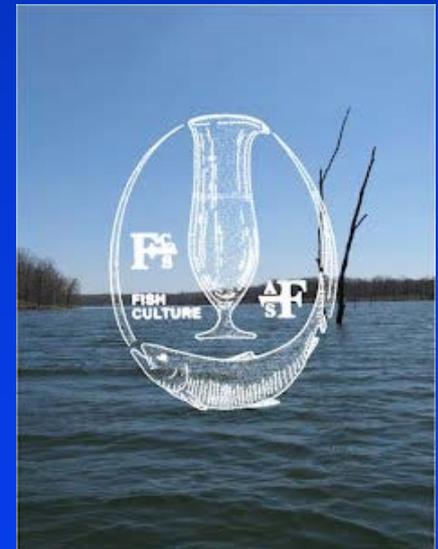


Hatcheries and Management of Aquatic Resources (HaMAR)

□ Tom Flagg¹, Jesse Trusenski²,
Jim Bowker³

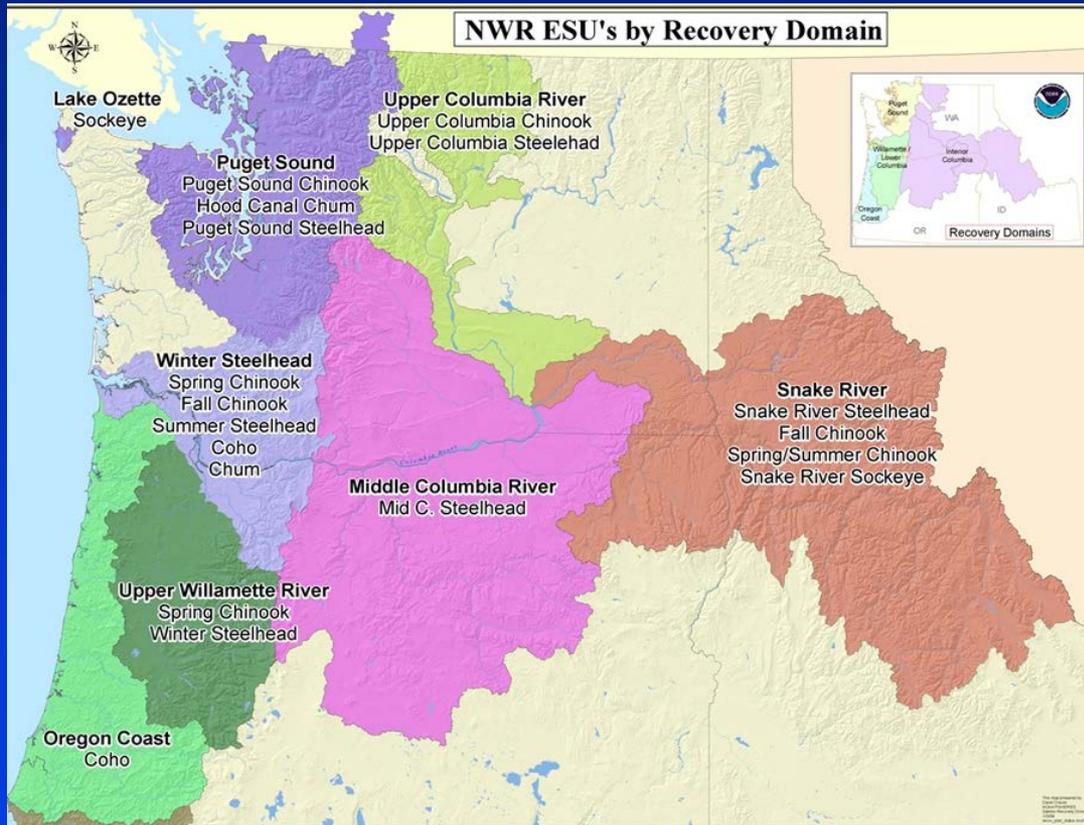
- ¹NOAA Fisheries
- ²Southern Illinois University Carbondale
- ³USFWS



Information Presented

- **Why we care about the Hatchery Question**
- **Describe AFS groundwork**
- **Describe current status of Hatchery Issues in the NW**
- **Beg for NWFCC support for HaMAR**

ESA Listed Salmon in PNW



- 19 populations of listed salmonids in NWR.

- Covering over 50% of land mass of three states (WA, OR, ID).

www.nwr.noaa.gov/Salmon-Recovery-Planning

Species & Number of Hatchery Salmon Released in the PNW

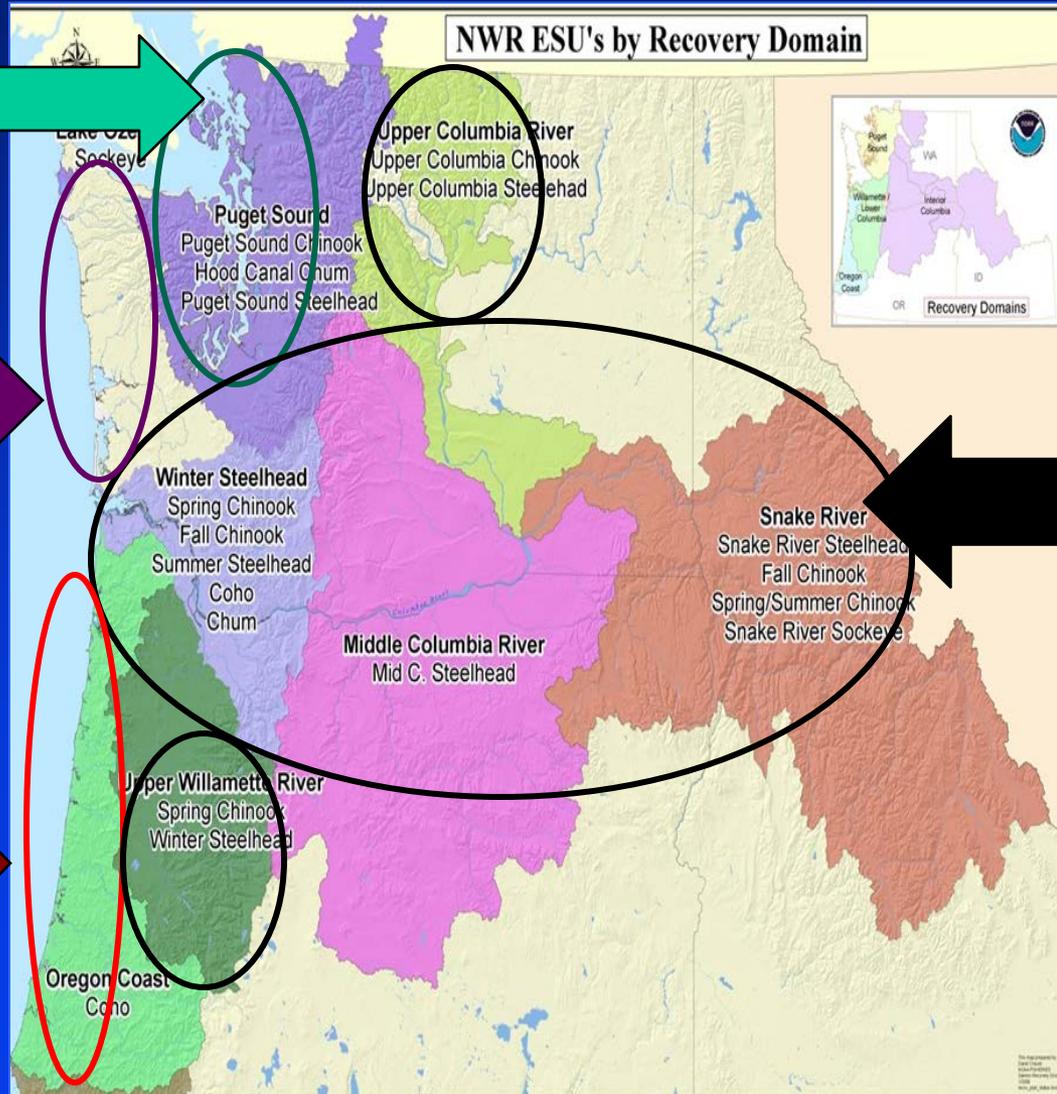
- Pink – 0
 - Chum – 50M
 - Sockeye – 28M
 - Coho – 41M
 - Chinook – 181M
 - Steelhead – 20M
- Over 500 individual hatchery programs in the region.
 - Contribute 70-80% of fish in coastal salmon and steelhead fisheries

Hatchery Salmon Released in PNW

US Salish
Sea ≡
145M

WA
Coastal
≡ 30M

OR
Coastal
≡ 10M

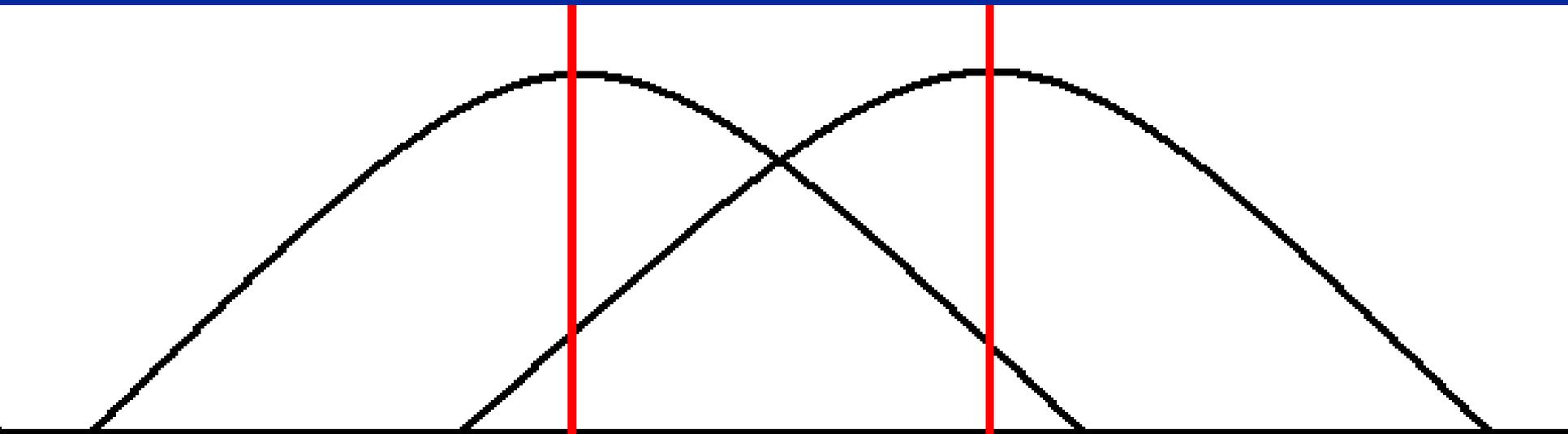


Columbia
River
Basin =
140M

Fitness optima in two environments

Hatchery
optimum

Natural
optimum



Trait phenotypic values



Theoretical Hatchery Fish Effects

- **Loss of distinct population**
- **Altered life history patterns**
- **Use of non-indigenous stocks**
- **Changes in:**
 - Behavior
 - Competition
 - Predation
- **Swamping by massive hatchery releases**
- **Hatchery driven high harvest rates**

AFS Symposia Series (1980s-2000s)

- Roles of Fish Culture in Fisheries Management [Lake of the Ozarks, 1983]
- Uses and Effects of Cultured Fishes in Aquatic Ecosystems [Albuquerque, 1993]
- Propagated Fish in Resource Management [Boise, 2003]
- Hatcheries and Management of Aquatic Resources (HaMAR) [Nashville/Little Rock, 2013]

AFS Symposia Series (1980s-2000s)

- Much discussion about genetic, ecological, and demographic impacts and their mitigation
- Largely focused on whether stocking hatchery-origin fish was appropriate and whether the risks outweighed the benefits.

AFS Symposia Series (1980s-2000s)

- Initial purpose - linking fish culture (i.e. hatchery programs) with fisheries management (i.e. harvest and conservation benefits)
- While acknowledging that hatchery programs could provide benefits,
- there was considerable concern that they may also cause some harm

Hatcheries – Good, Bad, or Ugly

(1980s-2000s)

- 100s-1000s articles written on hatchery effects
 - Much negative hatchery bashing
 - But also good science pointing out that the old ways of hatchery operations were often counterproductive to fitness and ecosystem needs
- By early 2000s, saw push towards conservation and sustainability ethic

Hatchery Scientific Review



- **HSRG** - Congressionally established (1999): Puget Sound & coastal Washington & all Columbia River (WA, OR, ID)
- **HRT** - USFWS Team (2005): Service Hatcheries in the Columbia River



HSRG/HRT Hatchery Actions

- *Hatchery Operations Standards*
 - SOPs/BMPs
 - Fish marking
 - Weirs/collections
- *Broodstock Management*
 - *Segregate: harvest* ($pHOS < 5\%$)
 - *Integrate: conservation* ($pNOB > pHOS$)
- *All include some Protection for Wild Fish*

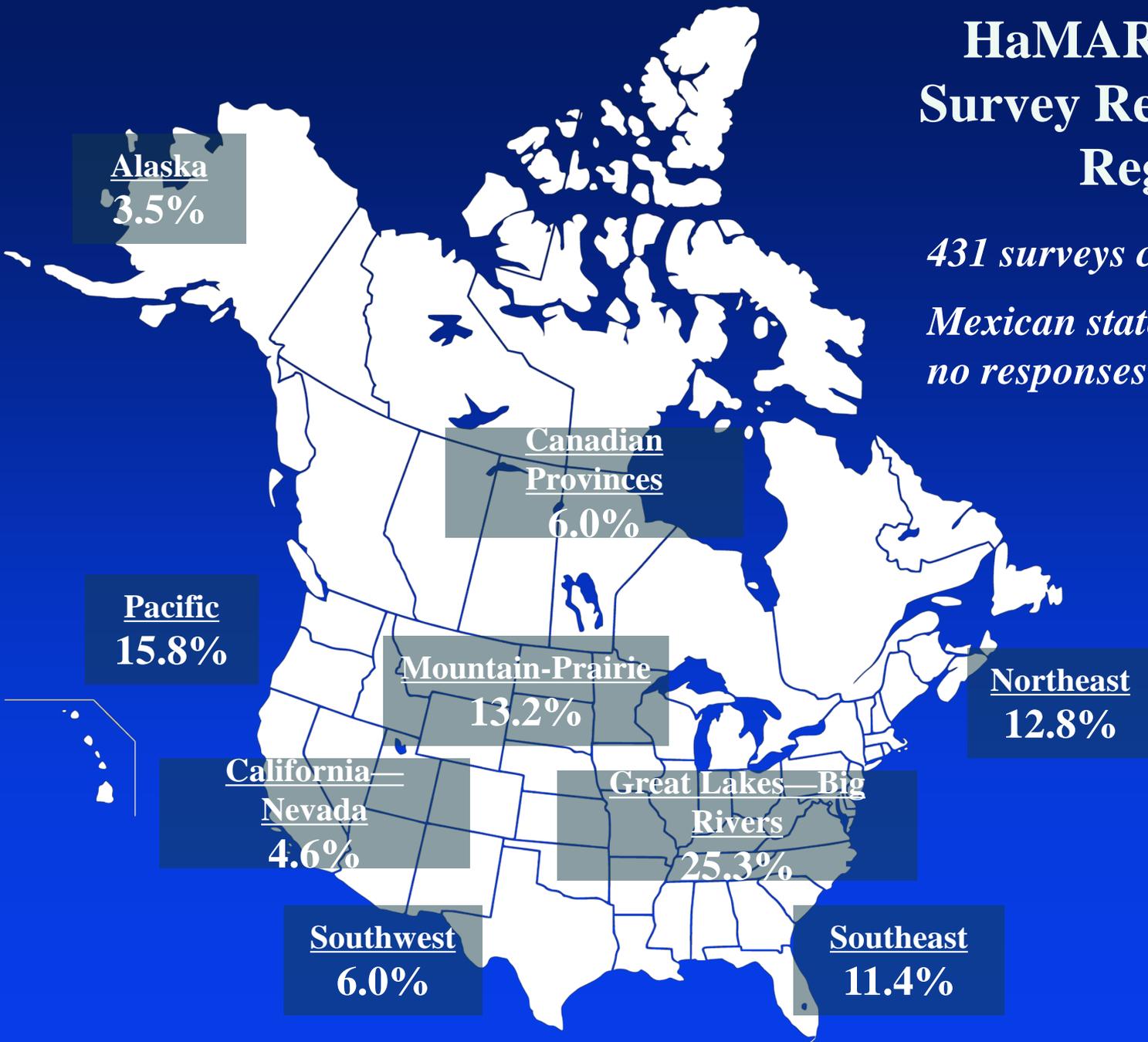
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- **Hatcheries and Management of Aquatic Resources (HaMAR) [Nashville/Little Rock, 2013]**

HaMAR Scoping Survey Responses by Region

431 surveys completed

*Mexican states targeted, but
no responses received*



Alaska
3.5%

Canadian
Provinces
6.0%

Pacific
15.8%

Mountain-Prairie
13.2%

Northeast
12.8%

California-
Nevada
4.6%

Great Lakes-
Big
Rivers
25.3%

Southwest
6.0%

Southeast
11.4%

Other
1.4%

Top Ten Topics Identified by Survey

Nearly 40 topics ranked from 0 (not important) to 5 (extremely important)

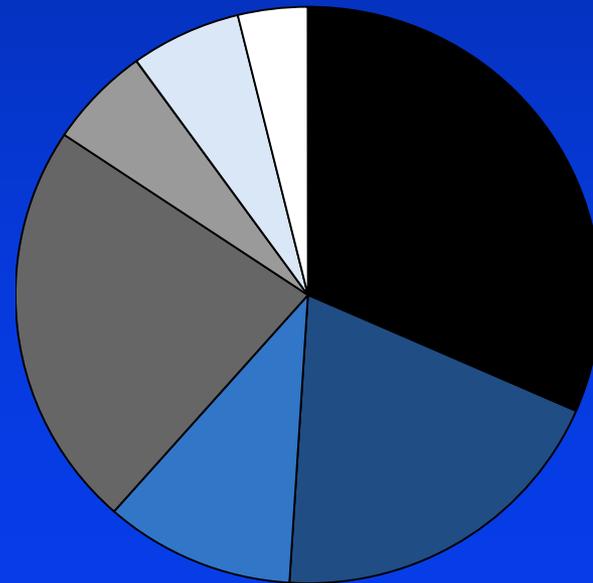
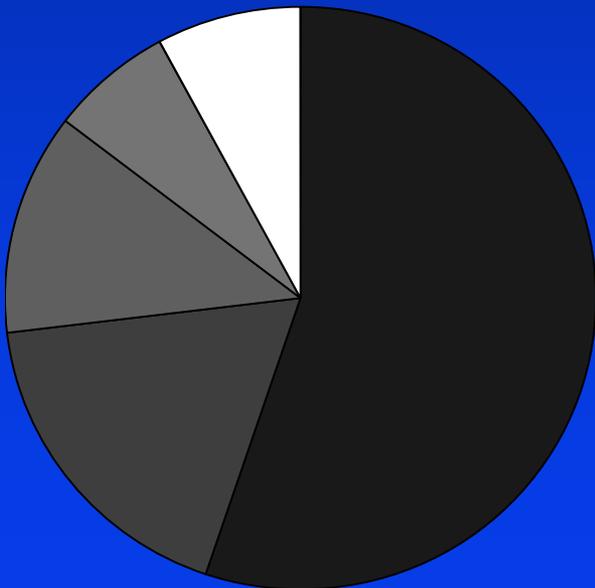
Topic	Rank
1. Habitat restoration and management efforts as companions to stocking	4.2
2. Monitoring and adaptive management of stocking programs	4.1
3. Development of propagation techniques that results in genetically appropriate, healthy hatchery-origin fish	4.1
4. Fish health and access to disease management tools	4
5. Understanding the limitations of hatchery-origin fish and stocking programs	4
6. Biological interactions between wild and hatchery fish	3.9
7. Defining appropriate uses for hatchery-origin fish, defining expectations and understanding the limitations of hatchery-origin fish and stocking programs	3.9
8. Culture of imperiled species and conservation hatcheries	3.8
9. Risk assessment and decision-making	3.8
10. Genetic integrity of hatchery-origin fish	3.7

HaMAR Scoping Survey Responses by Employer & Discipline

Majority of responses come from state/provincial agency employees focused on fisheries management and fish culture

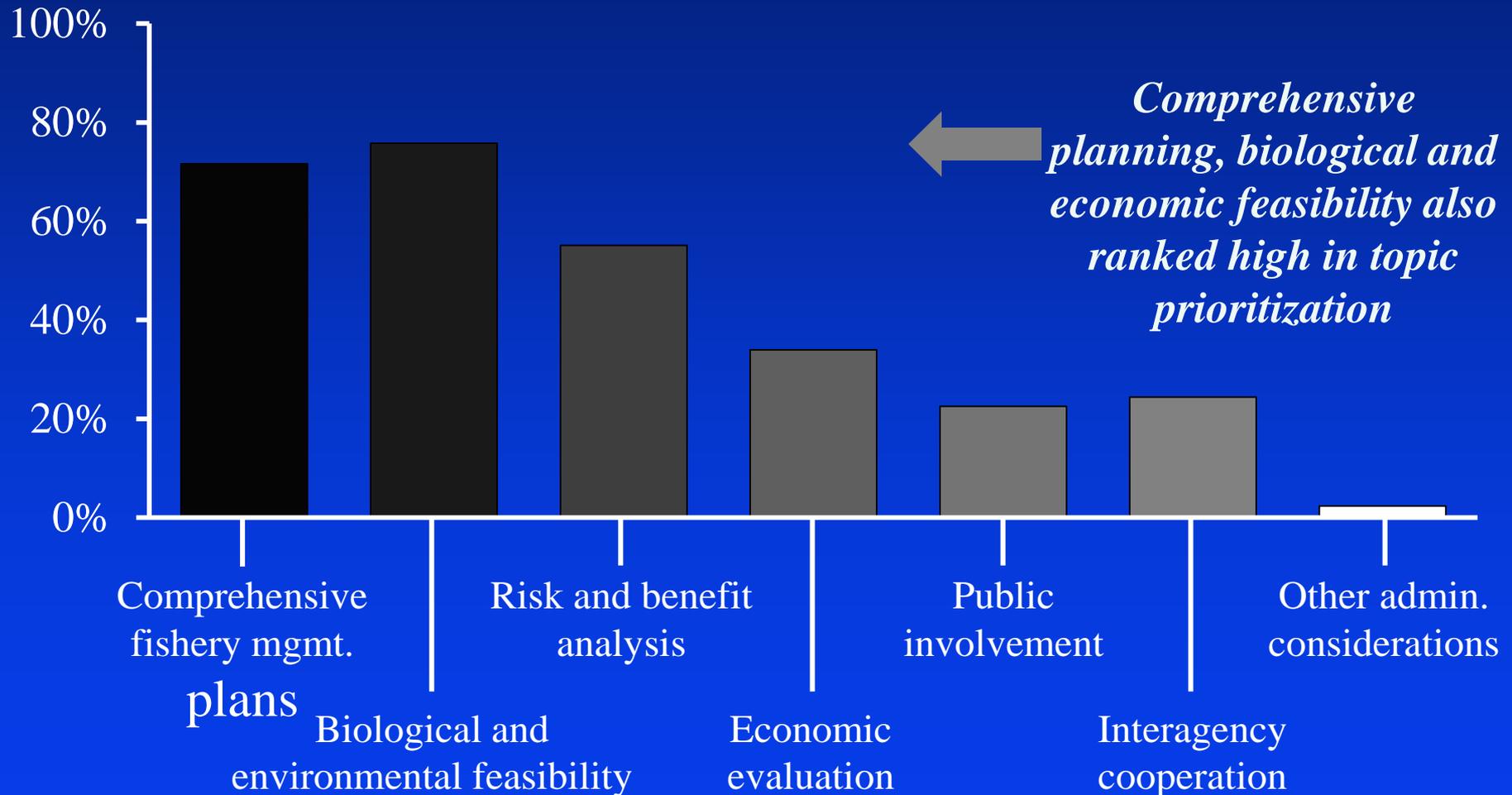
- State or provincial agency
- Federal agency
- Academia
- Private sector
- Other

- Fisheries management
- Fish culture/hatchery operation
- Natural resources/fisheries administration
- Research
- Academia
- Education and outreach
- Other



Elements of Decision-making Maintained, but Priorities Have Changed Since PFIRM Cycle

Small percentage of respondents indicated administrative Issues were critically important when deciding whether to use hatchery-origin organisms



AFS HaMAR meeting

- HaMAR - focus now will be less on “*Is the release of cultured fish beneficial?*”
- and more on:
 - “*What kinds of cultured fish are the best kinds to release*”
 - and “*How to reform hatchery management and operation to address both sustainable fisheries and conservation objectives*”.

AFS HaMAR meeting

- Today, to us - it's clear that hatcheries aren't going anywhere
- and hatchery-origin fish are going to continue to be a part of fisheries management activities



Hatcheries and Management of Aquatic Resources (HaMAR) outcomes

- **AFS Guidance document:** series of guidelines/recommendations for the production and use of hatchery-origin fish.
- **Address two important elements of AFS strategic plan:**
 - Global Fisheries Leadership
 - Value of Membership