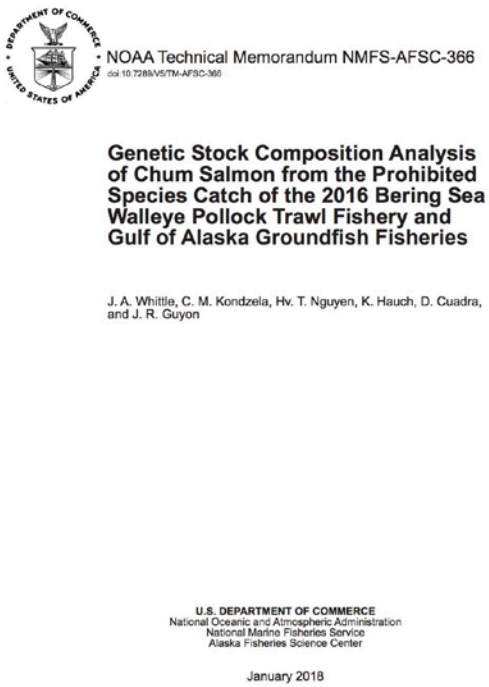
- Pull genetic records
- Format mixture
- MSA *rubias*

# Spatio-temporal dynamics of chum salmon PSC

- Quantify the inter- and intra-annual patterns of genetic stock composition across space, time, fishing sector, and fish age
- Evaluate how age- and stock-specific distributions of chum salmon vary with biotic and abiotic factors in the Bering Sea.
- End goal: Move to predictive framework for bycatch avoidance

# Data visualization: R shiny (*interactive web*) application

- pdbarry.shinyapps.io/gsi_salmon_comparisons/



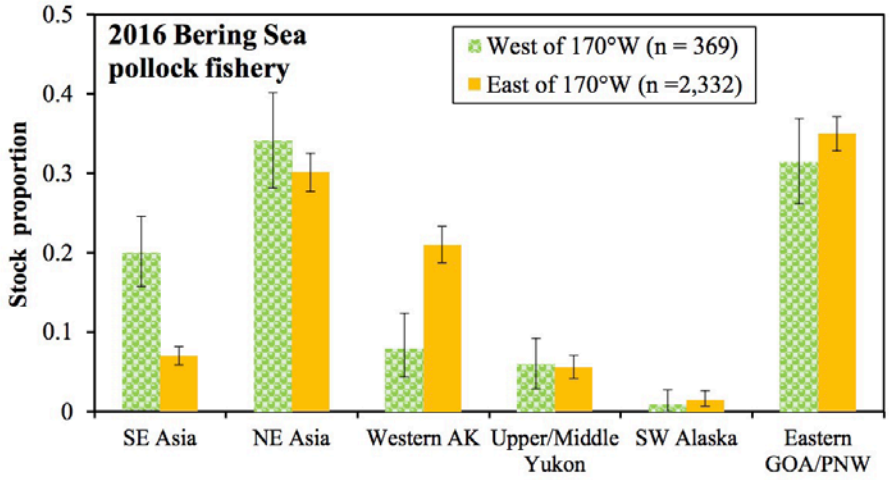
NOAA Technical Memorandum NMFS-AFSC-366

Genetic Stock Composition Analysis of Chum Salmon from the Prohibited Species Catch of the 2016 Bering Sea Walleye Pollock Trawl Fishery and Gulf of Alaska Groundfish Fisheries

J. A. Whittle, C. M. Kondzela, Hv. T. Nguyen, K. Hauch, D. Cuadra, and J. R. Guyon

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Alaska Fisheries Science Center

January 2018



# Data visualization

**Select**:

*Region*

- Bering Sea / GOA

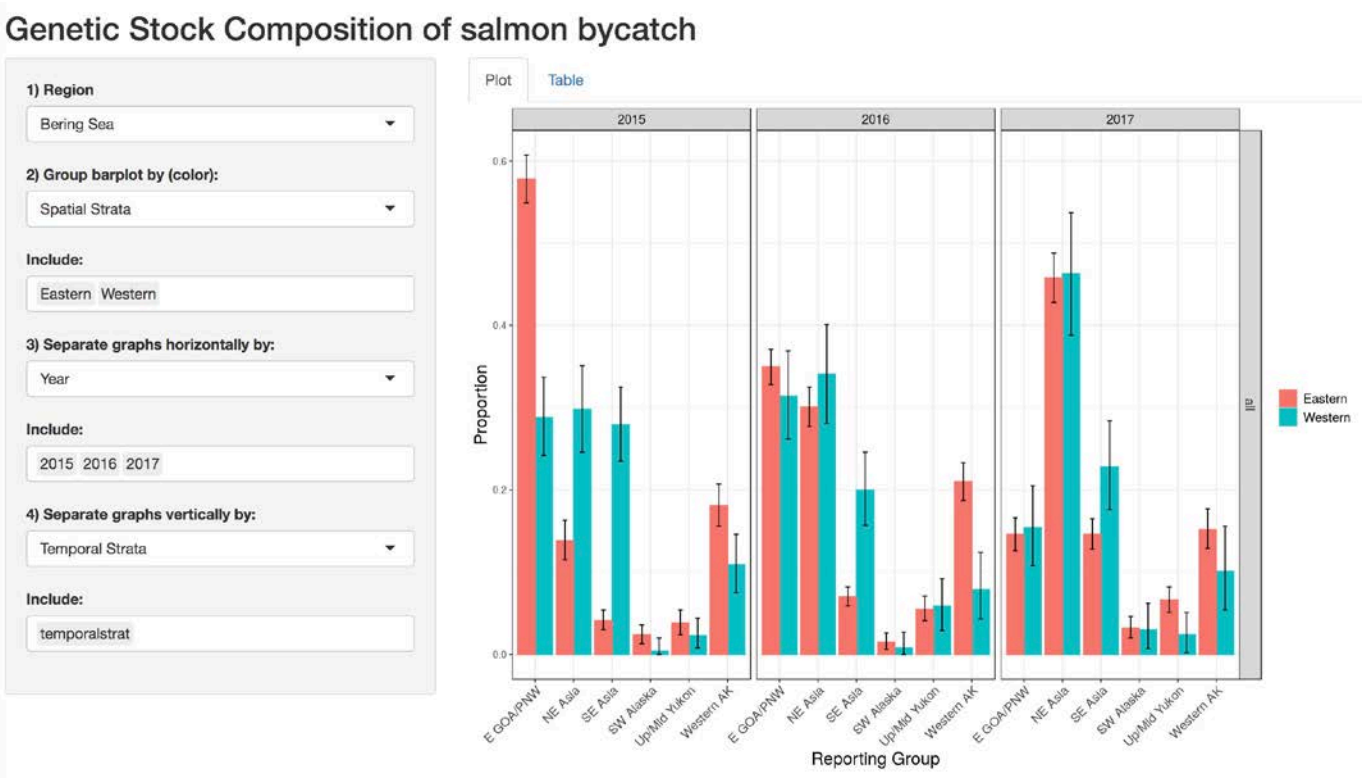
*Spatial strata*

- NMFS area
- East/West 170

*Temporal strata*

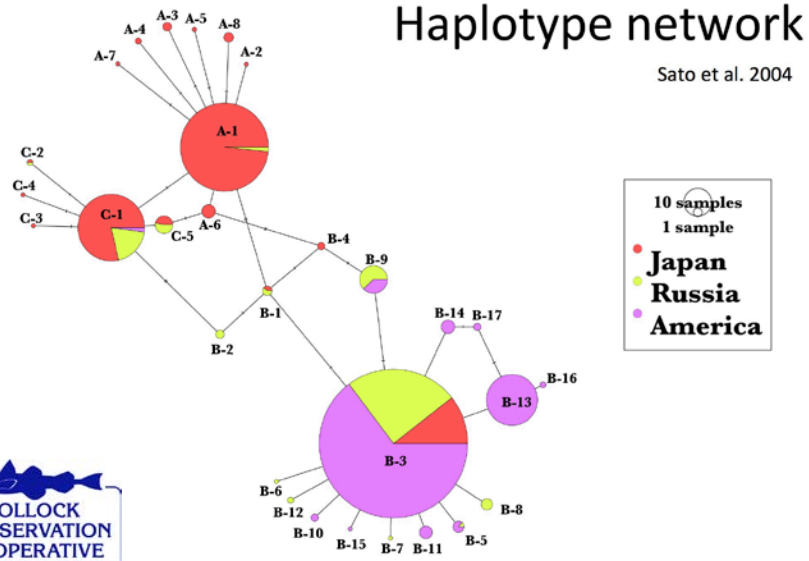
- Early/Middle/Late
- A/B season

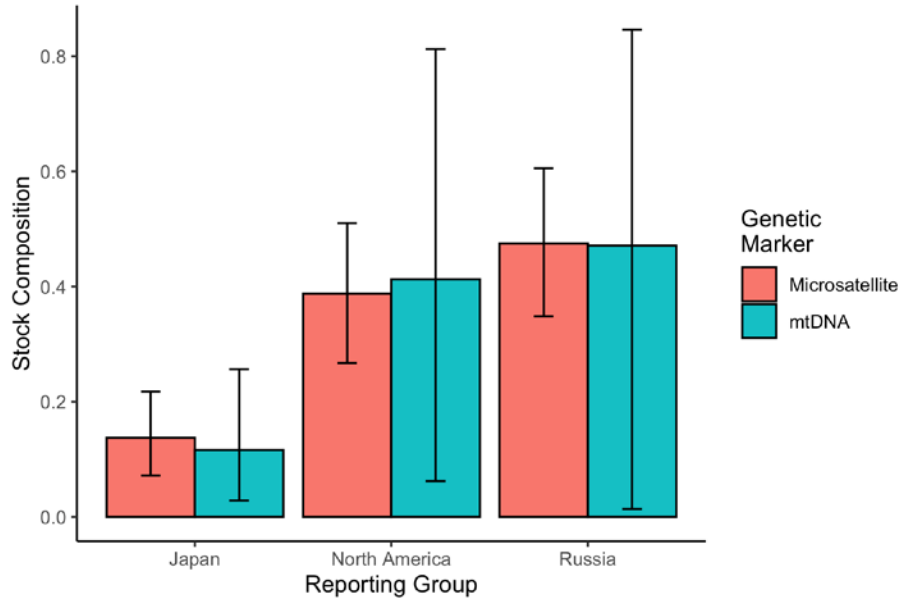
*Year*



# Shipside stock identification of chum salmon bycatch with nanopore sequencing

- Can we estimate Asia vs. North America contributions to mixtures?




POLLOCK CONSERVATION COOPERATIVE Research Center

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