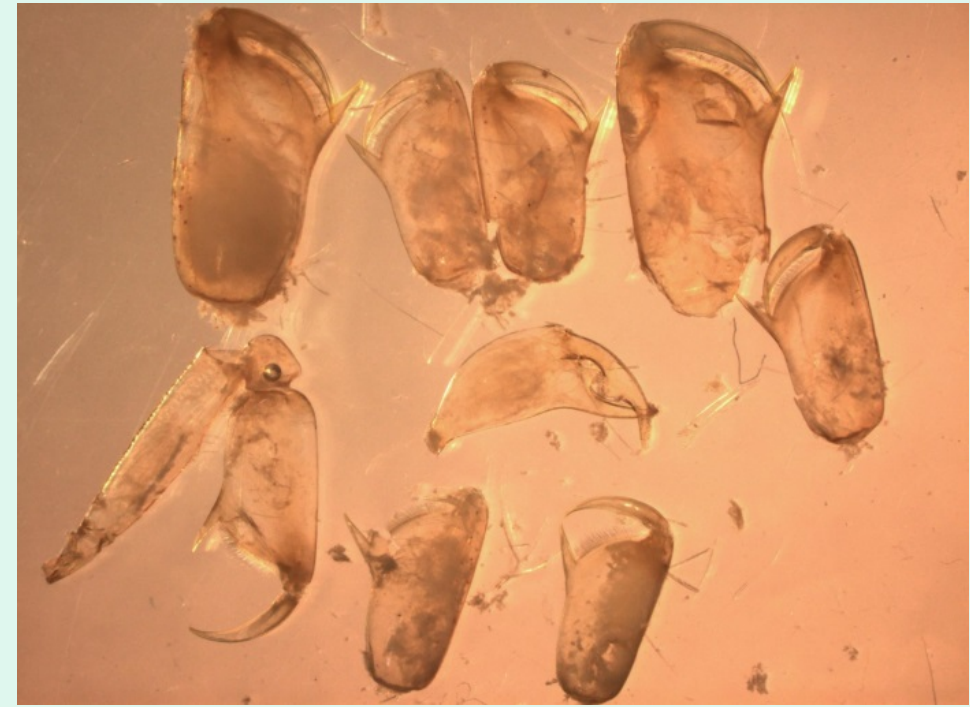# Dietary Analysis Of The Redtail Surfperch, *Amphistictus rhodoterus*

Karina Nelson[1], Jennifer Dugan[2], Timothy Mulligan[3], David Hubbard[2], Sean Craig[3], Rosa Laucci[4], Megan Wood[1], Drew Barrett[3], Helen Mulligan[3], Michelle Succow[3]

1-San Francisco State University, 2-UC Santa Barbara, 3-Humboldt State University, 4-Tolowa Dee-ni' Nation

Dietary Analysis

Fish collection

Laboratory methods

Data analysis

Results

Selected prey items
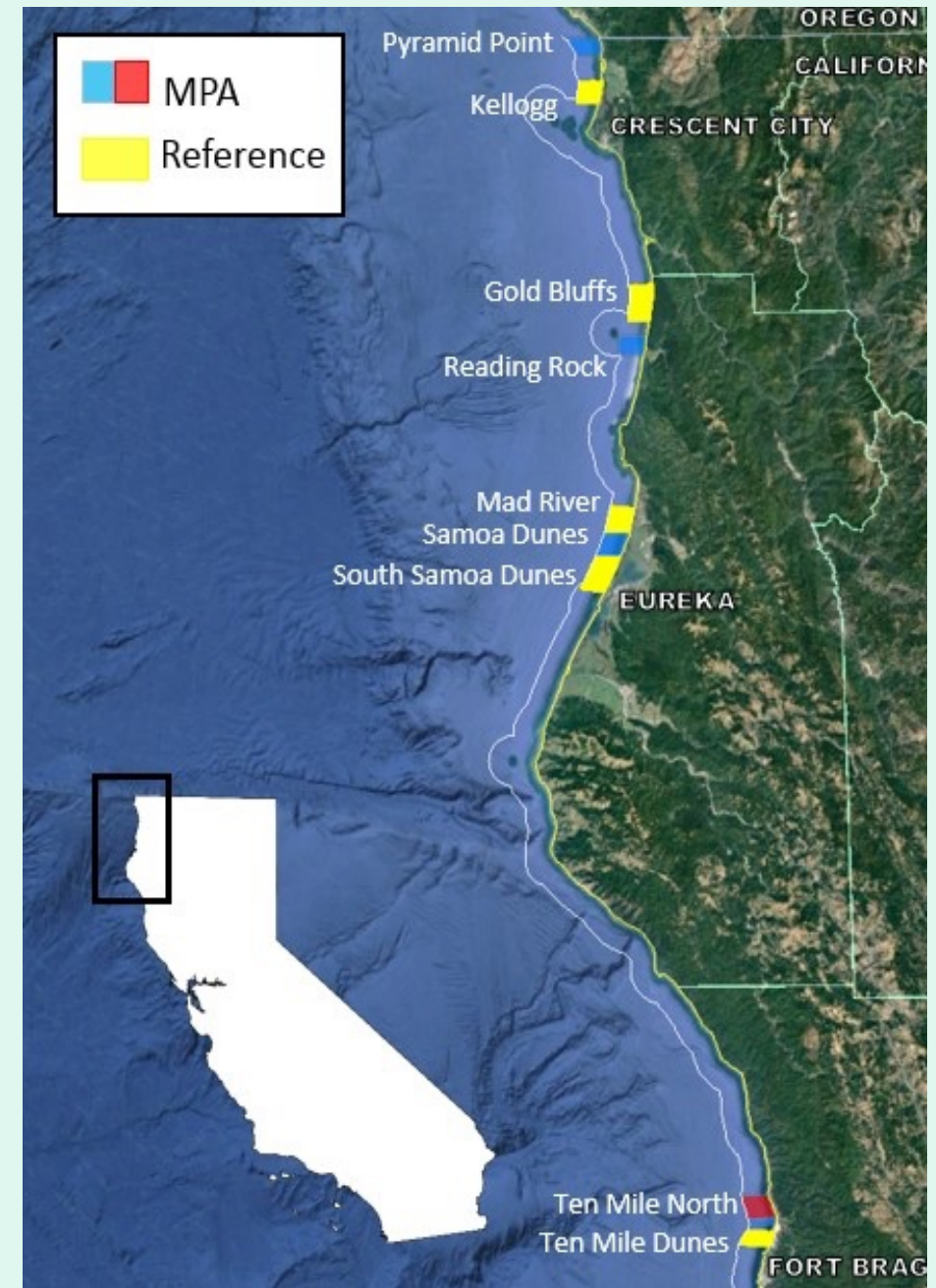
Fish Collection

Samples collected 2014 – 2015

Collected from four reference sites

Goal: average of 12 fish per site/trip

Immediately on ice

Return to lab for processing

LABORATORY PROCEDURES

Fresh fish – kept on ice; processed w/in 24 hr;

Measurements

standard length, total length

Weights

total, gut, liver, gonad, depot fat

Misc.

otoliths, scales, fin clips

ANALYSES

Condition factors

Reproductive condition (GSI)

(Aging, DNA analysis)

Diet analysis**

Diet Analysis

Guts fixed in 10% formalin

Preserved in 40% Isopropanol

Gut opened & contents removed :
   Dissecting scope
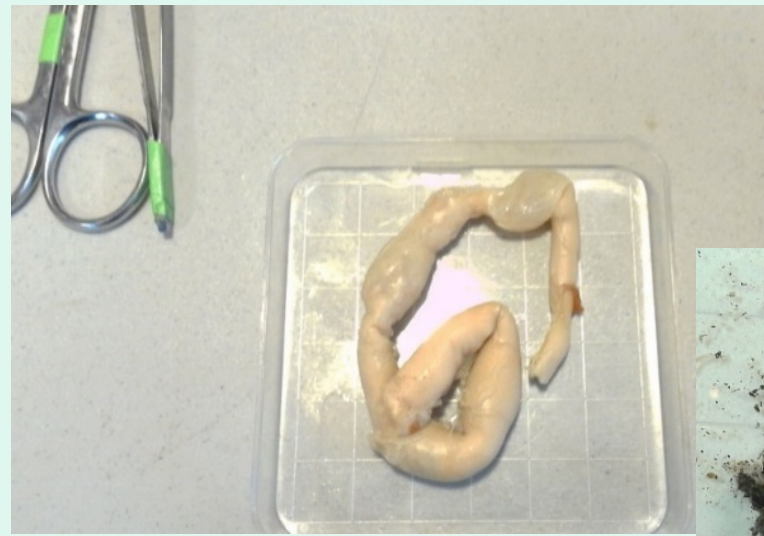   **Entire gut used**

For each fish:

   All contents identified to appropriate taxonomic level

   All prey taxa enumerated

   Each prey taxon grouped & weighed to 0.0001 g (0.1 mg)

246 fish with non-empty guts

Diet Analysis – Calculations

Abundance: number of a prey taxon

% number = (# of taxon/total # of prey items)*100

Weight: weight of a prey taxon

% weight = (wt of taxon/total wt of prey items)*100

% Frequency of occurrence:

(# of guts containing a taxon/total # of guts)*100

Index of Relative Importance (IRI) =

(% number + % weight) * (% frequency of occurrence)

Pooled Data
→ Overall & site and size specific dietary patterns

RESULTS

Representative results
Overall trends
Site and size specific trends

Prey specific information
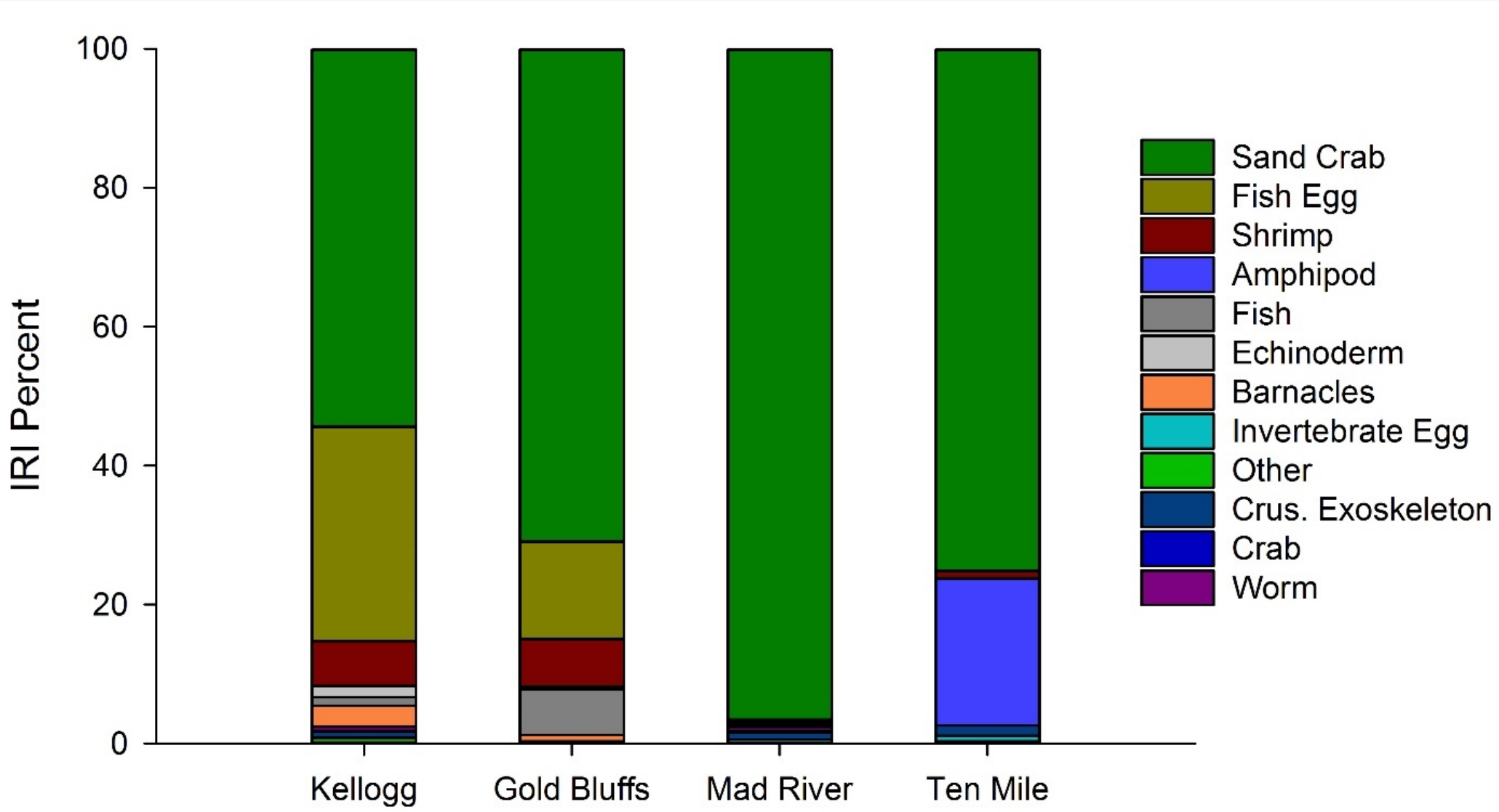
Prey Items From All Sites Ranked By Abundance

Prey item	Number	% Number	Weight (g)	% Weight
Fish Egg	3440	48.9	4.6	0.5
Sand Crab	1866	26.5	617.5	67.9
Invertebrate Egg	591	8.4	3.0	0.3
Amphipod	307	4.4	5.2	0.6
Barnacle, Acorn	303	4.3	45.1	5.0
Worm	153	2.2	14.5	1.6
Crus. Exoskeleton	89	1.3	20.9	2.3
Shrimp	77	1.1	61.5	6.8
Microcrustacea	54	0.8	1.1	0.1
Barnacle, Stalked	37	0.5	2.2	0.3
Fish	27	0.4	65.8	7.2
Unidentified	25	0.4	5.7	0.6
Echinoderm	21	0.3	37.1	4.1
Crab	17	0.2	20.4	2.3
Isopod	11	0.2	0.2	0.0
Mussel	11	0.2	0.2	0.0
Salp	5	0.1	3.9	0.4
Nematode	2	0.0	0.0	0.0
Snail	2	0.0	0.0	0.0
Spider	1	0.0	0.0	0.0

# Prey Items From All Sites Ranked By IRI

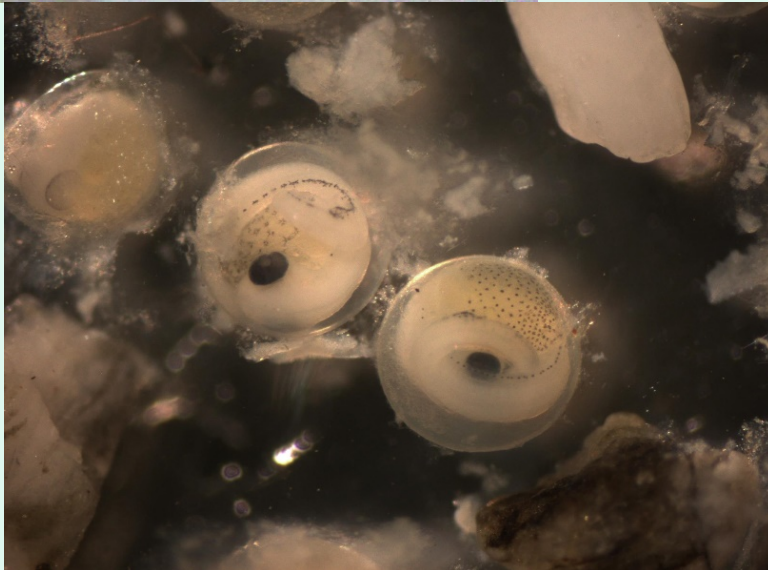| Prey Item	Number Stomachs	% Frequency of Occurrence	Index of Relative Importance (IRI)
Sand Crab	185	75.2	7102
Fish Egg	25	10.2	502
Shrimp	57	23.2	182
Amphipod	37	15.0	74
Crus. Exoskeleton	49	19.9	71
Fish	20	8.1	62
Worm	24	9.8	37
Barnacle, Acorn	9	3.7	34
Echinoderm	18	7.3	32
Invertebrate Egg	7	2.8	25
Crab	14	5.7	14

Index Of Relative Importance (IRI) Values For Major Dietary Groups

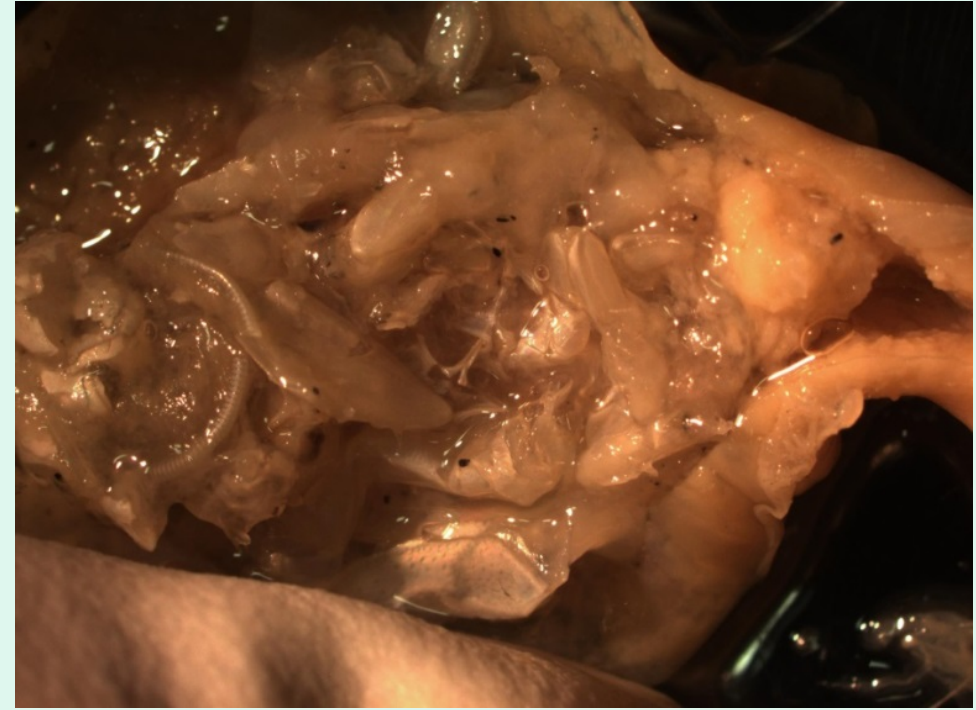**Length Frequencies Of Redtail Surfperch Used In Diet Analysis**

small (<170 mm SL) medium (170 mm ≤ SL ≤ 220mm) large (>220 mm SL)

Index Of Relative Importance (IRI) Values Of Major Dietary Groups By Sizeclass
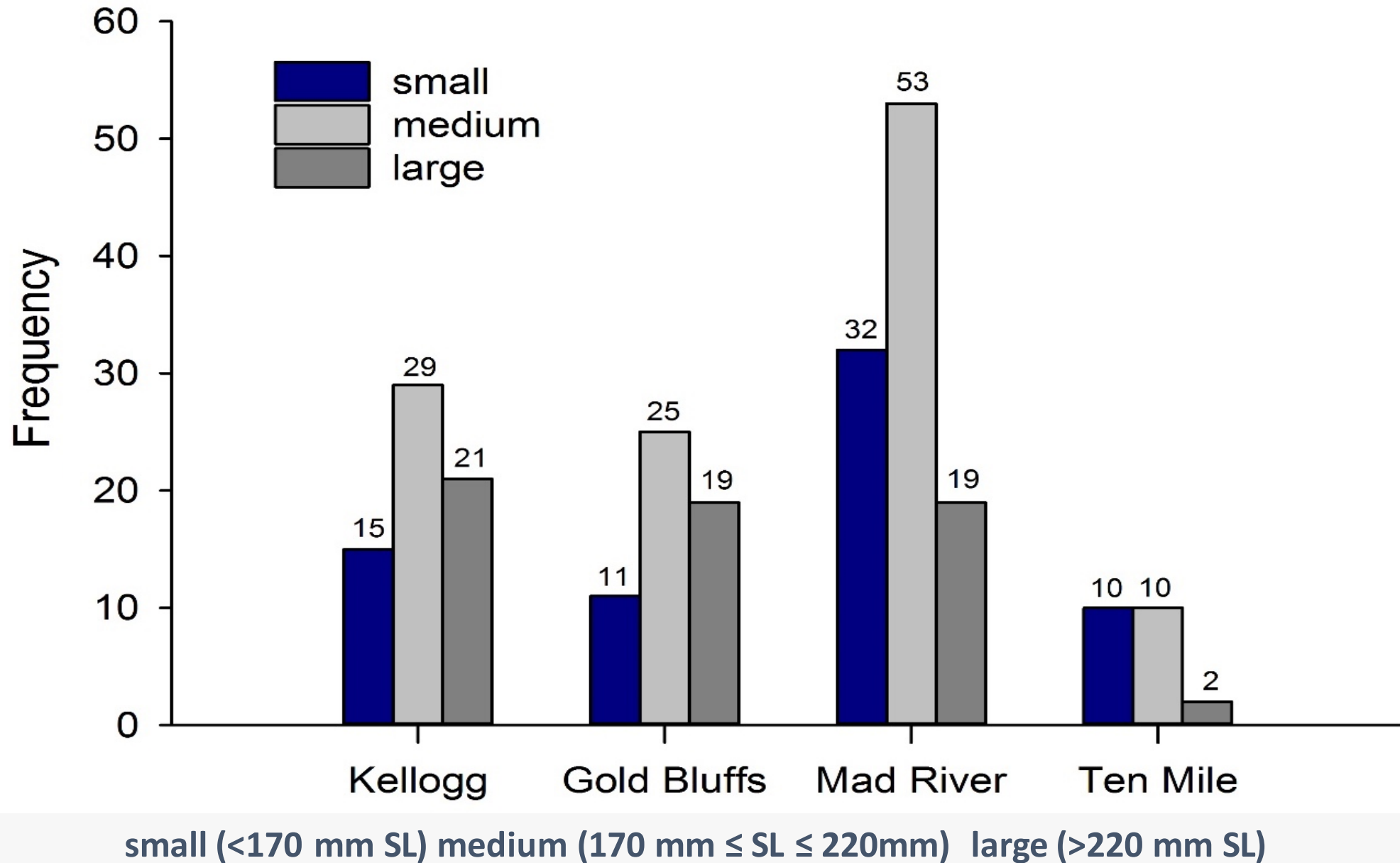
Specific Prey Examples

PREY ITEM – Sand Crabs

    preferred prey at all sites

    small / medium/ large fish
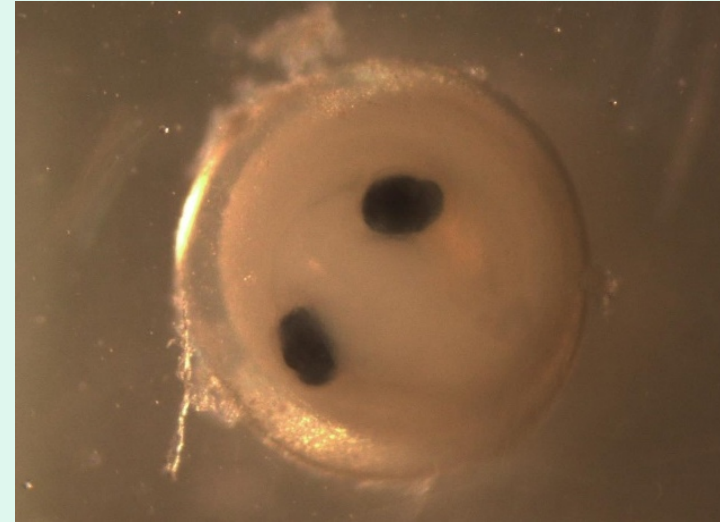
    size selection

PREY ITEM - Fish Eggs

    Kellogg & Gold Bluffs

    smelt eggs

    small / medium fish
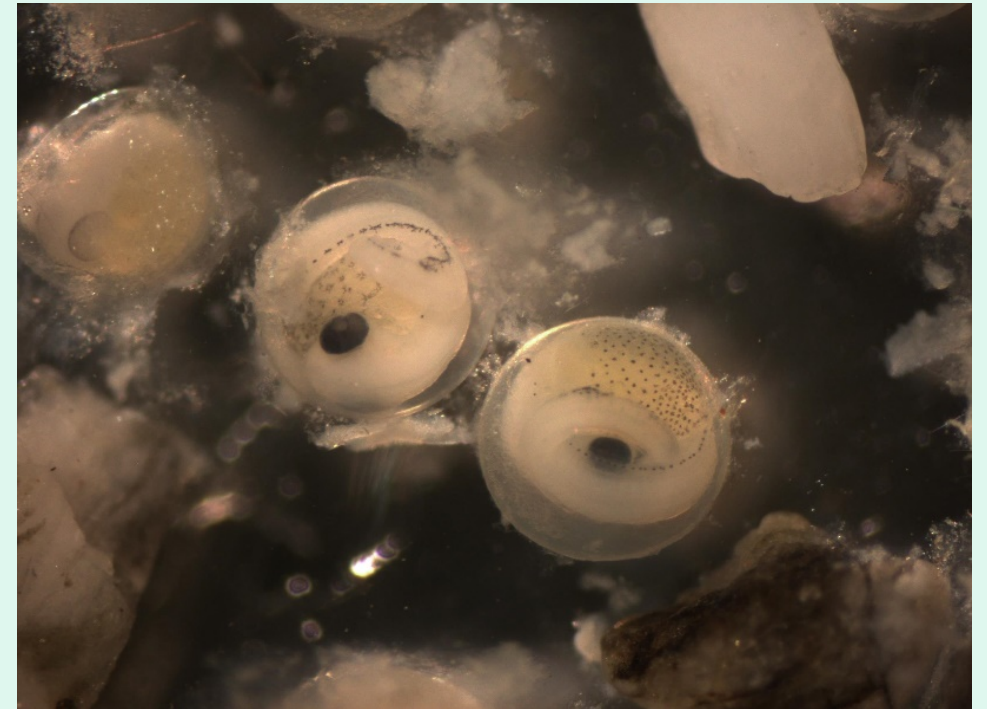
Medium fish
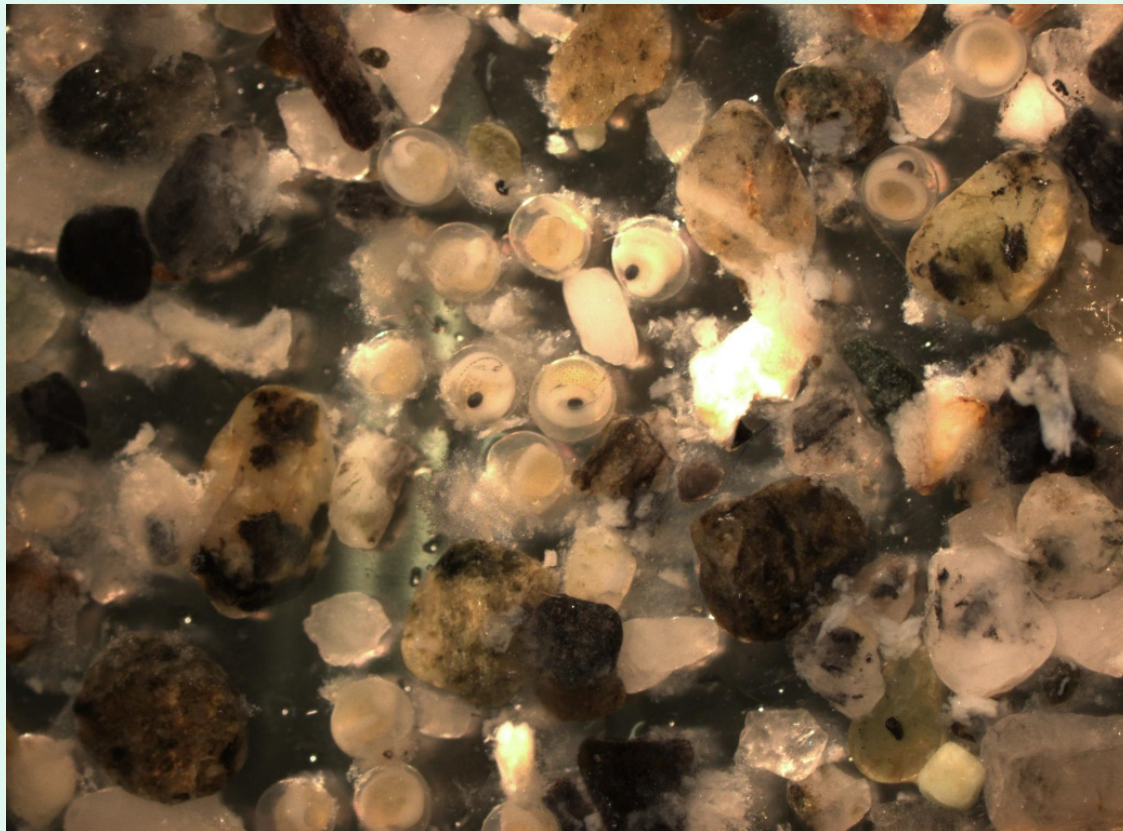
    gravel / coarse sand

PREY ITEM - Fish Eggs
medium fish
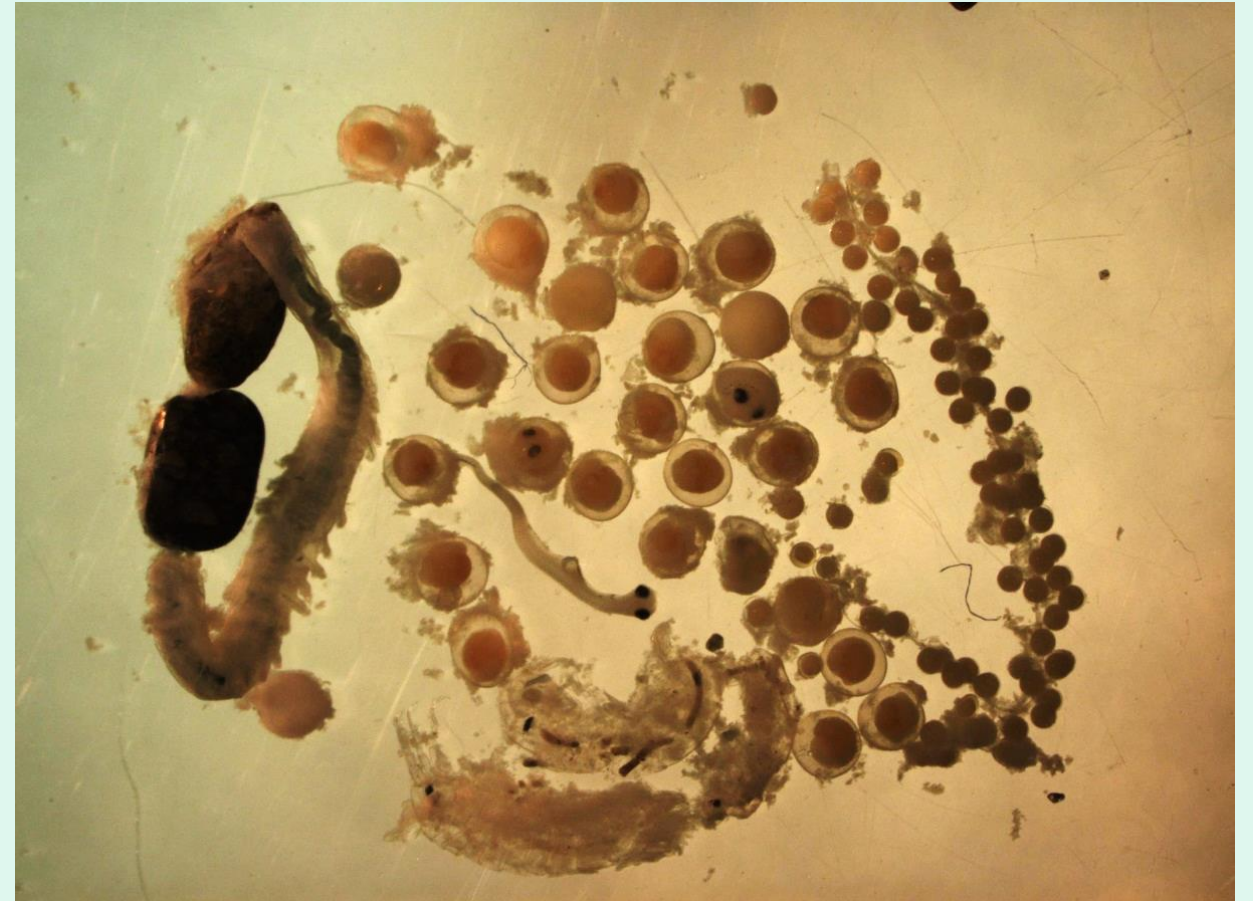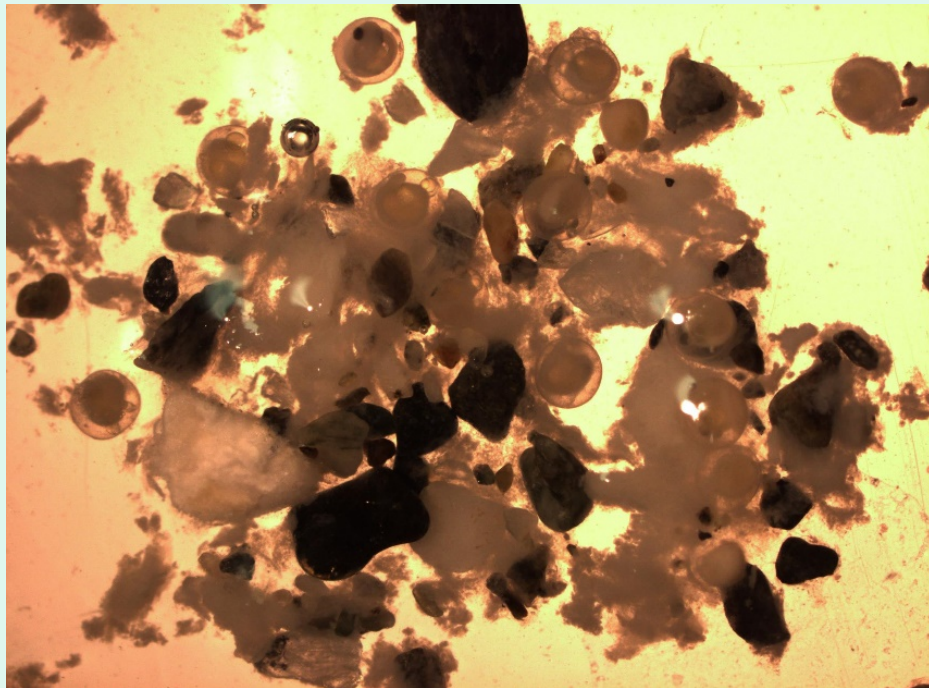### gravel / coarse sand
primary prey

PREY ITEM - Fish Eggs

  small fish
  little substrate
  other small prey items

PREY ITEM - worms
Mad River & Kellogg polychaetes

medium/large fish
sand

PREY ITEM – Crabs

      Mad River & Kellogg

      Moderate to small IRI

      1 small crab

      Carapace & leg fragments – usually degraded

      medium/large/ fish

SUMMARY

Sand crabs were clearly the most dominant dietary component for redtail surfperch collected at the four northern California beaches.

Although these fish prefer sand crabs when they are available, they appear to be opportunistic with regard to type & size of prey.

Fish from more heterogeneous environments had more diverse diets.

They definitely forage on the bottom and appear to capture or scavenge both infaunal and epifaunal prey.