Economic Analysis of a Columbia River Fish Hatchery Program

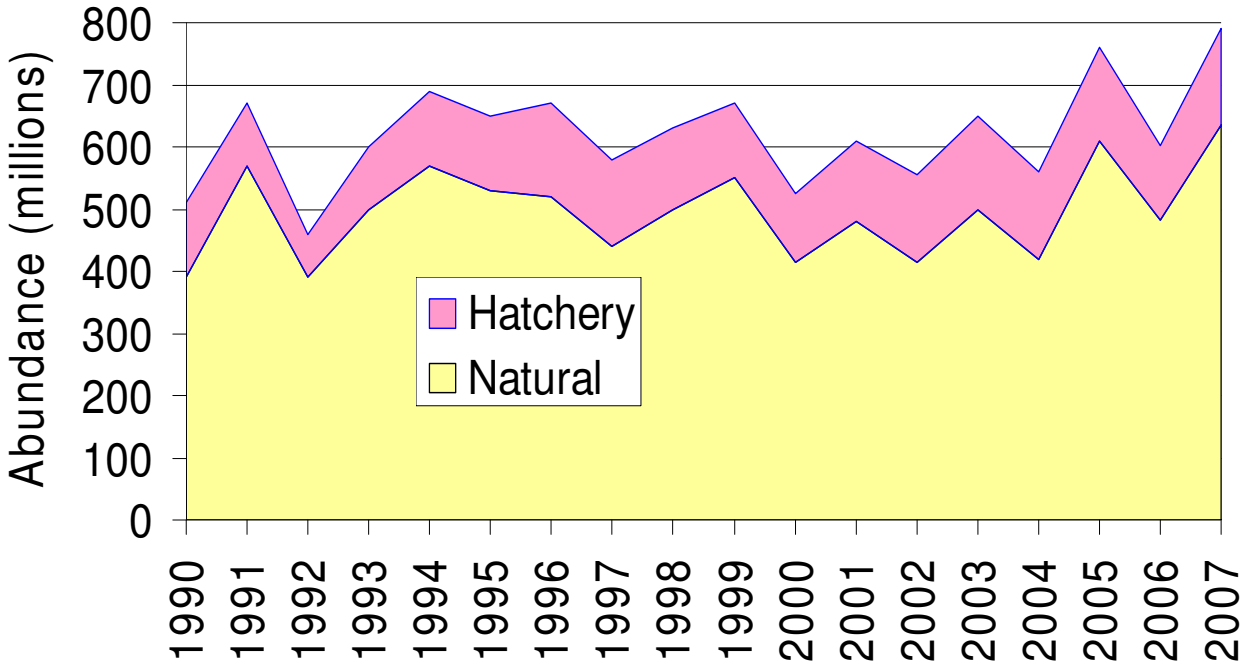
Christopher N. Carter, Ph.D.
Natural Resource Economist

Hans D. Radtke, Ph.D.
Natural Resource Economist

Presentation

- Economic analyses of Col R. hatcheries done before - beginning in the late 60s and early 70s
- Use example of Col R. Mitchell Act (MA) funded hatcheries to examine some economic issues associated with large scale hatchery fish production
- Describe economic measures and show estimates prepared using recent information on MA hatcheries
- A similar paper on this subject is available on the Native Fish Society website. A later version has been submitted to an AFS journal
- A background paper on the economics of North Pacific salmon fisheries is available at the Wild Salmon Center website

Salmon Natural and Hatchery Abundance Trends in the North Pacific - 1990 to 2007

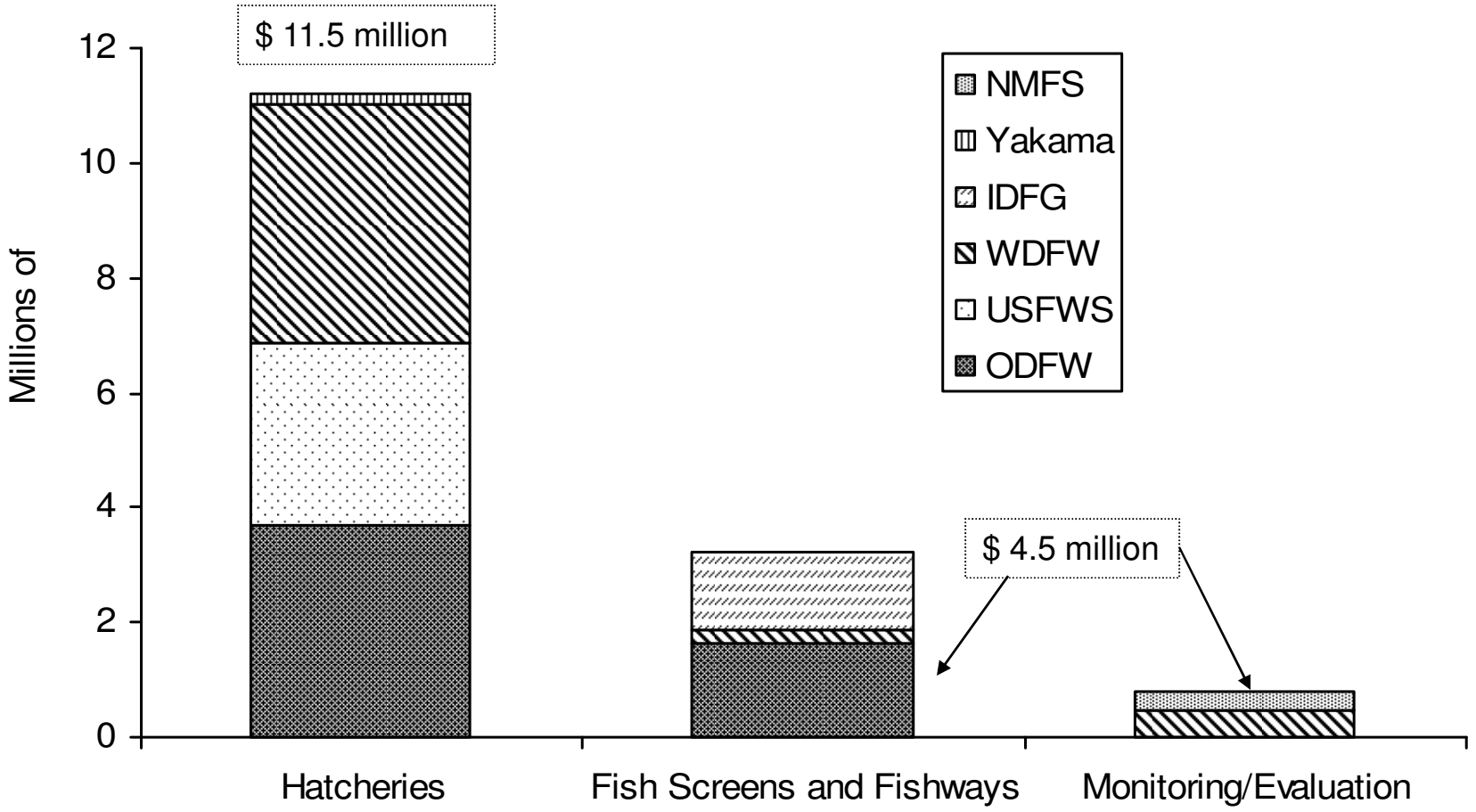


1. Abundance is expressed in adult fish counts for harvest plus freshwater escapement.
2. Major harvesting nations are the U.S., Russia, Japan and to a lesser extent Canada and ROK

Columbia River Focus

- In contrast to the whole North Pacific, Columbia River Basin stocks' harvest contributions are about 3/4th hatchery origin
- Concerns about effects of large scale hatchery production on ESA listed stock populations expressed in literature, state & federal reviews and recovery planning
- Recommendations on modifications to methods for operating parts of CoI R hatchery programs are under active consideration
- Revisit issues that economic analysis of hatcheries in the Columbia River may suggest.

Federal Funding for MA Activities in 2005

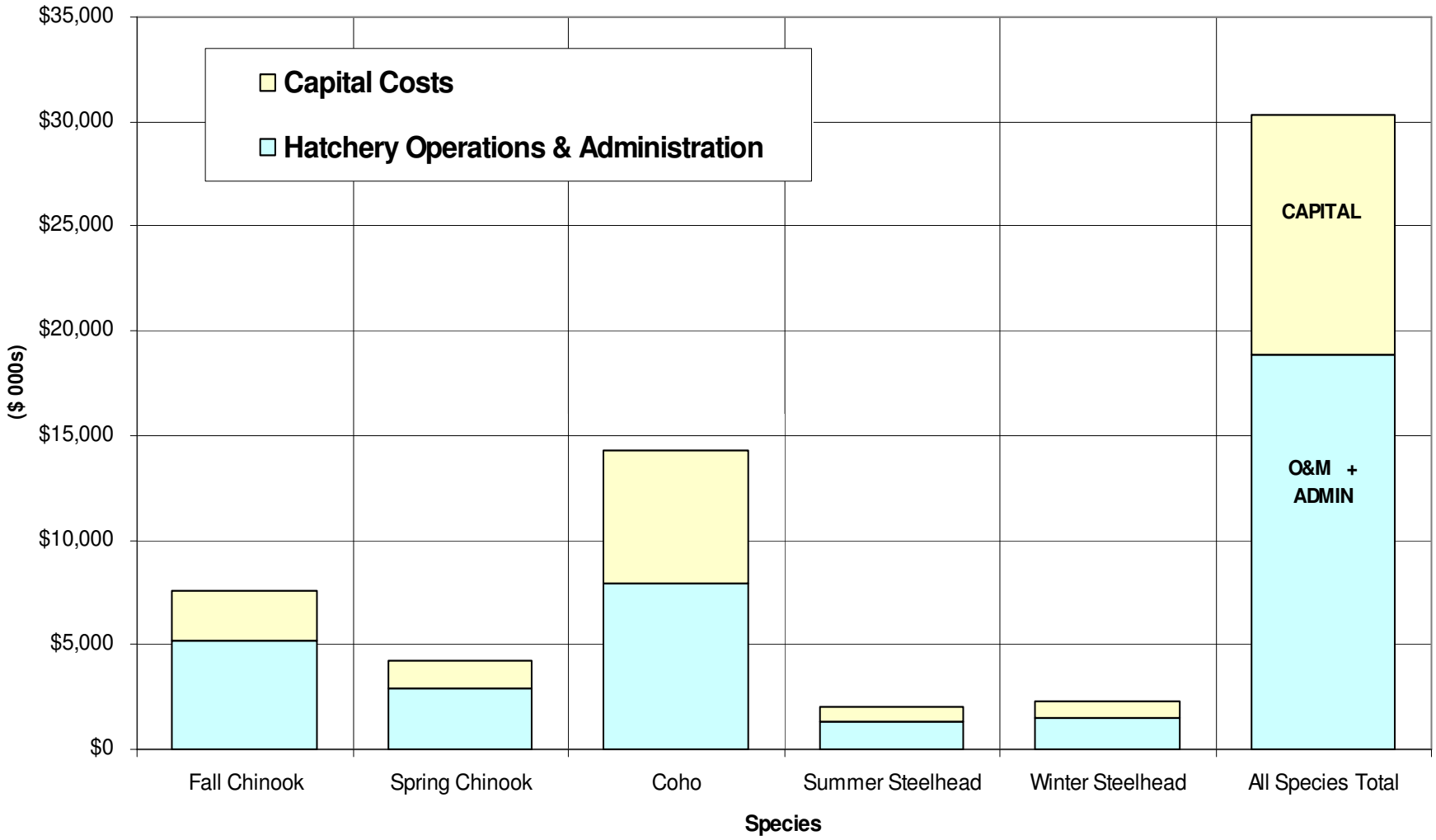


Source: IDFG et al. (2005).

Hatchery Costs

- Specific example presented for MA hatchery costs
- Good cost info now available
- Cost components:
  - Operations & Maintenance (O&M) of hatcheries
  - Administrative/management costs
  - Capital costs - such as construction costs

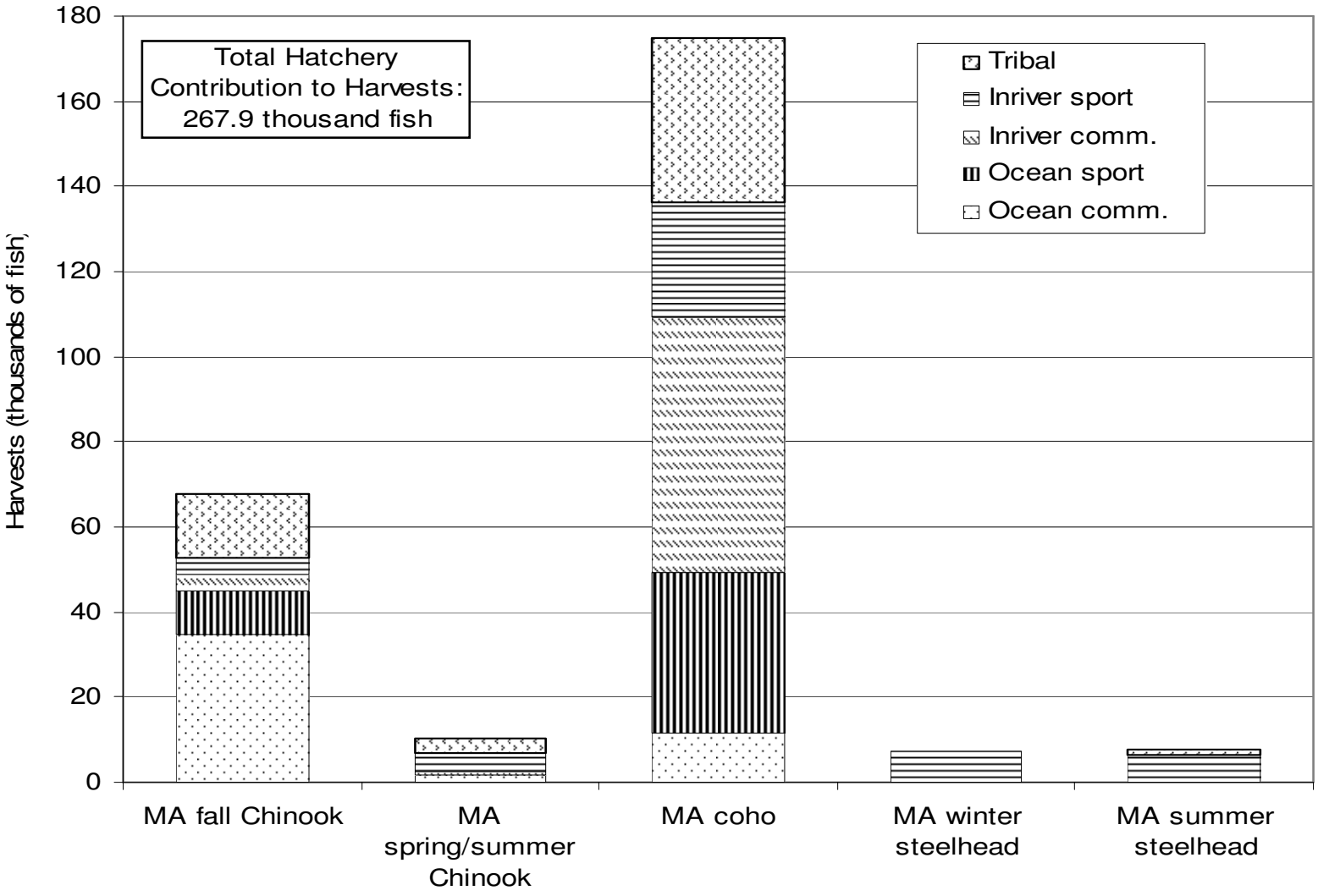
Annual Fish Production Costs (x $000) at MA Hatcheries



Hatchery Production & Fisheries Contributions

- Smolts hatchery produced and released to migrate downriver
- Smolt to adult survival rates (SAR) influenced by
  - River flow regime and hydro system management
  - Predators and other passage problems
  - Ocean conditions affecting survival
- Harvest contributions
  - Migration patterns
  - Fisheries management regimes & regulations

Harvests of MA Funded Hatchery Production by Species and Fishery



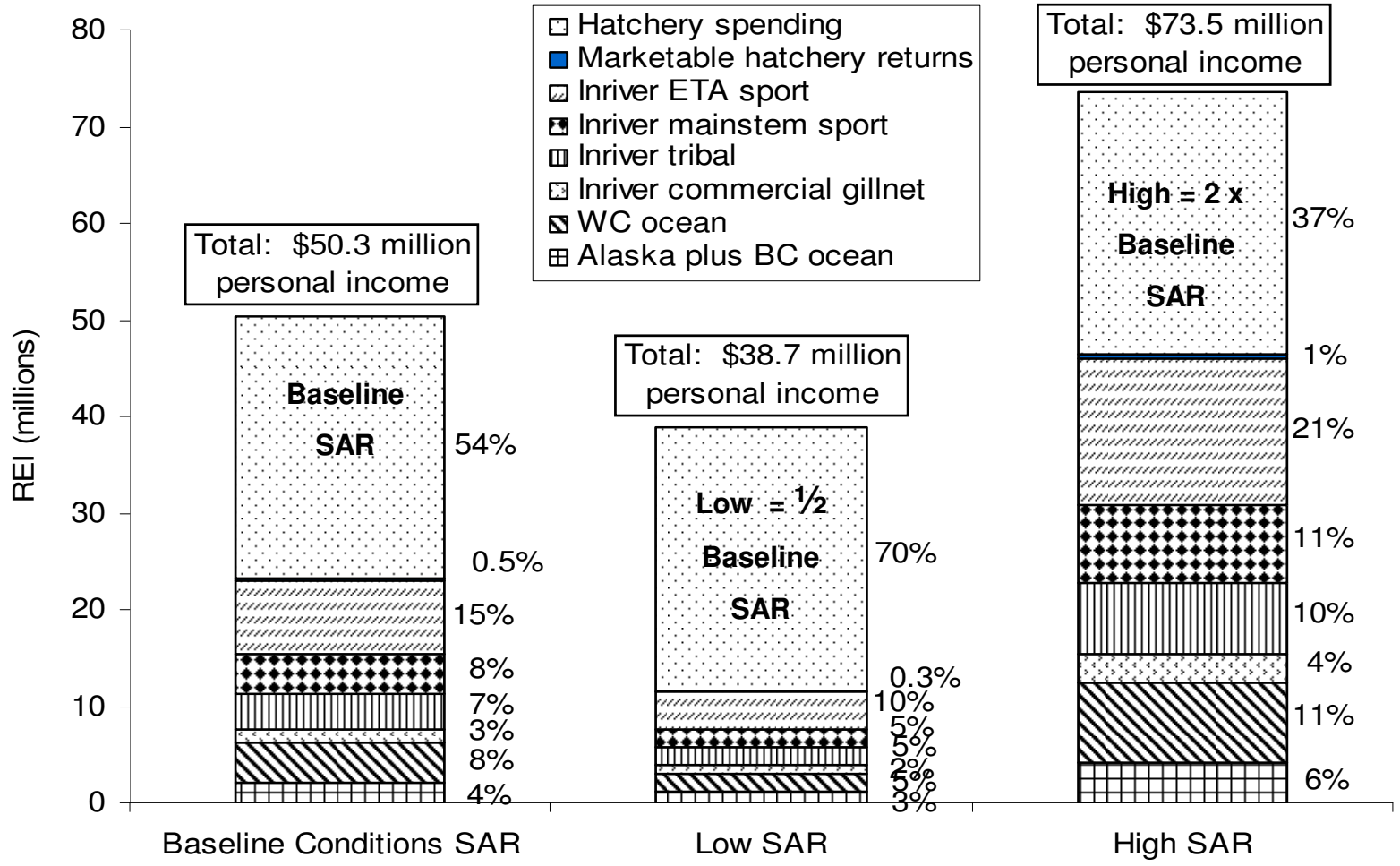
Annual Financial Flows Associated With Smolt Production and Adult Harvest

- Expenditures on hatchery operations and administration
- Harvest - Fisheries-related financial flows
  - Recreational angler expenditures
  - Commercial ex-vessel values
  - Value added at processing level
- Regional Economic Impacts (REI) in harvest regions' economies
  - Input – Output models and economic models of industries
  - Estimate Personal Income (direct, indirect & induced) Impacts
  - Translates to # FTE Jobs

Regional Economic Impacts (REI)

- **Regional Economic Impact estimates from study**
  - Depend on program costs and fisheries contributions
  - Harvests depend on smolt survival to harvestable adult (SARs)
  - $50 million annually in income using Baseline SAR estimates
  - 46 % from fisheries vs. 54 % from hatchery operations + admin
- **At SAR that is Double x baseline**
  - $74 million annually in total personal income
  - 63 % from fisheries vs. 37 % from hatchery operations + admin
- **At SAR that is Half x Baseline**
  - $39 million annually in total personal income
  - 30 % from fisheries vs. 70 % from hatchery operations + admin

REI From Hatchery Spending, Fisheries, & Hatchery Returns for Baseline Conditions and Two SAR Scenarios



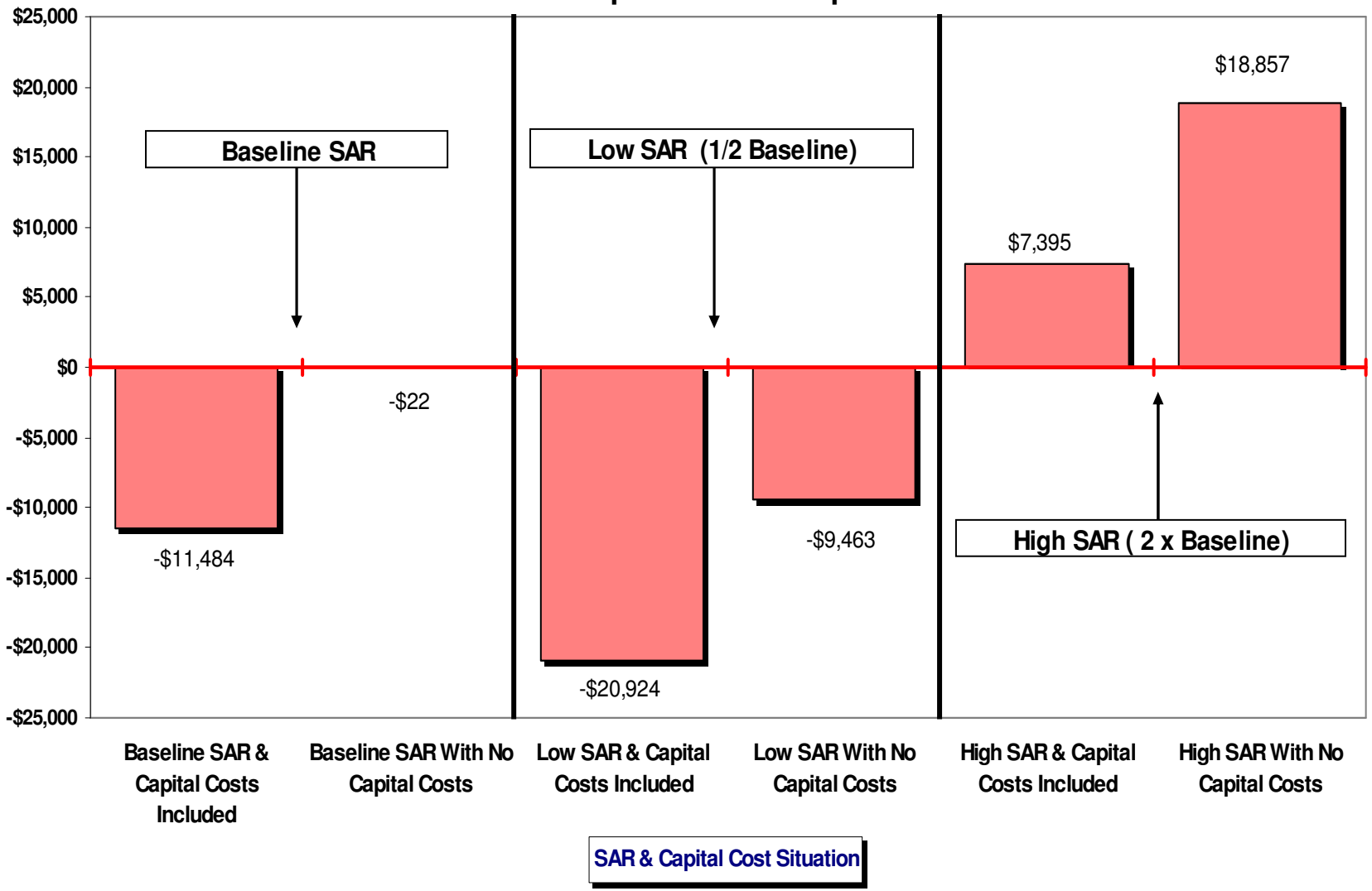
Economic Values & Benefit - Cost Analysis

- Appropriate for Non-Treaty areas and fisheries only
- Benefits and costs accounted for at national level
- Looks at the benefits compared to what it costs to get those benefits (What do we get for what we give up?)
- Recreational fishing benefits based on net willingness to pay (WTP)
- Commercial industry benefits based on harvest values – harvest costs
- Overall Benefits minus Costs are positive when the recreational and commercial net benefits ("NEVs") exceed the costs to society of producing those benefits

- **Note: Effects of hatchery fish on naturally produced fish are ignored in this analysis!**

All Species Total Net Benefits at Different SARs

For Both Capital Cost Assumptions



Conclusions, Issues and Questions - 1

- If funded from outside the region, REI from hatchery costs and fisheries activity have positive economic impacts (income & jobs) at any SAR, but REI increases as SAR increases.
- In Benefit – Cost analysis: Net benefits depend importantly on: (1) SARs and (2) how we account for hatchery productions costs
  - Net benefits from fishing tend to increase as SARs increase
  - Costs appear lower if we ignore fixed costs - construction costs
- If hatchery fish adversely affect naturally produced fish, there is an external effect from hatchery production that tends to reduce B – C
  - If measureable, reflect it in benefit – cost analysis
  - May ultimately affect “existence values” (ESA)
  - Over time increasing natural production through modification or reduction in hatchery production could make sense

Conclusions, Issues and Questions - 2

- Can we determine what the effects of hatchery production are on naturally produced fish in the short term and over time?
- Does it matter if MA program purpose is mitigation or fisheries enhancement?
- Can fisheries scientists improve estimates of SARs?
- Is it possible to alter production schedules to reduce costs during poor ocean condition years, but increase releases in good years?
- Should we allocate more funds to habitat improvement work to benefit naturally produced fish and less to hatchery production?
- How will fisheries and the associated economies be affected if we try to transition to a situation where natural production is enhanced and hatchery production deemphasized or modified significantly?
- This study suggests such a transition may make good economic sense