

Status of research on the biology and ecology of opah, *Lampris guttatus*

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Photo: William Van Orden



MOTIVATION

- **VERY limited information available regarding the life history and ecology of this resource**
- **Signature species in “deep ecosystem” of tuna longlining**
- **Prized “exotic” fish – particularly in the Hawaii restaurant trade (Hawaii longliners treat as incidental catch not “bycatch”)**
- **Fascinating ecological subjects but quite a challenge to study**

United Fishing Agency (UFA) landings, 1987-2002

| Opah | |
|---------------------------------------|-------------------------|
| Annual landings (lbs) | 150K - 1.2M |
| Avg. individual fish wt. (lbs) | 97 - 111 lbs |
| Mean price (per lb) | \$ 0.87 - \$1.60 |
| Annual ex-vessel revenue | \$240K - \$1.4M |

(Data courtesy R. Ito, NMFS Honolulu Laboratory)

Specific project goals ...

- **Comprehensive seasonal and where possible, interannual biometric summaries and relationships (e.g., length-weight frequencies, sex ratio, etc)**
- **Determination of reproductive parameters (incl. size and age at maturity, fecundity, spawning season – Gonadosomatic Index or GSI)**
- **First cut age and growth estimations**
- **Distribution patterns, preferred habitat, faunal associations, and trophic relationships**

Principle project activities:

- **Conduct comprehensive shore-based biological sampling program**
- **Perform an analysis of spatial distribution patterns, preferred habitat, faunal associations, and trophic relationships**

UFA:

- Catch and size composition
 - For opah – sex ratio
 - For monchong – species differentiation
- Special effort to link UFA metrics with biological sampling



Buyers/Dealers

- Length, Weight, Sex
- Morphometrics
- Biological samples for reproduction and ageing

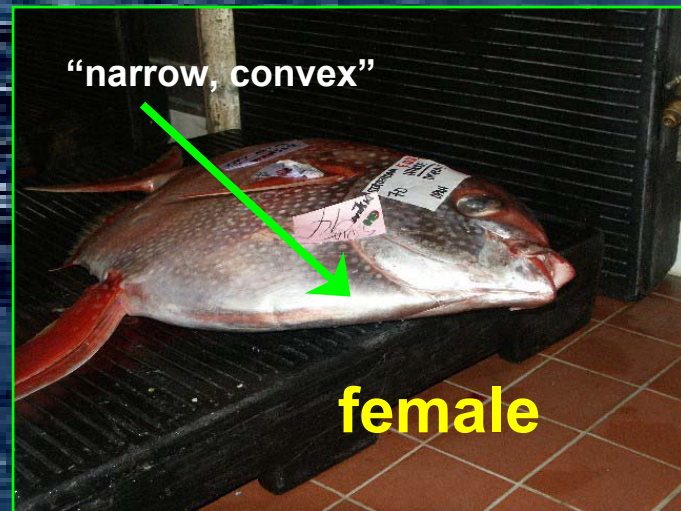
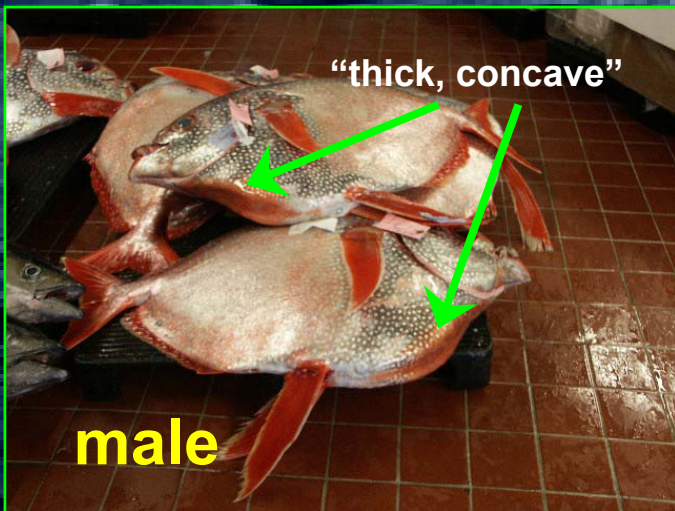
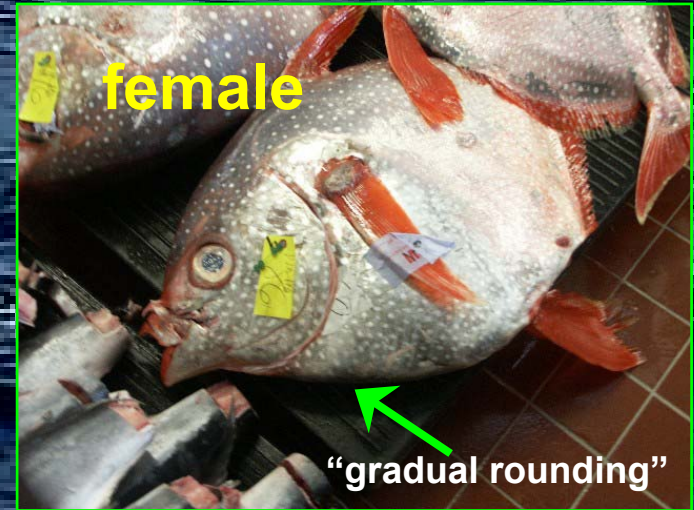
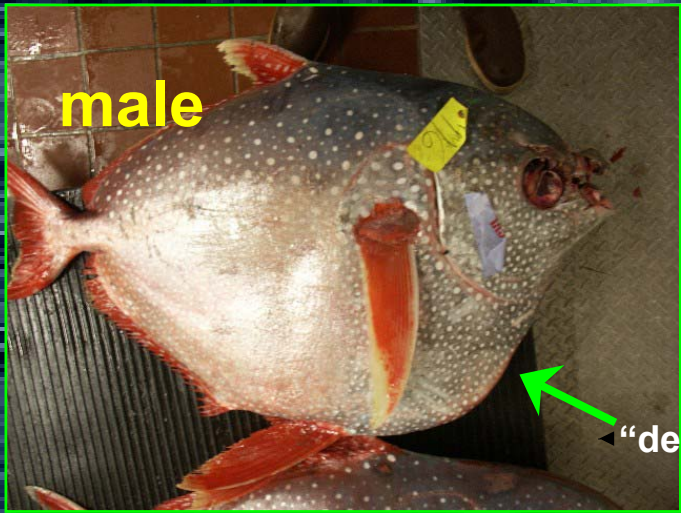


Opah, *Lampris guttatus*

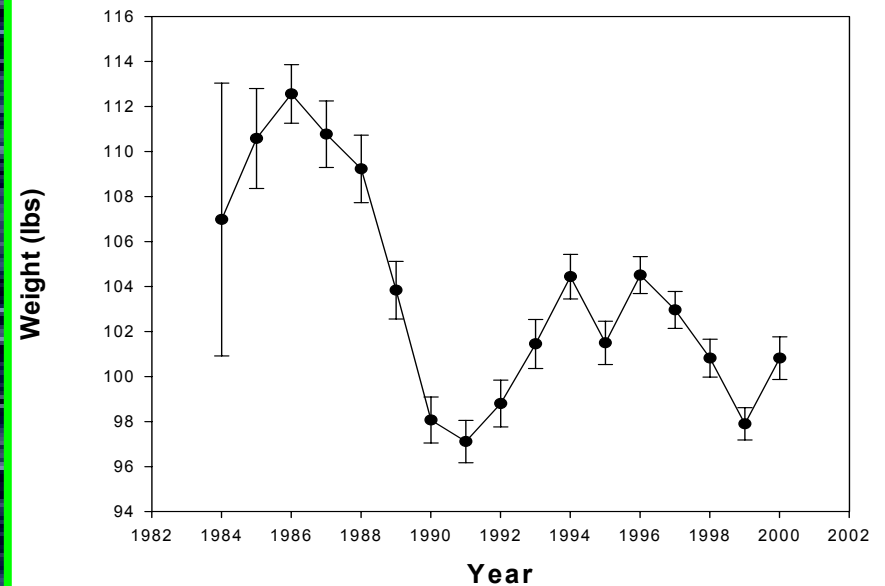
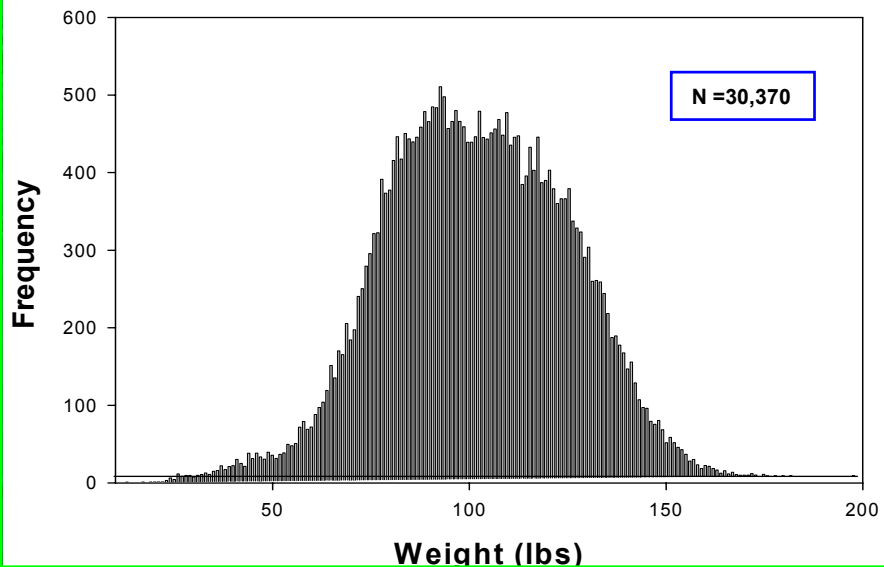
- aka 'moonfish'
- believed to be generally solitary (?? – small groups)
- “large” animals attaining 317 lbs
- among most photogenic of pelagic fishes



Sexual dimorphism of the pectoral girdle in 'large' opah:

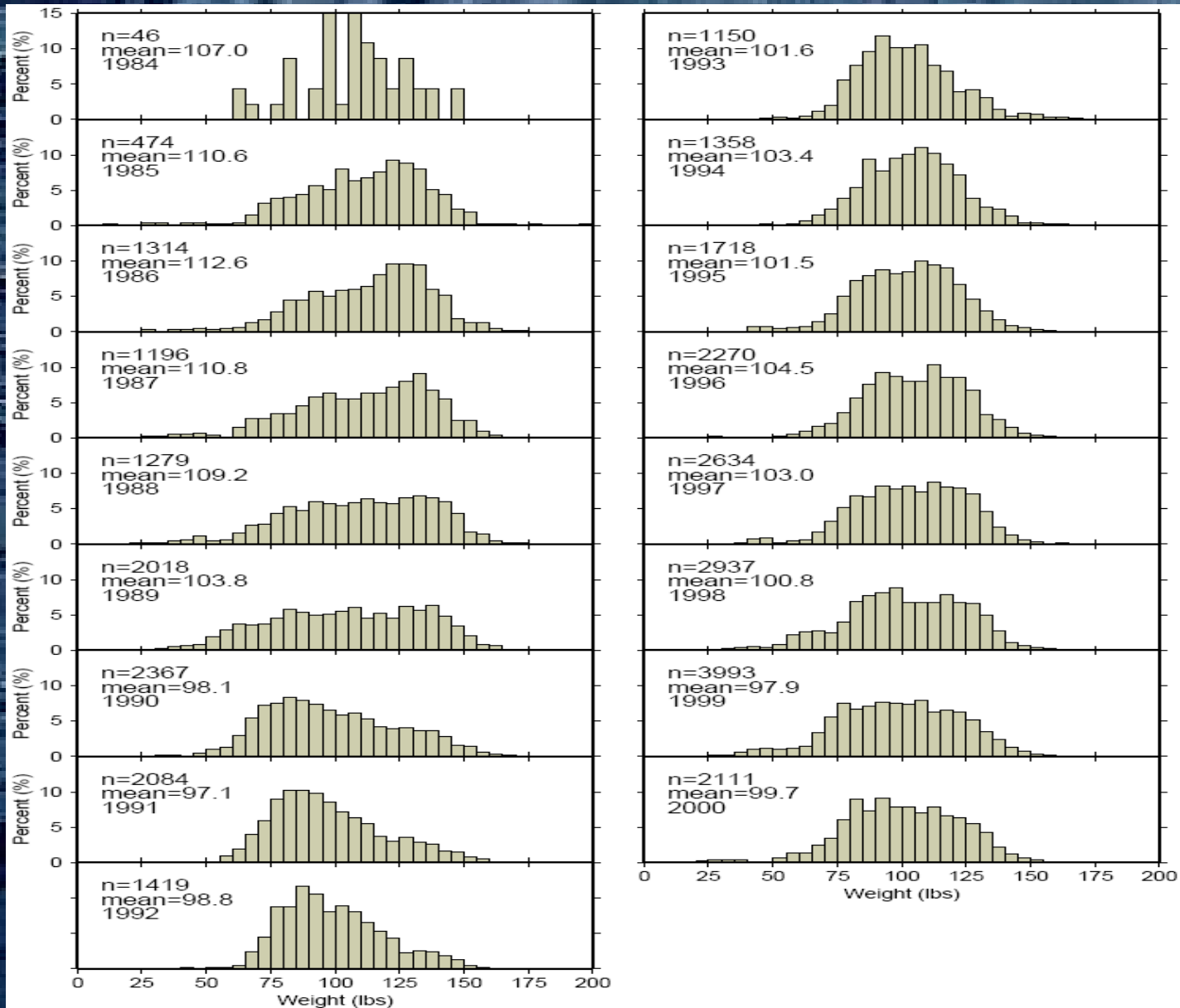


UFA sampling, opah



(Data courtesy FMEP, NMFS Honolulu Laboratory)

UFA sampling, opah



Age & Growth, Opah

- **Relatively clear annuli in cross-sections of 2nd ray of dorsal fin**
- **Assuming annuli are formed annually, fish are estimated between 1+ to 6+ years (2 to 7 annuli)**

Spatial distribution patterns, preferred habitat, faunal associations and trophic relationships

- Capture depth information collected from vessels of opportunity:

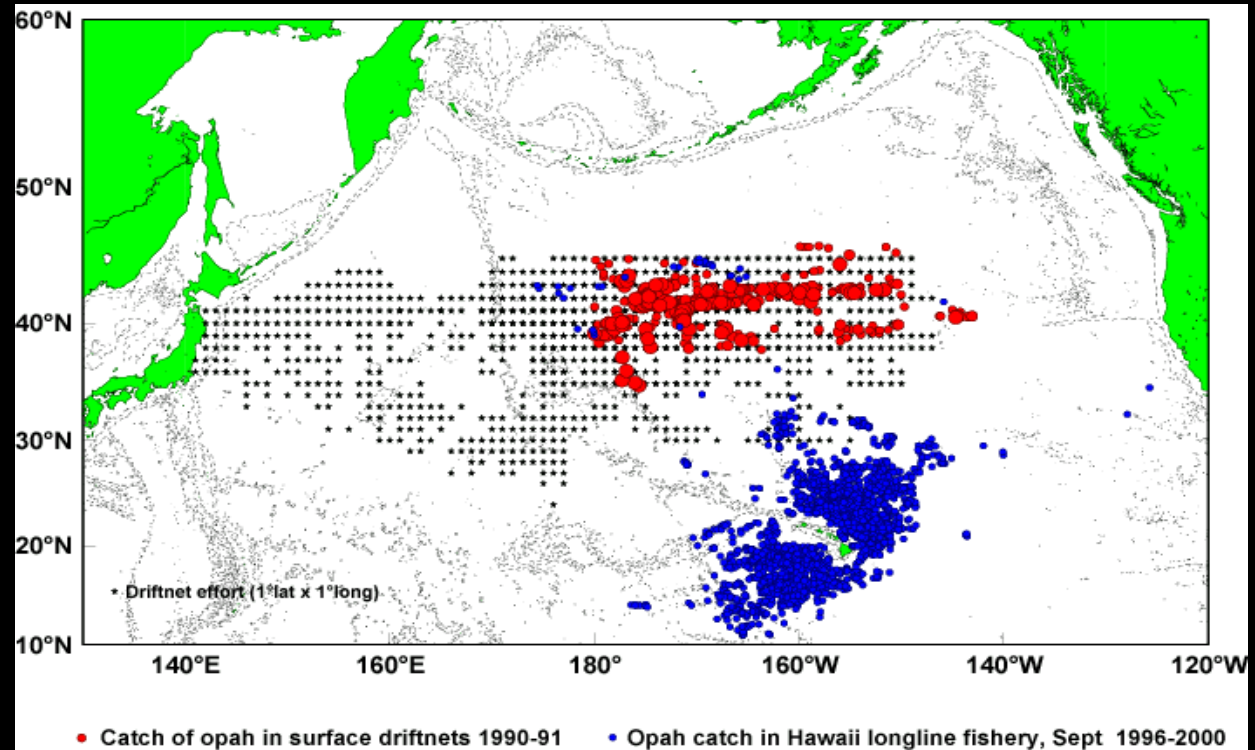
F/V Tucana (Apr '02)

F/V Sea Pearl (Nov '02)

F/V Kelly Ann (Mar '03)

F/V Sea Pearl (Jul '03)

- Diet studies



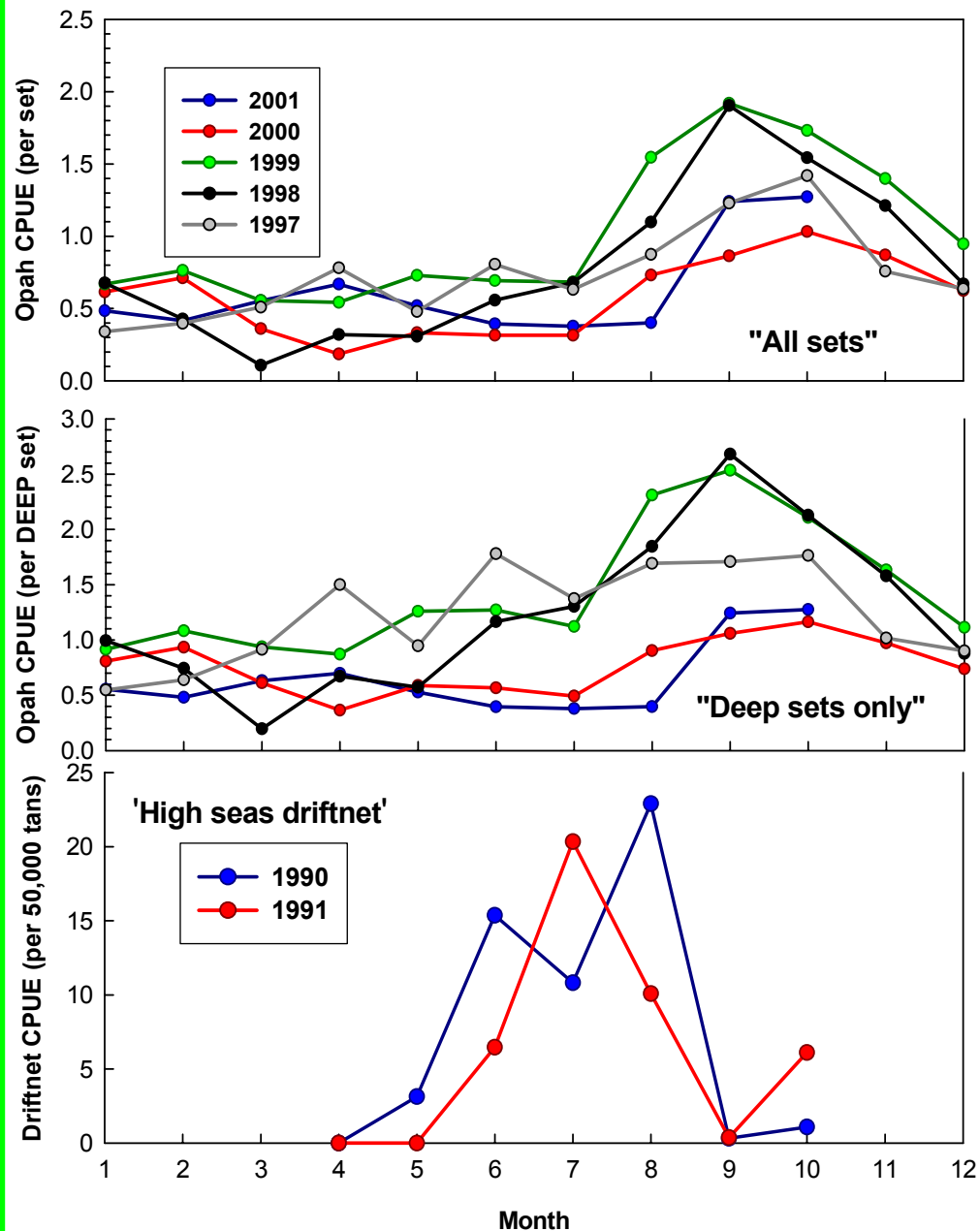
30 - 107 cm FL (M = 64 cm)

97 - 116 cm FL (M = 106 cm)

➤ 99.03% of opah taken on “deep” sets

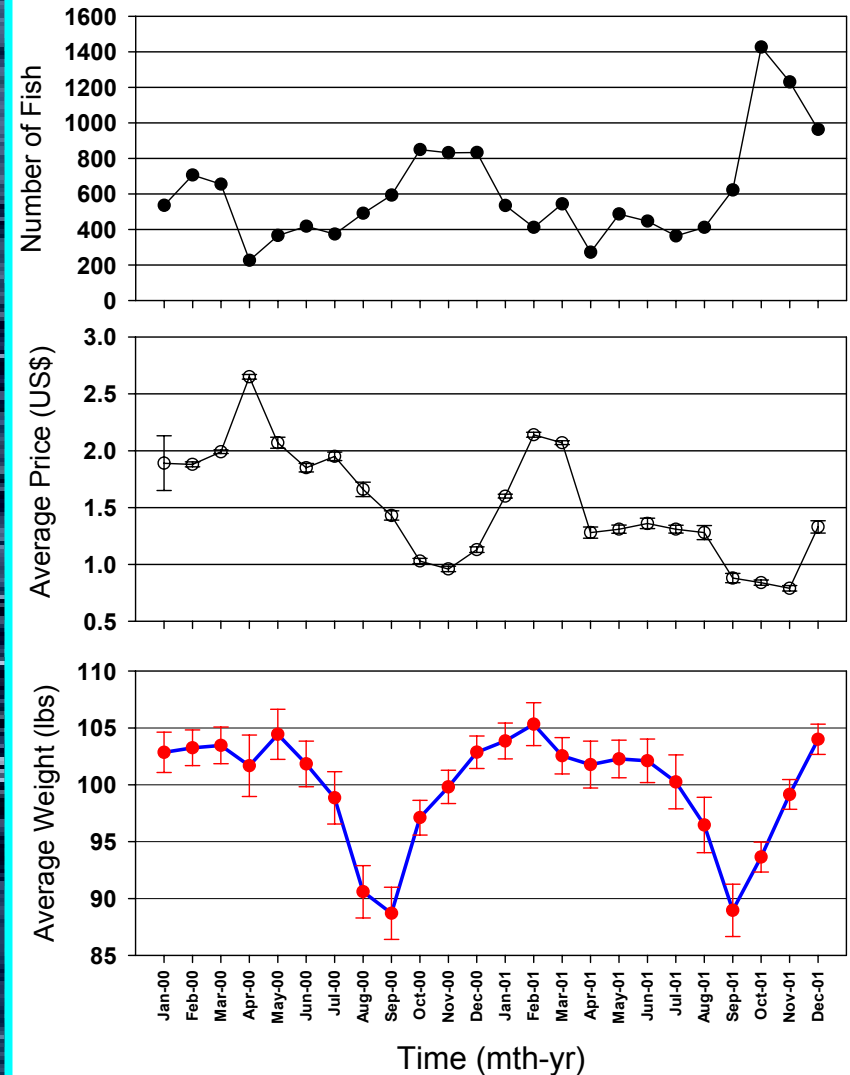
➤ But opah also taken at surface as evidenced in high seas driftnet fisheries catches – peaks in June-August

➤ Catches of opah in the Hawaii longline fishery peak during August-October, BUT ...



Opah landings at UFA, 2000-01

- Aug-Oct are also periods when smallest fish are landed – effort distribution?
- Size (especially when small) tends to be reflected in price



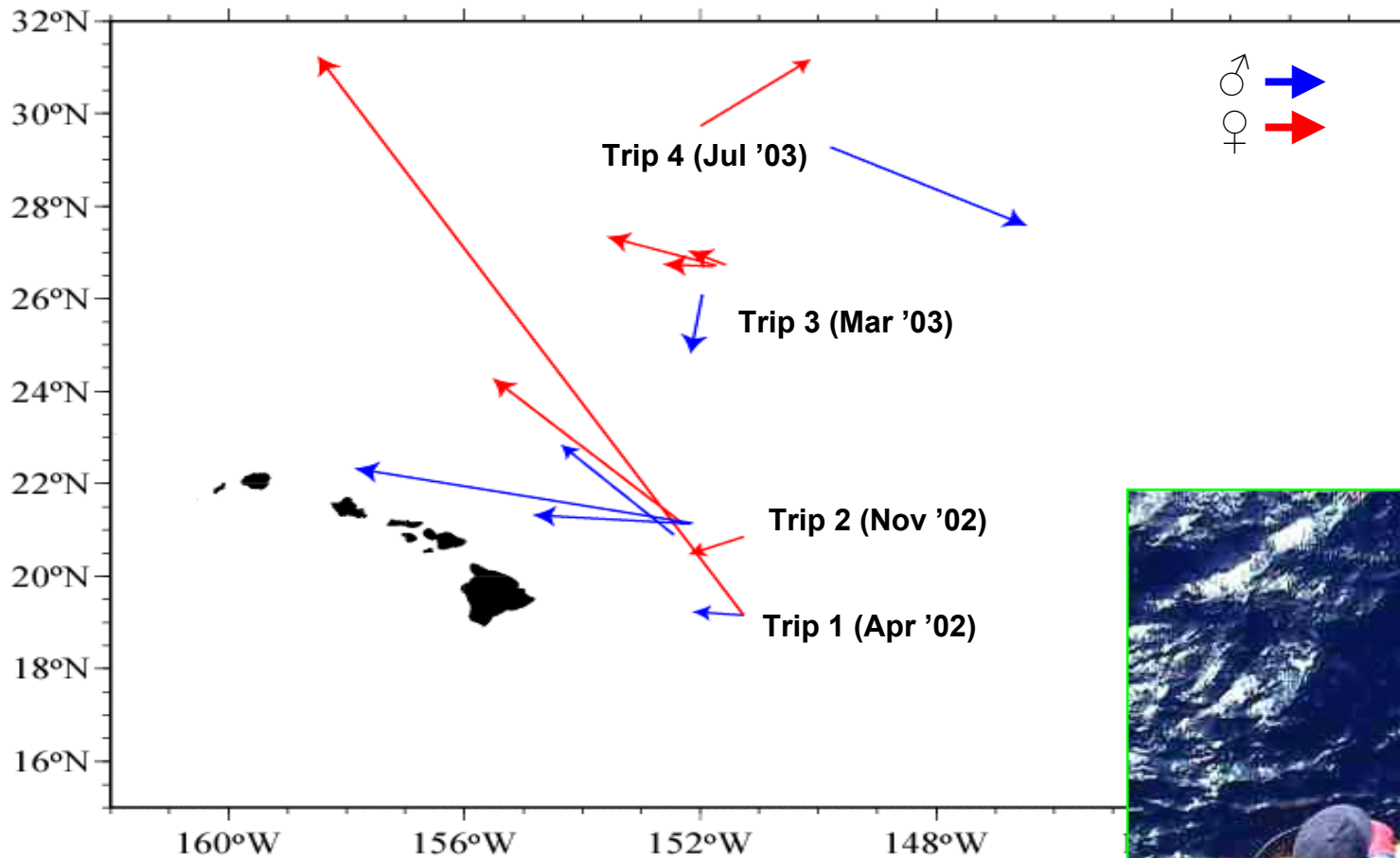
UH Requirements For Vertebrate Animal Use

(<http://www.hawaii.edu/ansc/IACUC/index.html>)



- **Do fish feel Pain – yes/no?**
- **The Institutional Animal Care & Use Committee (IACUC) - 2003 Vertebrate Animal Use Protocol Form**
- **GUIDELINES FOR USE OF FISHES IN FIELD RESEARCH**
American Society of Ichthyologists and Herpetologists (ASIH), American Fisheries Society (AFS), American Institute of Fisheries Research Biologists (AIFRB), from Fisheries , Vol. 13, No. 2, p. 16-23, 1988
- **Regulations for Care and Use of Vertebrate Animals for Research (WebCT site)**

Opah movement in the central North Pacific (PAT tags)

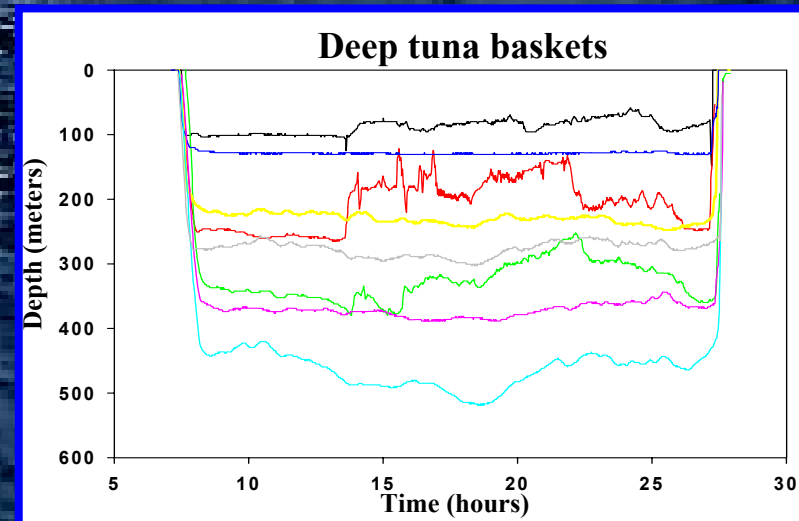


Core temperatures (°C) of opah monchong



Eye muscle, n:18 = 3.1°C (5.6°F)

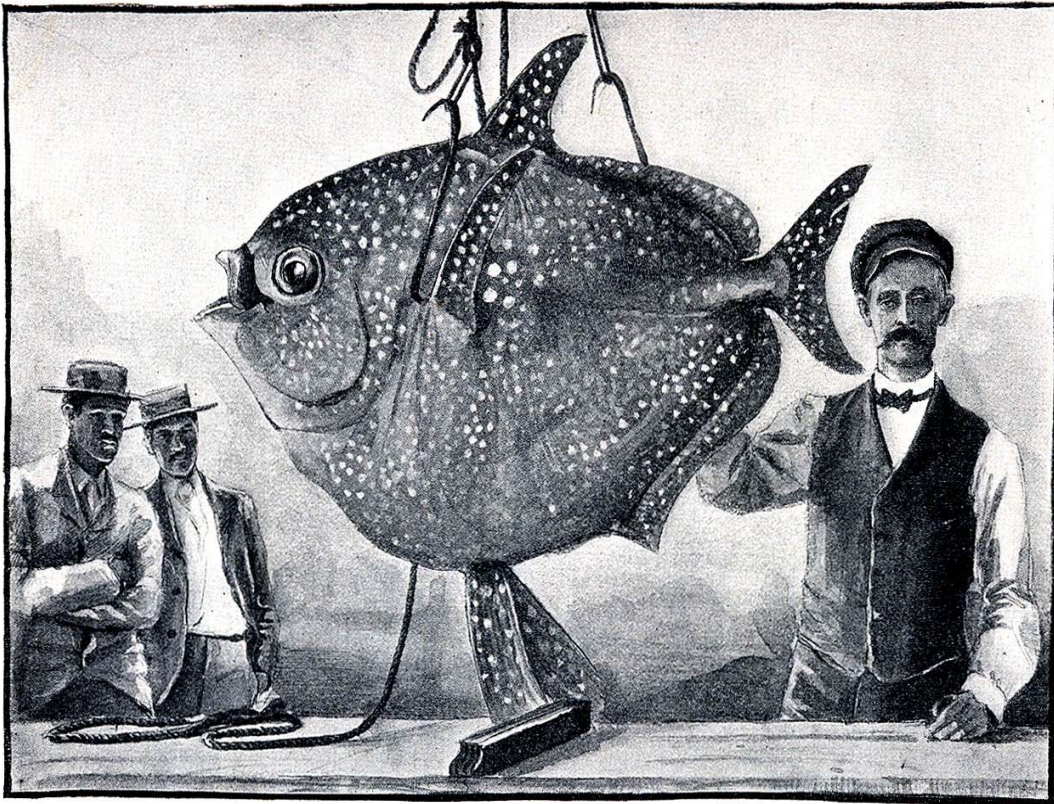
| Opah | | | | | |
|----------|---------|------|------|------|------|
| | N | Mean | ± SD | Min | Max |
| All | 38 | 17.7 | 4.5 | 7.8 | 26.4 |
| Alive | 9(24%) | 21.6 | 4.0 | 15.3 | 26.4 |
| Dead | 29(76%) | 16.5 | 4.1 | 7.8 | 25.9 |
| Monchong | | | | | |
| | N | Mean | ± SD | Min | Max |
| All | 98 | 18.0 | 3.4 | 9.5 | 25.0 |
| Alive | 72(73%) | 17.9 | 3.2 | 11.1 | 24.6 |
| Dead | 26(27%) | 18.1 | 3.9 | 9.5 | 25.0 |



Project status:

- **Progressing: some facets of study faster than others**
- **Winter '04 sampling trip**
- **Data/sample collections and analyses continue**

Questions?



Average Total Mercury Content for Hawaii Pelagic Fish*

| | |
|-----------------|-----------------------------------|
| Mahimahi: | 0.19 ppm (range 0.06 to 0.33 ppm) |
| Striped Marlin: | 0.20 ppm (range 0.04 to 0.52 ppm) |
| Aku (Skipjack): | 0.23 ppm (range 0.11 to 0.47 ppm) |
| Yellowfin Tuna: | 0.31 ppm (range 0.09 to 0.99 ppm) |
| Ono: | 0.38 ppm (range 0.06 to 0.85 ppm) |
| Albacore: | 0.43 ppm (range 0.26 to 0.60 ppm) |
| Bigeye Tuna: | 0.47 ppm (range 0.11 to 0.83 ppm) |
| Opah: | 0.73 ppm (range 0.40 to 1.29 ppm) |

*Based on Hawaii State Department of Health 2002 analysis. For all species listed above, the average total mercury content is primarily methyl mercury.