

# ESTIMATION OF HERRING ABUNDANCE IN PUGET SOUND

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# Herring Stock Assessment Methods

- WDF/WDFW has conducted acoustic/trawl and spawn deposition surveys since early 1970's:
  - **Spawn Deposition Surveys**: two person crew in small boat using rake to grapple vegetation (Semi to biweekly depending on area; 2-5 hours/survey; 6-30+ surveys/stock/year); ongoing/140 surveys in 2010.
  - **Acoustic/Trawl Surveys**: chartered trawl vessel (58') with 2-3 WDFW staff; acoustic vessel operated by 2 WDFW staff; 1-10+ surveys/stock/year; cut after 2009 season.

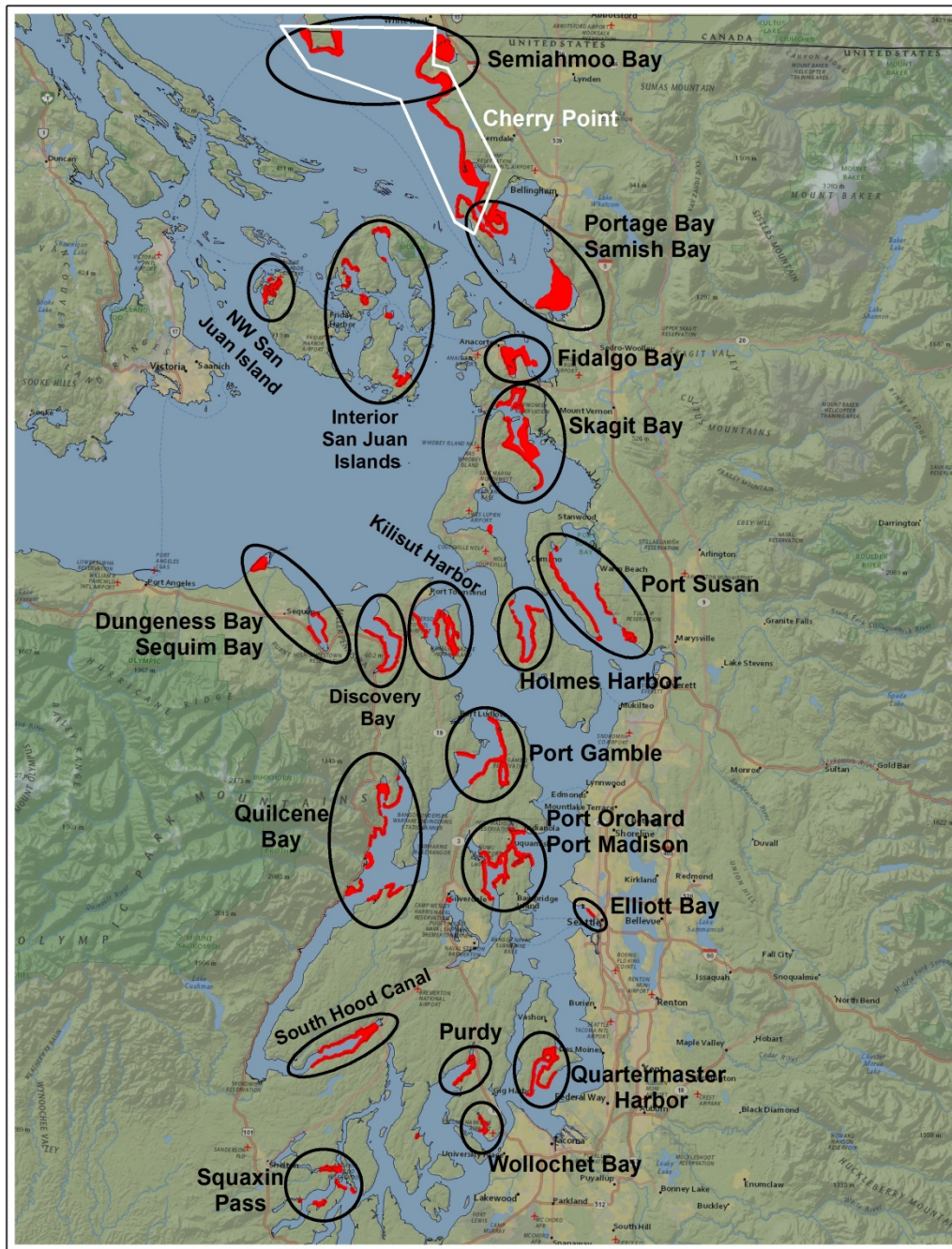
# Spawn Deposition Surveys

- The biomass of spawner herring is estimated in tons from the sampled density and area of spawn deposition as outlined by Hourston et al (1972) and described by Trumble et al (1977) and Meyer and Adair (1978); same conversion factors used since 1976 (see handout):
  1. Aquatic vegetation in lower intertidal and upper subtidal zones is sampled for the presence of herring eggs.
  2. Density of eggs per unit area of the surveyed vegetated zone is estimated.
  3. Based on fecundity per unit body weight (**200 eggs/gram female**), eggs/unit area converted to estimated tons of adult herring spawning escapement.



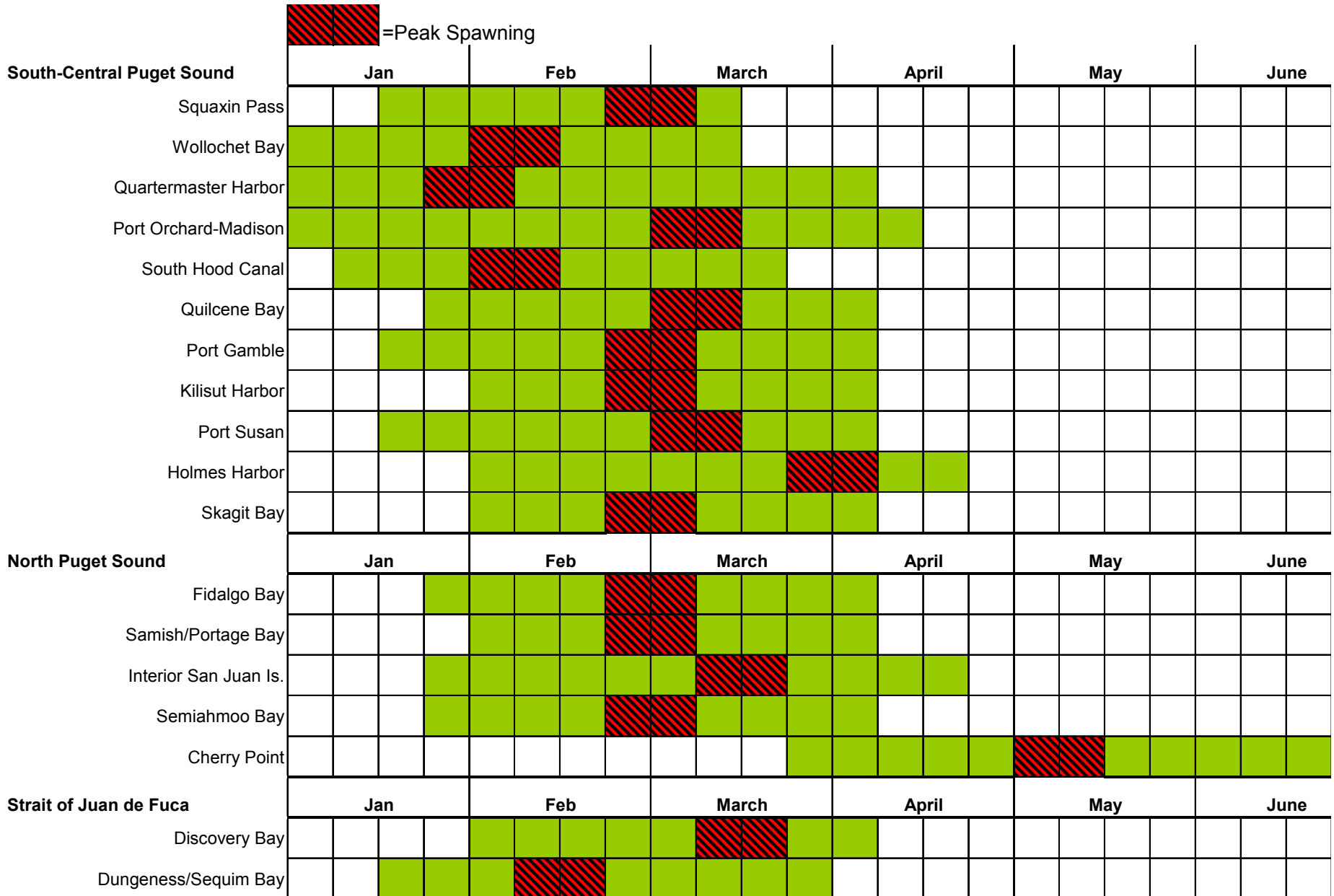






Documented herring spawning grounds in Puget Sound.

## DOCUMENTED AND PEAK SPAWNING TIMES FOR PUGET SOUND HERRING STOCKS



















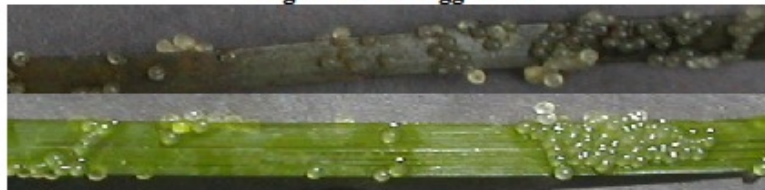




**Very Light 1-25 Eggs/inch**



**Light 25-75 Eggs/inch**



**Light Medium 75-125 Eggs/inch**



**Medium 125-200 Eggs/inch**



**Medium Heavy 200-300 Eggs/inch**



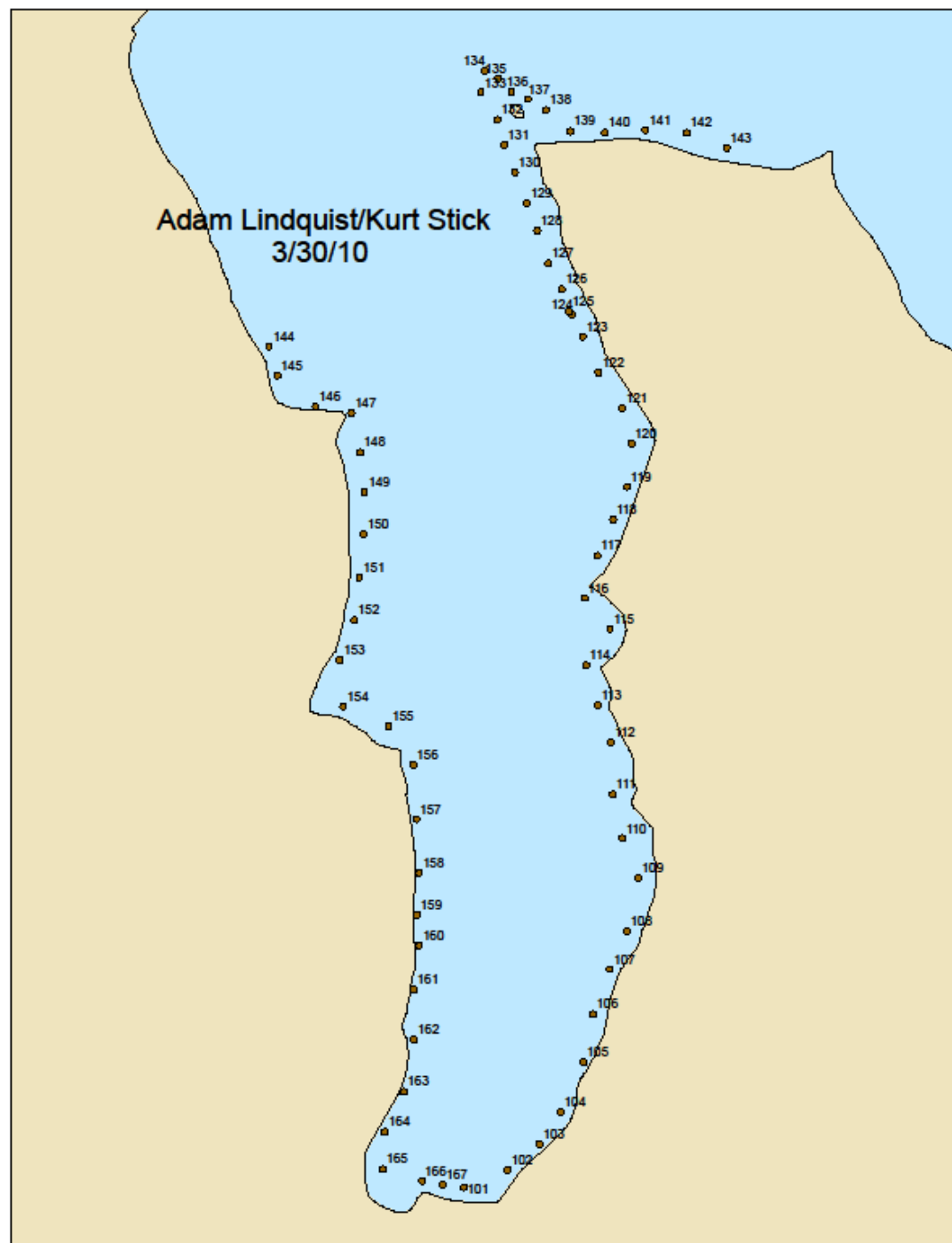
**Heavy 300-650 Eggs/inch**



**Very Heavy > 650 Eggs/inch**







# Spawn surveys: Assumptions/sources of error

- Non-uniform spawn deposition and substrate distribution.
- Spawn intensity designation (see next slide).
- Conversion factor of **100 eggs/gram of adult fish**.
- 50:50 sex ratio.
- Survey timing/frequency.
- Egg mortality.
- Width of vegetation band.



