An underwater photograph of a Chinook salmon swimming in a river. The water is clear and greenish, and the riverbed is covered in small, light-colored rocks. The salmon is positioned in the center of the frame, swimming towards the right. The text is overlaid on the image in a bold, black, serif font.

**Application and use of ultrasound to
determine gender composition of spring
Chinook salmon (*Oncorhynchus
tshawytcha*) broodstock for mitigation
programs in the Wenatchee River Basin.**

Broodstock Collection Protocols

- Determines adults (females) needed to meet production goals.
- Determines where and how fish are collected.
- Assumes equal sex ratios.

Risks Associated with Assuming an Equal Sex Ratio

- Not achieving/exceeding egg production goals.
- Politics of killing excess adults (particularly for ESA listed species).
- Reducing the abundance of naturally spawning adults by taking more than is required.

Sources of Bias Associated With Broodstock Collection

- High variability in observer efficiency.
- Early arriving vs. late arriving fish.
- Unknown gender/age composition of returning spawning population.

Solution

- Use historic sex ratios.
- Determine gender at time of collection.
 - secondary sex characteristics
 - **ultrasound**

Equipment



Honda Electronics Hs-101V
Ultrasonic scanner with HLV-
155 5.0MHz Linear Rectal
Transducer.

Unit dimensions are 26 cm x 18
cm x 6cm with a 8.8 cm x 11.5
cm black and white LCD screen.

Approximate Cost: \$7,200

Requirements

- Trained personnel.
- Properly tuned/calibrated equipment.
- Adequate lighting conditions to accurately view images.

Scan Position



- Transducer held perpendicular to body.
- Start at the base of the pectoral fins.
- Image is a cross section of the fish.

Maturing Spring Chinook Female

HONDA ELECTRONICS HS-101V
PROBE:HLV-155

06/26/2008
08:48:25



Heart

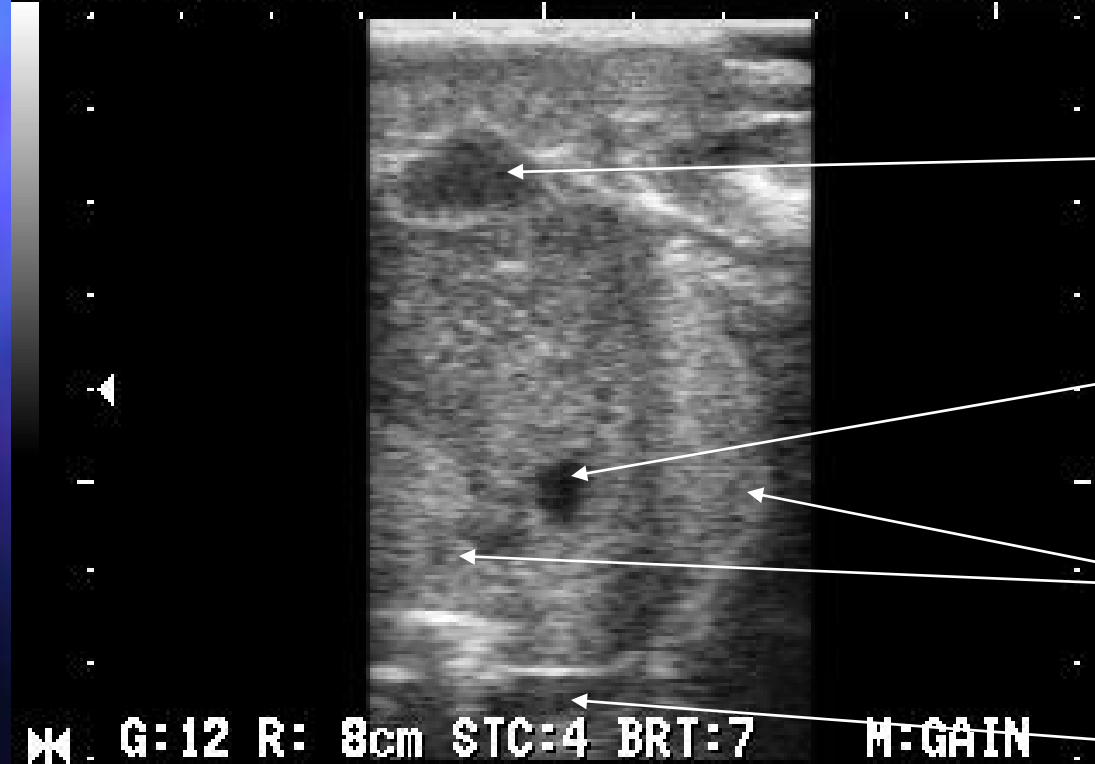
Esophagus

Egg masses

M G: 9 R: 8cm STC:4 BRT:7 M:GAIN

Maturing Spring Chinook Male

HONDA ELECTRONICS HS-101V 06/26/2008
PROBE:HLV-155 08:56:15



Heart

Esophagus

Testes

Kidney

Results

- Identification of females for the 2004-2007 Chiwawa spring Chinook broodstock at collection varied between 77%-99% with an average of 92%.
- Utilizing ultrasound for the 2008 brood netted a 100% identification rate.

Conclusions

- Appears to significantly reduce observer error.
- Allows sampler to target males or females for broodstock to meet the 1:1 sex ratio protocol regardless of gender composition of run-at-large.
- Increases the probability that egg production goals can be met.
- Could result in fewer adults collected to meet mitigation goals.
- Has the potential to reduce the impacts to wild fish by making more fish available to spawn naturally.

Contact Information

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