

**Appendix D10: To Market, To (Hypothetical) Market:  
Protected Species Valuation Research at NMFS**



## To market, to (hypothetical) market: Protected Species Valuation Research at NMFS

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## An overview of NMFS-sponsored protected species non-market studies

Species	Date fielded	Scale	Initiating region
Cook Inlet beluga whale	2013	Alaska households	Alaska (AFSC)
Klamath river species: coho salmon wild chinook salmon & steelhead trout shortnose & Lost River suckers	2011	National, with oversampling in Klamath river area and oversampling in the rest of Oregon and California	Southwest (SWFSC)
Multi-species (16)	2010 Phase 1 2011 Phase 2	National	HQ
Steller sea lion	2007	Two samples: (1) Non-Alaska U.S. households (2) Alaska households	Alaska (AFSC)
North Atlantic right whale	Instrument developed; not yet fielded	National	Northeast (NEFSC)

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## An overview of NMFS-sponsored protected species non-market studies

Species	Date fielded	Method	Mode
Cook Inlet beluga whale	2013	Stated Preference Choice Experiment	Mail
Klamath river species: coho salmon wild chinook salmon & steelhead trout shortnose & Lost River suckers	2011		Mail with option to take online
Multi-species (16)	2010 Phase 1 2011 Phase 2		Online using a standing RDD-recruited web panel
Steller sea lion	2007		Mail
North Atlantic right whale	Instrument developed; not yet fielded		Mail

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## Stated Preference/Valuation Issues to Examine

- Scope sensitivity
- Warm-glow
- Hypothetical bias
- Heterogeneity in WTP
- Questionnaire design
- Information effects
- Anchoring effect (prices)



Survey-specific Theoretical and/or Methodological Issues

**Cook Inlet beluga whale**

- Value reductions in extinction risk
- Value ESA status improvements
- Examine differences in WTP between rural and urban households



**Steller sea lion**

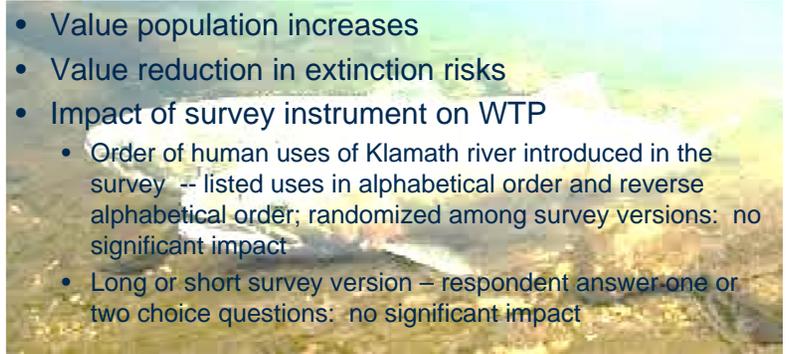
- Value population increases
- Value ESA status improvements
- Examine the role of supply uncertainty and found sensitivity to the baseline population trajectories (increasing, stable, decreasing)
- Lew, Layton, & Rowe 2007



Survey-specific Theoretical and/or Methodological Issues

**Klamath river fish species**

- Value population increases
- Value reduction in extinction risks
- Impact of survey instrument on WTP
  - Order of human uses of Klamath river introduced in the survey -- listed uses in alphabetical order and reverse alphabetical order; randomized among survey versions: no significant impact
  - Long or short survey version – respondent answer one or two choice questions: no significant impact



Survey-specific Theoretical and/or Methodological Issues

**Multi-species Valuation Survey**

- Value ESA status improvements
- Scope test: WTP sensitive to scope (Lew & Wallmo 2011)
- Preference ordering of species: WTP statistically different among some species (Wallmo and Lew 2012)
- Temporal stability of preferences: preferences appear to be stable (~ 14 months)
- Effect of different cost vectors: analysis ongoing
- Species ordering effects: analysis ongoing
- Geographic variation in WTP: analysis ongoing



**SEA TURTLE VALUES**

Species	Mean WTP* to Improve to Threatened	Mean WTP * to Recover
Hawksbill sea turtle	\$51.17 (47.04-55.29)	\$85.95 (81.27-90.20)
Leatherback sea turtle	\$36.04 (33.13-38.84)	\$64.53 (60.64-68.49)
Loggerhead sea turtle	NA	\$41.52 (39.05-44.08)





## MARINE MAMMAL VALUES

Species	Mean WTP* to Improve to Threatened	Mean WTP * to Recover
Southern Resident Killer whale	\$48.30 (44.38-52.41)	\$84.38 (79.15-89.69)
North Pacific right whale	\$39.61 (36.36-42.95)	\$69.46 (65.07-73.85)
North Atlantic right whale	\$36.83 (33.65-40.13)	\$68.00 (63.96-71.88)
Humpback whale	NA	\$60.98 (57.47-64.52)
Hawaiian monk seal	\$34.43 (31.55-37.68)	\$62.96 (59.29-66.81)



## FISH VALUES

Species	Mean WTP* to Improve to Threatened	Mean WTP * to Recover
Southern California steelhead	\$45.71 (41.76-49.83)	\$71.06 (66.29-75.96)
CCC coho salmon	NA	\$51.96 (47.59-54.67)
Smalltooth sawfish	\$30.81 (26.70-35.08)	\$49.28 (44.40-54.47)
Upper Willamette River Chinook Salmon	NA	\$38.59 (36.07-41.01)
Puget Sound Chinook Salmon	NA	\$38.44 (35.99-40.70)



## INVERTEBRATES, PLANTS & CORAL VALUES

Species	Mean WTP* to Improve to Threatened	Mean WTP * to Recover
Black abalone	\$39.56 (35.62-43.59)	\$70.50 (66.19-74.58)
Johnson's seagrass	NA	\$43.83 (40.67-46.87)
Elkhorn coral	\$38.00 (33.93-42.15)	\$71.78 (67.30-76.23)



## Welfare Estimates from other NMFS studies

Species	Type of Improvement	WTP
Klamath species		
Wild chinook and steelhead	150% increase in fish returning to river	\$10.59
Shortnose and Lost River suckers	Reduce extinction rate to moderate	\$17.37
Coho salmon	Reduce extinction rate to low	\$48.21
Cook Inlet beluga whale	Reduce extinction rate to zero (urban or rural households)	\$109.97 \$113.23
Steller sea lion	Increase the western stock population to a recovered status (varying assumptions about population of eastern stock)	\$83.80 \$111.53



## Issues from the Multi-species Study

- 3 species per respondent, respondents asked to assume all other threatened/endangered species remain at current status
- Variation in types of species (desirable) limited the types of improvements we could use in choice experiment – only ESA status improvements were plausible

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## Issues from the Multi-species Study

From focus groups:

- some respondents focus on doing something for all species vs more (or less) for preferred (less preferred) species
- respondents want to know what are the ecosystem impacts of a species decreasing or going extinct

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## Challenges and Future Work

- OMB & conducting non-market valuation (particularly for non-use)
  - Sample and implementation issues
  - Using non-market results
- Second “Blue Ribbon Panel” (last one was 1993, focused on contingent valuation)

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## Challenges and Future Work

- Climate impacts/protected species values
- Ecosystem level valuations vs. species level
- Uncertainty
- Validity
- Aggregation approaches
- Improve fit for policy needs
- Special issue *Frontiers in Marine Science: The Economics of Protected Marine Species: Concepts in Research and Management*
  - <http://journal.frontiersin.org/ResearchTopic/3306#overview>
  - Wide range of topics
  - Call for abstracts upcoming

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## Citations Slide

- Mansfield, C., Van Houtven, G., Hendershott, A., Chen, P., Porter, J., Nourani, V., & Kilambi, V. 2012. Klamath River Basin restoration: Nonuse value survey. Final report: Prepared for the U.S. Bureau of Reclamation. Research Triangle Park, NC: RTI International. <http://www.rti.org/publications/abstract.cfm?pubid=19774>
- Wallmo, K., and Lew, D. 2012. The value of recovering threatened and endangered marine species: a choice experiment approach. *Conservation Biology*, 26(5): 830-39.
- Lew, D., and Wallmo, K. 2011. External tests of scope and embedding in stated preference choice experiments: an application to endangered species valuation. *Environmental and Resource Economics*, 48(1): 1 – 23.
- Lew, D., Layton, D., Rowe, R., 2010. Valuing Enhancements to Endangered Species Protection under Alternative Baseline Futures: The Case of the Steller Sea Lion. *Marine Resource Economics*, 25: 133 – 154.



## Welfare Estimates

Common Group	Species	Mean WTP to Recover
Whales	North Atlantic right whale	\$68.00 (63.96-71.88)
	North Pacific right whale	\$69.46 (65.07-73.85)
	Humpback whale	\$60.98 (57.47-64.52)
	Southern resident killer whale	\$84.38 (79.15-89.69)
Marine sea turtles	Loggerhead sea turtle	\$41.52 (39.05-44.08)
	Leatherback sea turtle	\$64.53 (60.64-68.49)
	Hawksbill sea turtle	\$85.95 (81.27-90.20)
Corals	Elkhorn coral	\$71.78 (67.30-76.23)



## Welfare Estimates

Common Group	Species	Mean WTP to Recover
Fish	Upper Willamette River Chinook Salmon	\$38.59 (36.07-41.01)
	Puget Sound Chinook Salmon	\$38.44 (35.99-40.70)
	Smalltooth sawfish	\$49.28 (44.40-54.47)
	Central California Coast Chinook salmon	\$51.96 (47.59-54.67)
	Southern California steelhead	\$71.06 (66.29-75.96)
Invertebrates	Black abalone	\$70.50 (66.19-74.58)
Plants	Johnsons seagrass	\$43.83 (40.67-46.87)
Seals/sea otters	Hawaiian monk seal	\$62.96 (59.29-66.81)



## Non-market Values for Threatened and Endangered species

### What's been done?

- Estimates for over 40 T&E species exist in literature, from bald eagles to striped shiners
- NMFS species: Atlantic and Pacific salmon species, Hawaiian monk seal, whale species, bottlenose dolphins, sea otters, Steller sea lion, coral reefs, abalone, seagrass
- Traditional method is Contingent Valuation; recent applications of Stated Preference Choice Experiment

### Why do more?

- More flexible instrument designs can fit better with policy or regulatory needs
- Difficult to compare values among studies due to methodological/survey design differences
- Different sampling scales
- Many gaps, still mostly mammals or charismatic species