Pilot Study for CDFW

ECOLOGICAL RISK ASSESSMENT

SANTA ROSA WORKSHOP 27 July 2017

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Why risk assessment?

- Develop a transparent framework for ranking the *relative* risk posed by fisheries for the ecosystem

- Incorporate flexibility to accommodate variable data quality, consider different characterizations of risk, etc.

- Screening tool to identify potential concerns → more about avoiding false negatives than asserting true positives
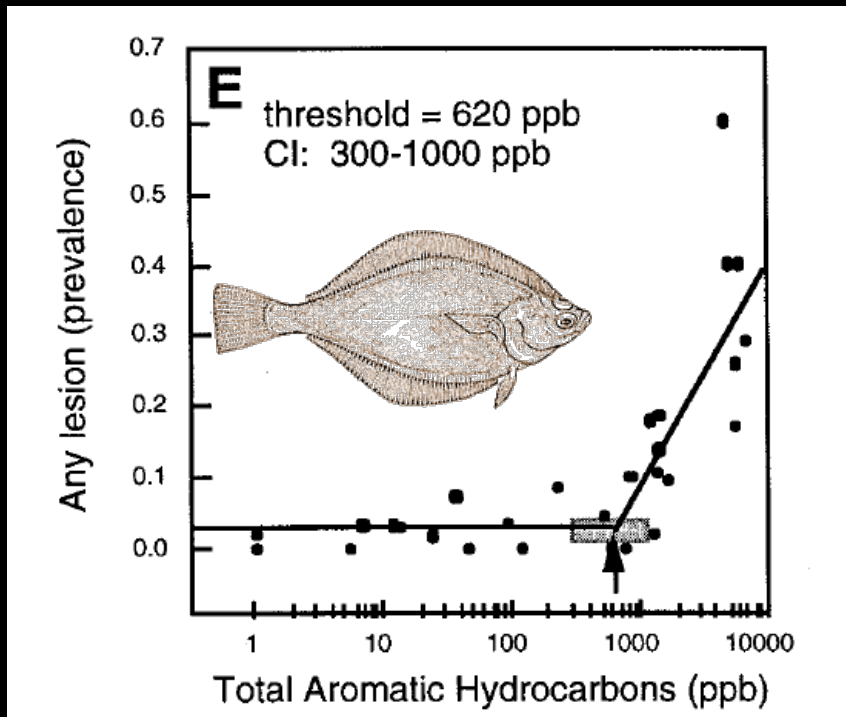
Ecosystem risk assessment framework
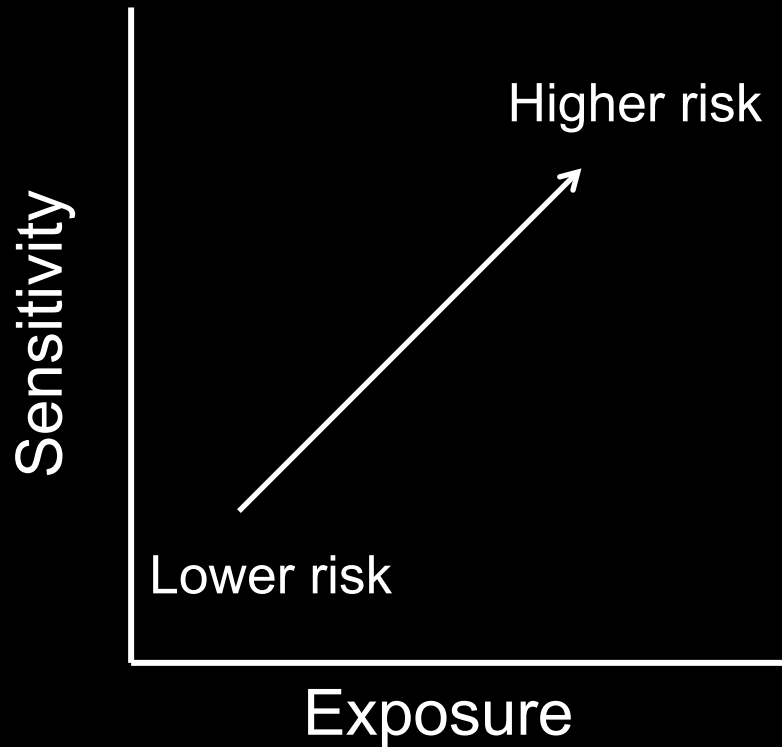
Quantifying risk

Horness et al. 1998

2 axes of information

1. the *exposure* of a subject to a pressure

2. the *sensitivity* of the subject to the pressure, if exposed

Sustainability of fishery bycatch: a process for assessing highly diverse and numerous bycatch

ILONA STOBUTZKI*, MARGARET MILLER AND DAVID BREWER

ELSEVIER

Evaluating impacts of fishing on benthic habitats: A risk assessment framework applied to Australian fisheries

A. Williams*, J. Dowdney, A.D.M. Smith, A.J. Hobday, M. Fuller

Wealth from Oceans Flagship, CSIRO M...

Evaluating sustainability of fisheries bycatch mortality for marine megafauna: a review of conservation reference points for data-limited populations

J. E. MOORE[1]*, K. A. CURTIS[2], R. L. LEWISON[3], P. W. DILLINGHAM[4], J. M. COPE[5], S. V. FORDHAM[6], S. S. HEP...[7], ...[8], ...[9], G. N. TU...

Linking land- and sea-based activities to risk in coastal ecosystems

Jameal F. Samhouri*, Phillip S. Levin

Assessing habitat risk from human activities to inform coastal and marine spatial planning: a demonstration in Belize

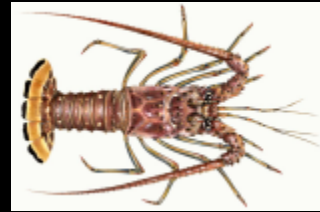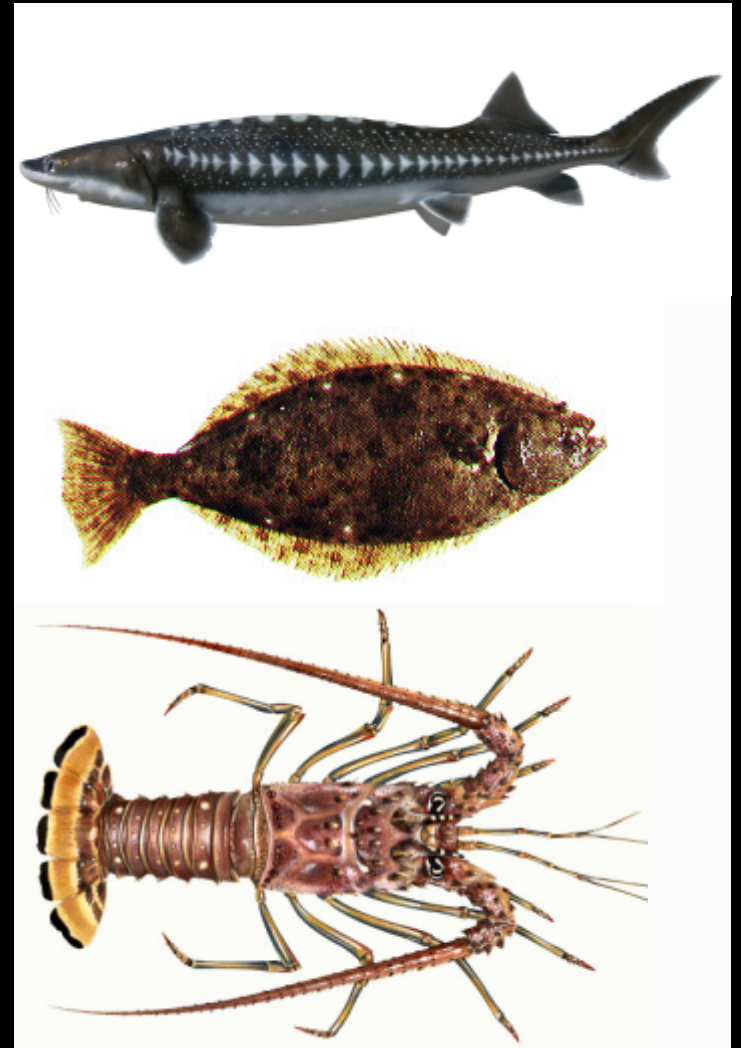"THE FIRST TEST WAS FALSE-POSITIVE, THE SECOND TEST WAS FALSE-NEGATIVE. WHAT ARE YOU TRYING TO PULL?"

No Concern   Serious Concern

false negatives

cutoff
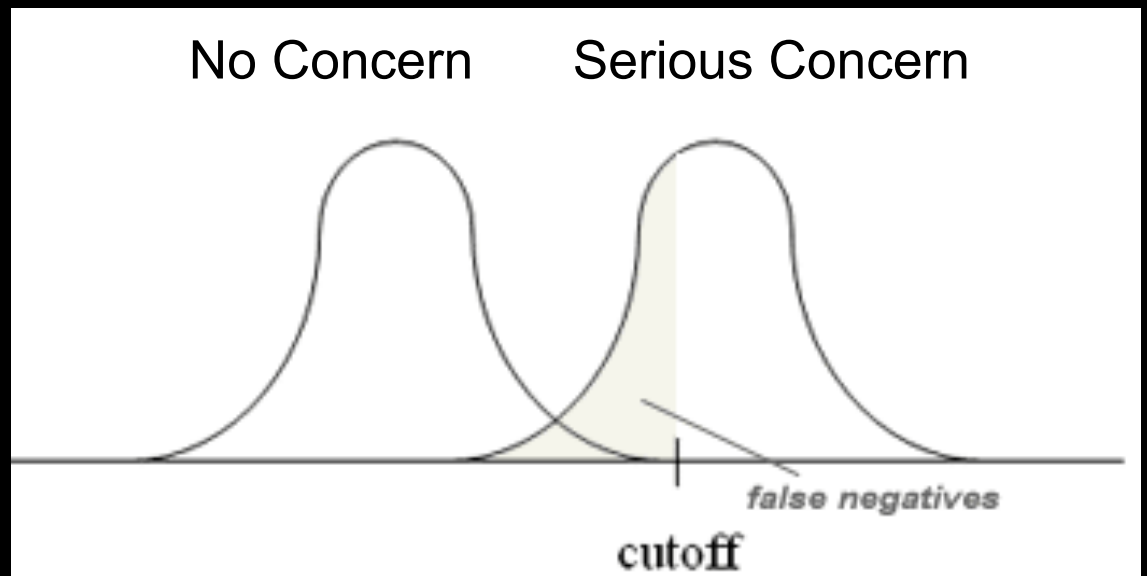
Target Species

Pilot study includes 5 Target Species

1. California Halibut
2. Kelp Bass
3. Pacific Herring
4. Spiny Lobster
5. White Sturgeon

Pilot study includes 9 Target Fisheries

1. White Sturgeon-Sport-H&L
2. Kelp Bass-Sport-H&L
3. California Halibut-Sport-H&L
4. California Halibut-Commercial-Trawl
5. California Halibut-Commercial-Gillnet
6. California Halibut-Commercial-H&L
7. Pacific Herring-Commercial-Gillnet
8. Spiny Lobster-Sport-Hoop Net
9. Spiny Lobster-Commercial-Trap

Target Attributes

Axis	Attribute
Exposure	Management Effectiveness & Current stock status
Exposure	MPA Coverage
Exposure	Morphology affecting capture
Exposure	Spatial intensity
Exposure	Temporal intensity
Exposure	Value of exploited species
Sensitivity	Age at maturity
Sensitivity	Behavioral response
Sensitivity	Fecundity
Sensitivity	Breeding Strategy
Sensitivity	Fishing Mortality
Sensitivity	Population connectivity

Sensitivity Attributes	Attribute description	High (4)	3	2	Low (1)
Fecundity	*Fecundity - the population-wide average number of offspring produced by a female each year*	<10	10-100	100-1,000	>1,000

Relative Risk Among Target Fisheries
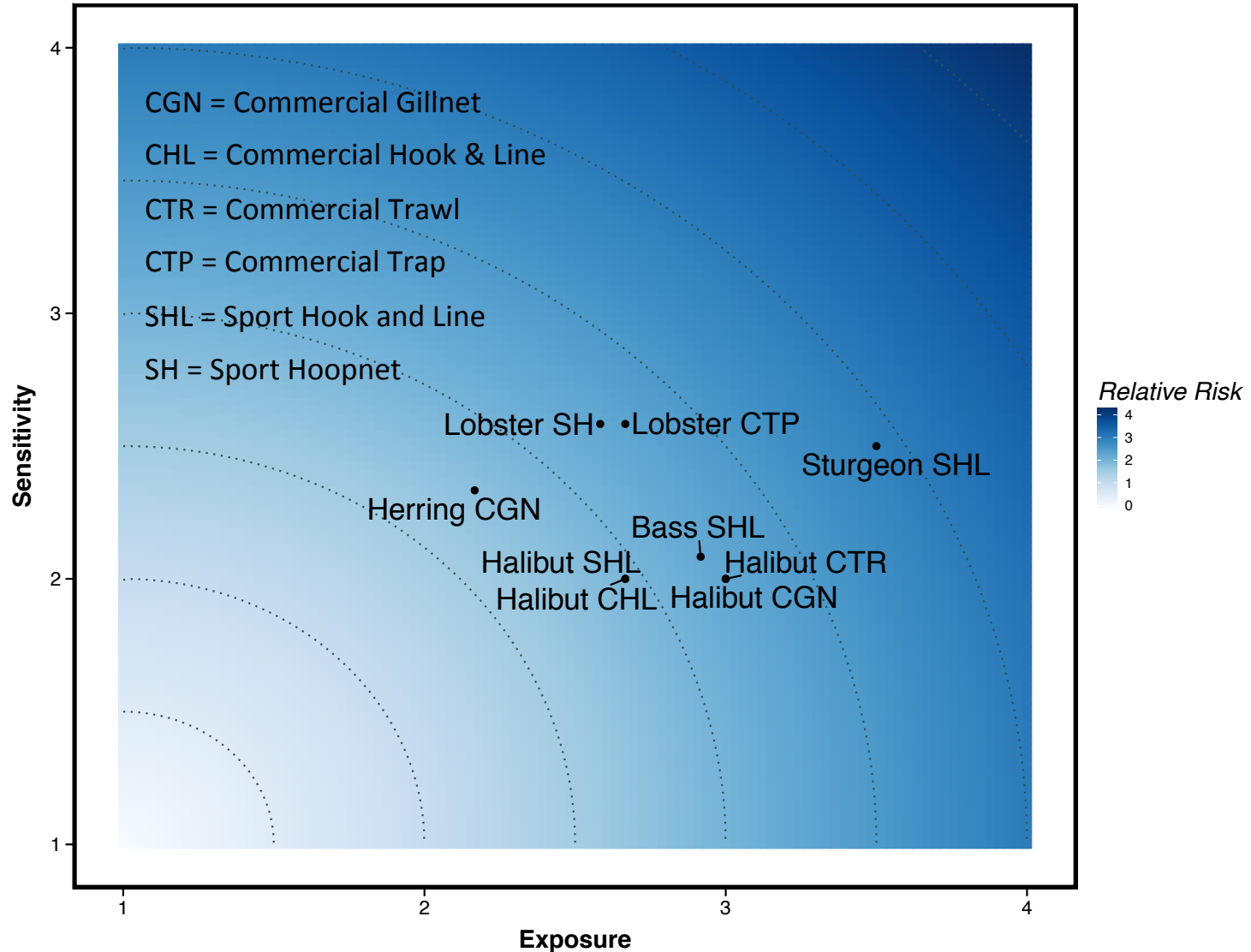
Relative Risk Among Target Species
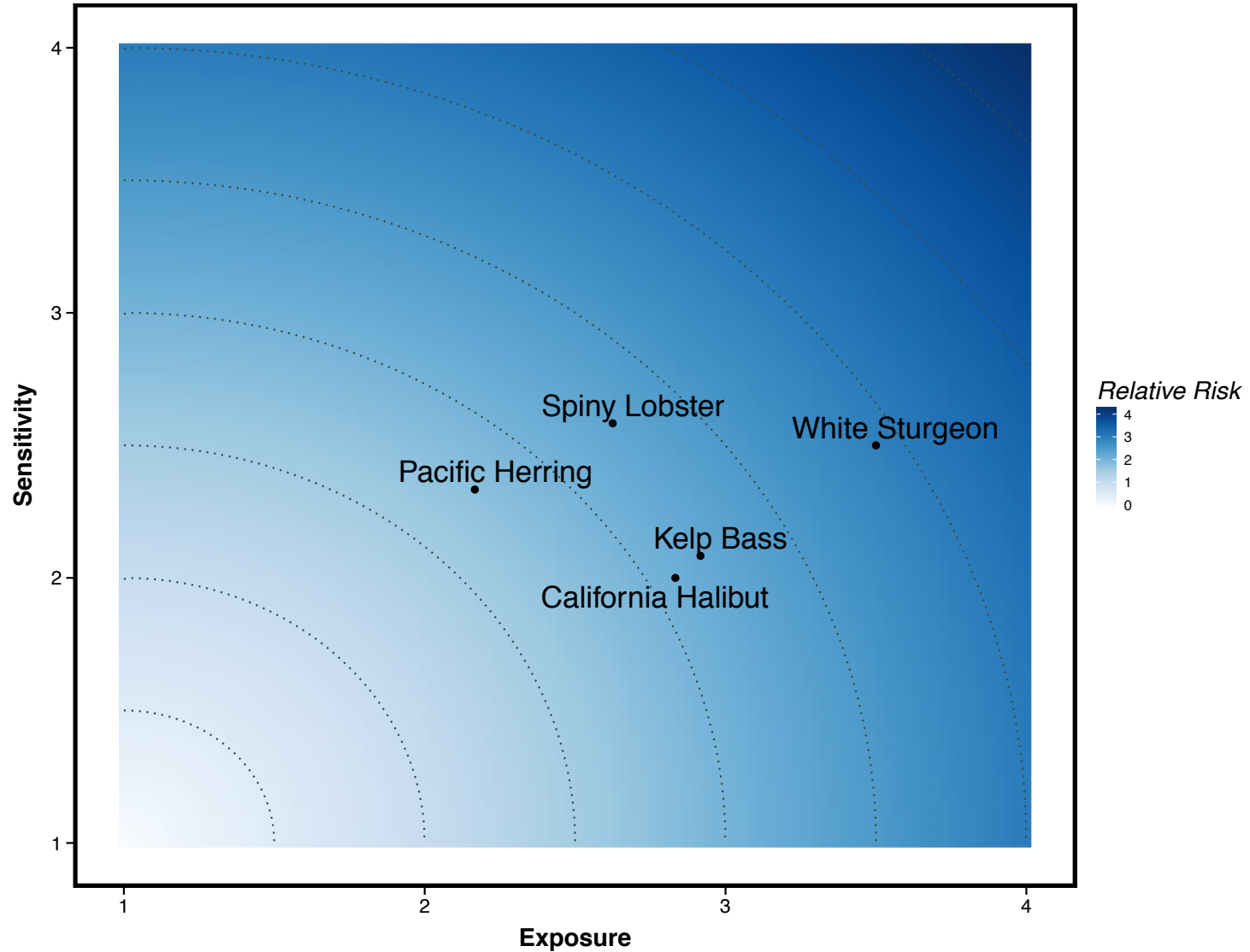
Bycatch

Working Definition: Catch that is returned to the water

We considered 10 Bycatch Groups

1. Marine Mammals
2. Marine Birds
3. Threatened or Endangered species or overfished rockfish
4. Elasmobranchs
5. Salmonids
6. Flatfish
7. Other Rockfish
8. Other Pelagic Finfish
9. Other Non-Pelagic Finfish
10. Other Marine Invertebrates

Bycatch Considerations

1. For any guild in which bycatch is significant (> 1% of total catch), we use the most common species within that guild and score it as appropriate.

2. Sub and supralegals are included in bycatch

Bycatch Considerations

3. For the guilds of Marine Mammals, Marine Birds, and T&E Finfish/Overfished Rockfish, if there is any bycatch of these guilds, we score the most common species within the guild, regardless of how small the number of bycatch species.

4. For the other seven guilds, if all species within the guild have what we consider to be non-significant* bycatch, we score that guild all zeroes.

Bycatch Attributes

Axis	Attribute
Exposure	Magnitude
Exposure	Management Effectiveness
Exposure	MPA Coverage
Exposure	Spatial Intensity
Exposure	Temporal Intensity
Exposure	Current Status
Sensitivity	Age at Maturity
Sensitivity	Behavioral Response
Sensitivity	Fecundity
Sensitivity	Release Mortality
Sensitivity	Population Connectivity
Sensitivity	Breeding Strategy

Evaluating Relative Risk

- Revised scores

- Cumulative Risk - Sums scores for Bycatch groups because not all groups may be impacted by the fishery (0 values).
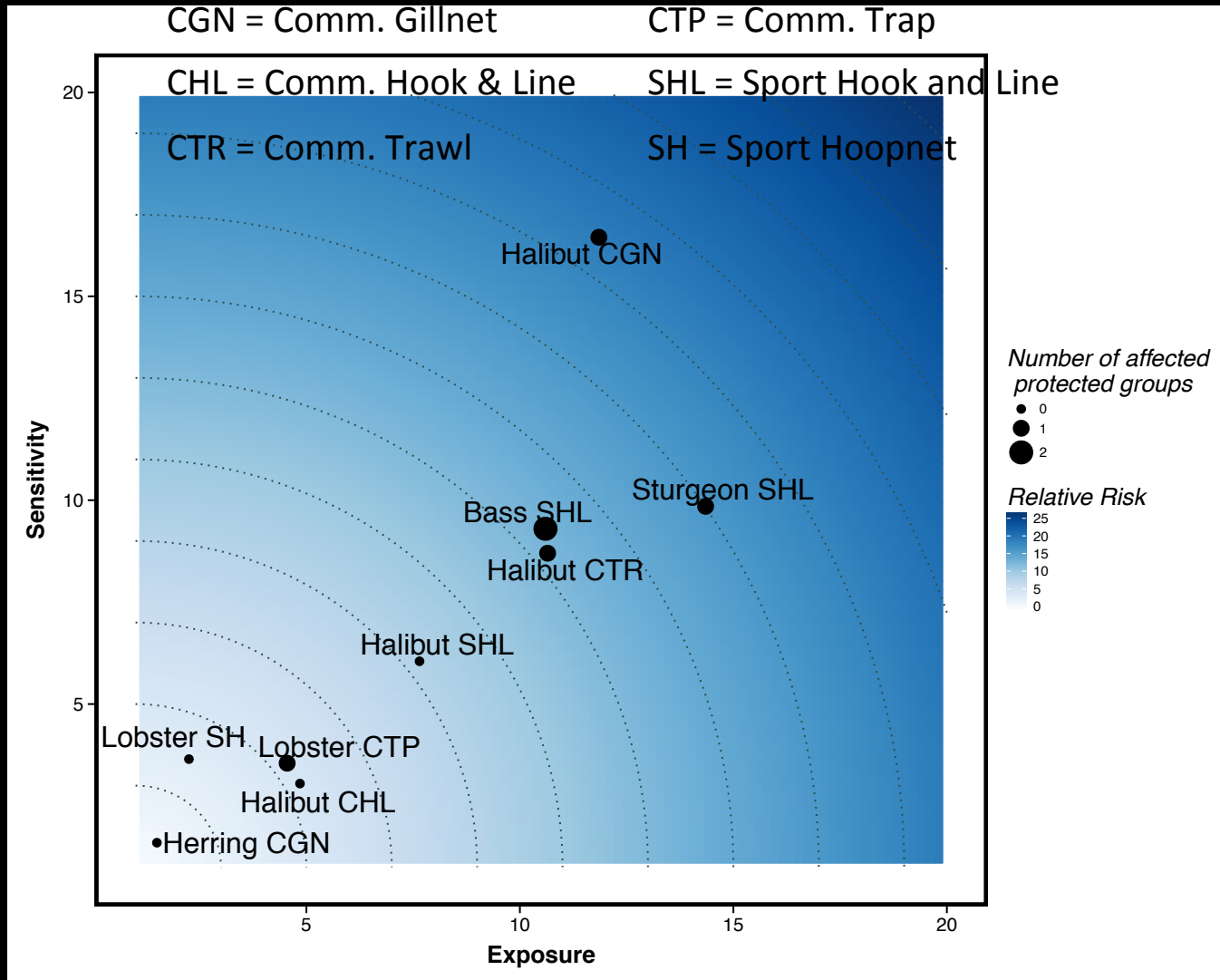
- Weighting - To emphasize certain attributes over others.
  - Exposure: 50% to magnitude
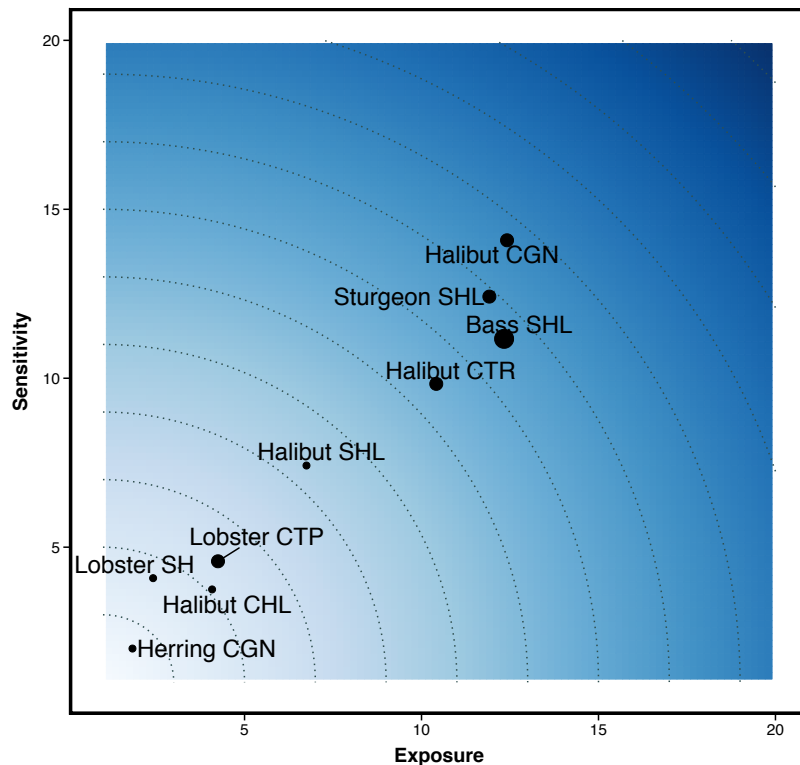 - Sensitivity: 50% to release mortality

- Protected groups - Highlighting fisheries that interact with protected groups (mammals, birds, threatened species)

Relative Risk to Bycatch Among Target Fisheries Weightings for Magnitude and Mortality
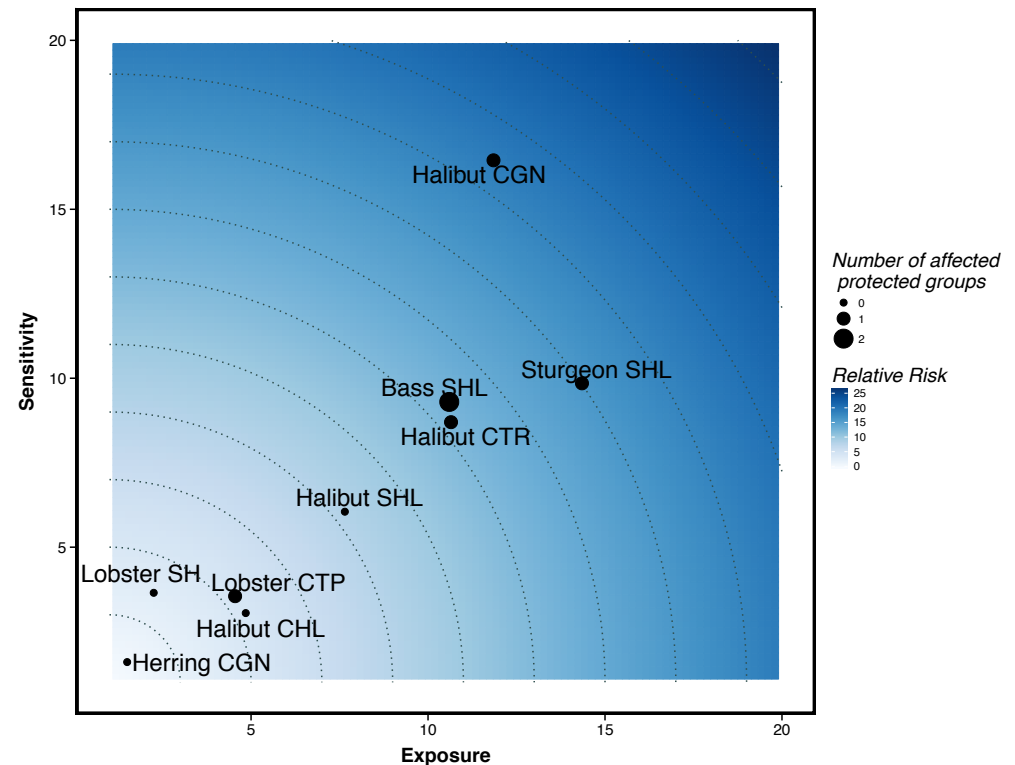
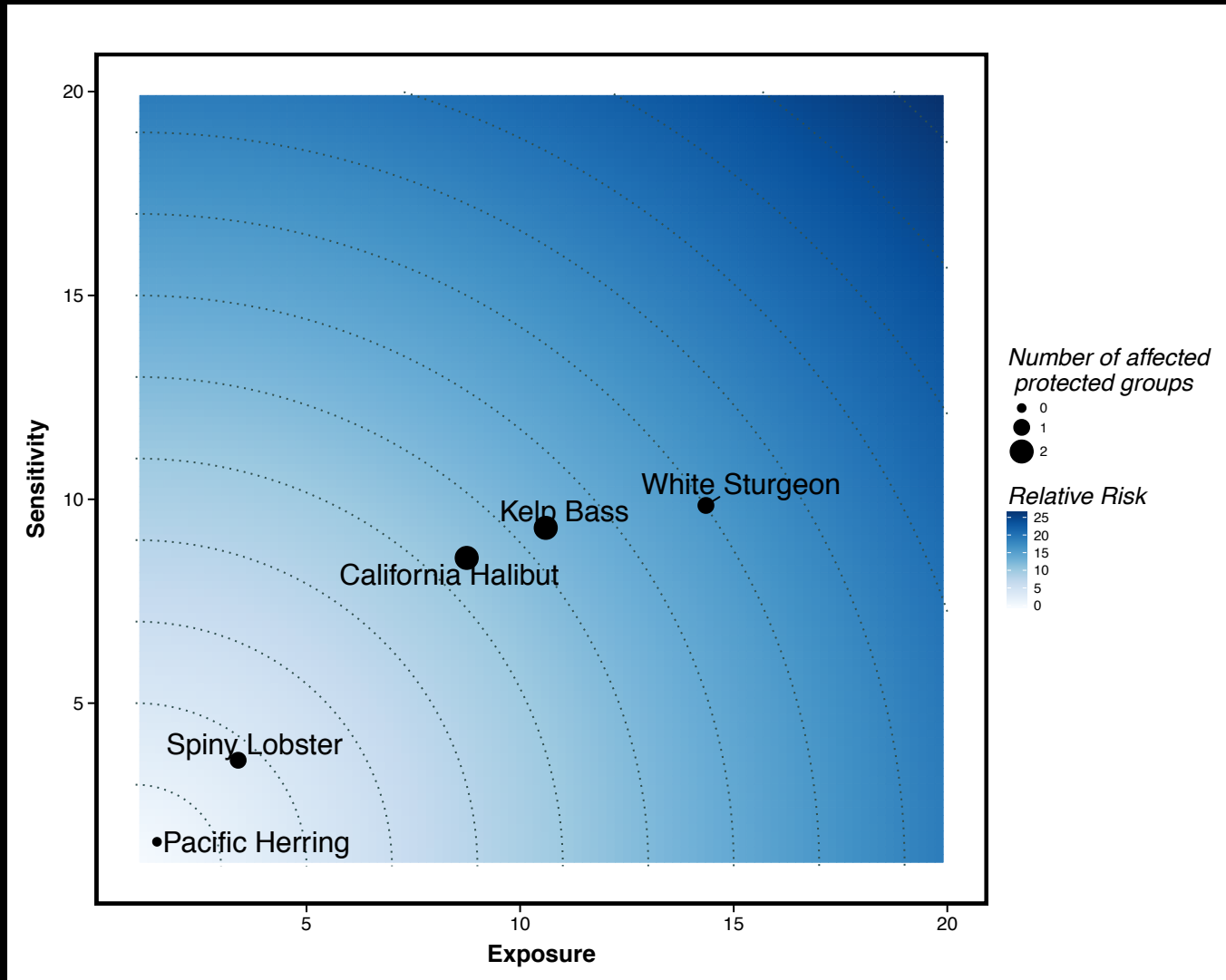# Comparison of methods for evaluating cumulative risk to bycatch

Relative Risk to Bycatch Among Target Species Weightings for Magnitude and Mortality

White sturgeon, California halibut, kelp bass may pose greatest risk to bycatch

Why is bycatch risk high for these 3?

Several bycatch (5+ bycatch guilds in each fishery)

White sturgeon → oversized white sturgeon, green sturgeon, elasmobranchs

California halibut → most bycatch groups (7)

Kelp bass → birds, sublegal kelp bass

Habitat

We considered 10 Habitat Groups

1. Habitat-forming marine vegetation
2. Habitat-forming marine invertebrates
3. Estuaries
4. Nearshore hard bottom
5. Nearshore soft bottom
6. Offshore hard bottom
7. Offshore soft bottom
8. Pelagic
9. Soft bottom intertidal
10. Hard bottom intertidal

Habitat Attributes

Axis	Attribute
Exposure	Intensity
Exposure	Management Effectiveness
Exposure	MPA Coverage
Exposure	Spatial Overlap
Exposure	Temporal closures
Exposure	Gear Footprint
Sensitivity	Damage to Habitat
Sensitivity	Current Status
Sensitivity	Population Connectivity
Sensitivity	Recovery Time

Evaluating Relative Risk to Habitats

- Revised scores
- Gear footprint - exposure attribute vs. multiplier
- Attribute weightings
  - Exposure: 50% to gear footprint
  - Sensitivity: 50% to damage
- Weighting of habitat groups
  - Based on CDFW assignments
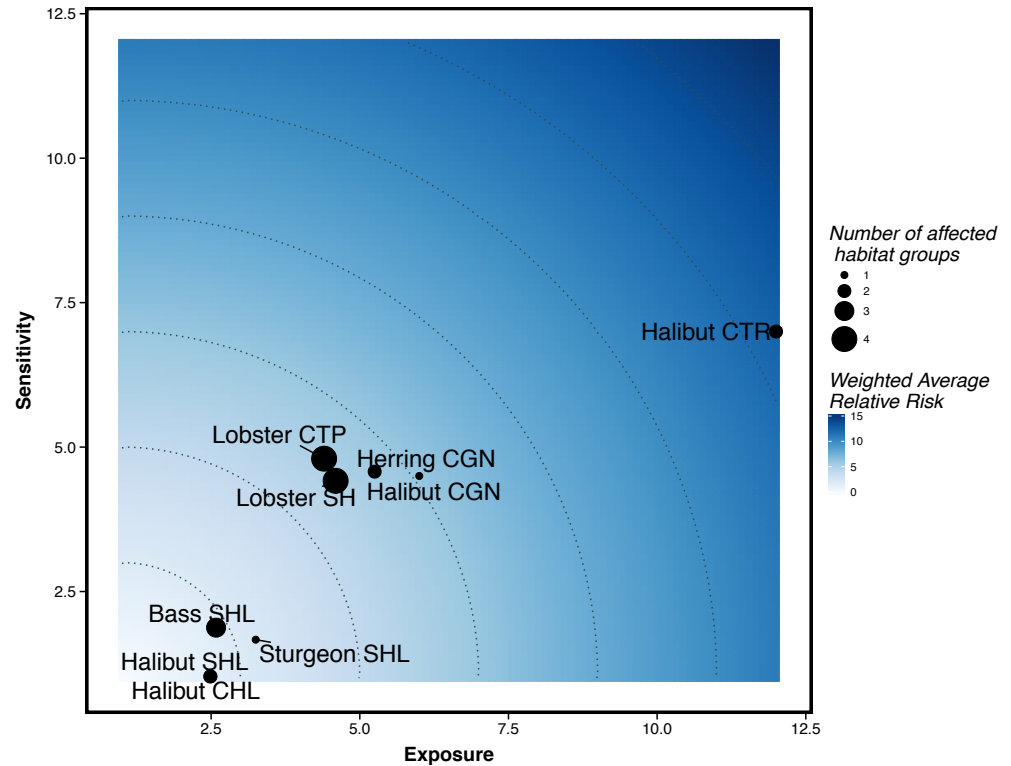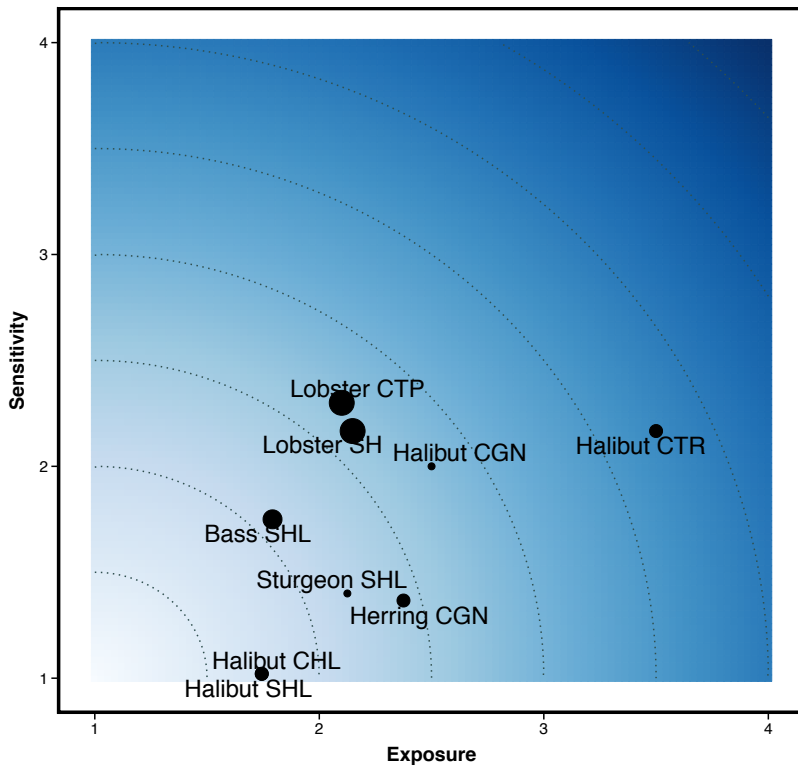- Highlighting the number of habitat groups that each fishery interacts with

Relative Risk to Habitat Among Target Fisheries
Weighted Attributes, Gear Footprint → Exposure
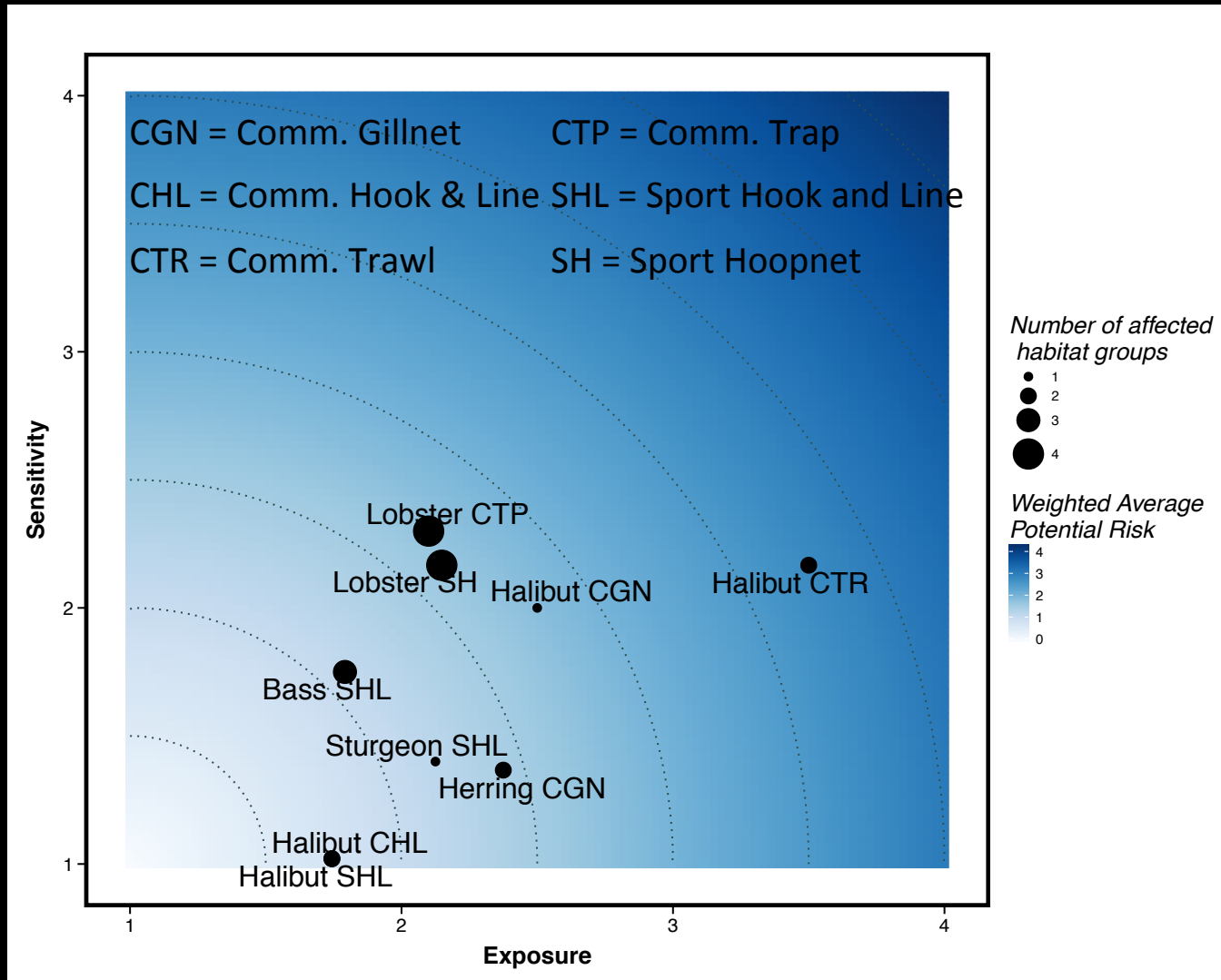
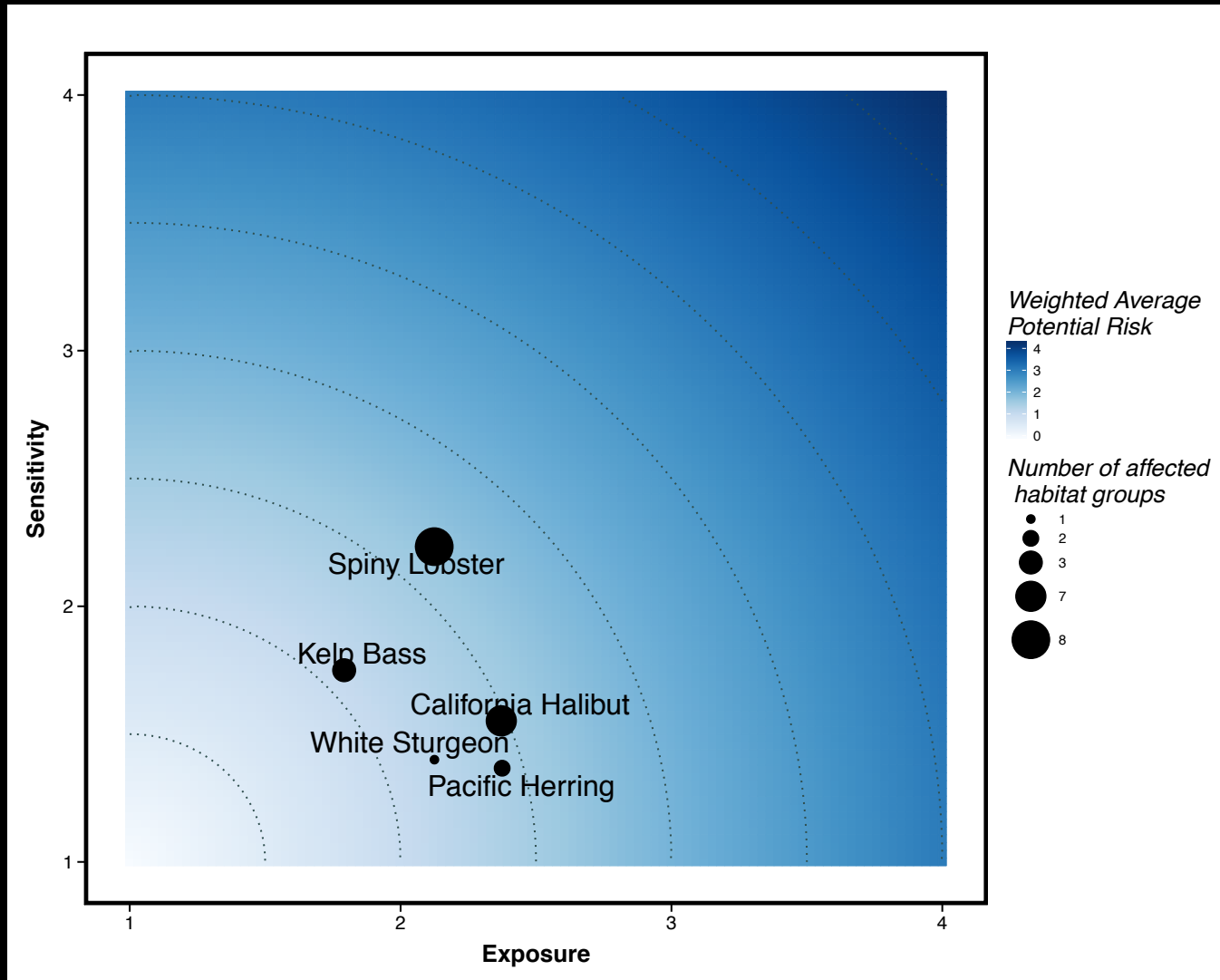# Comparison of methods for evaluating risk to habitats

**Weighted, gear footprint →
exposure**

Unweighted, gear multiplier

Relative Risk to Habitat Among Target Fisheries
## Weighted Attributes, Gear Footprint → Exposure

California Halibut and Spiny Lobster may pose greatest risk to Habitats

Why is habitat risk high for these groups?

California halibut trawl and gillnet → highly influential gear footprint and damage attributes
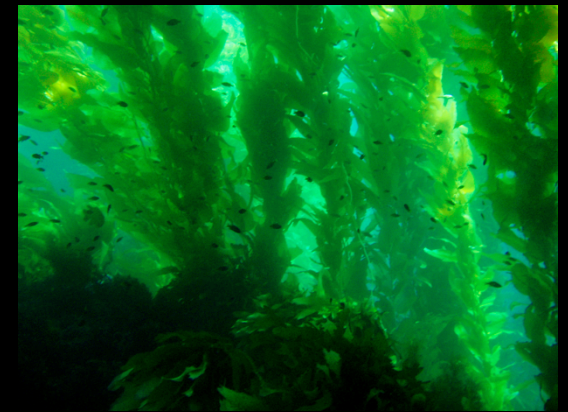
Spiny lobster→ Inverts, Hard and soft bottom nearshore, Vegetation

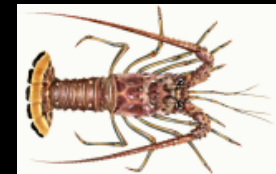Pacific herring? Highly influential gear multiplier
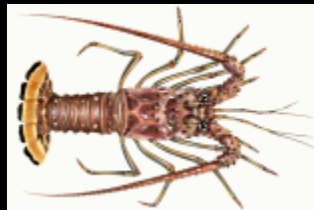
Preliminary Conclusions

- Target – greatest for white sturgeon, least for Pacific herring.

- Bycatch – greatest for white sturgeon and Pacific halibut commercial gillnet.

- Habitat – greatest for California halibut and spiny lobster.

The project is ongoing and will incorporate input from today's workshop

The End...for now