NOAA FISHERIES

Pacific Islands Fisheries Science Center

Can Native Species Compete with Valuable Exotics?

Measuring Willingness to Pay for Recreational Fishing in Lake Michigan

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Background

How to allocate scarce resources?

Native Sportfish

Lake trout

Walleye

Exotic Sportfish

Chinook salmon

Alewife

Current economic impact:
$2.7 billion, 22,000 jobs

Research Questions

For recreational anglers on Lake Michigan…

Does target species affect econ. value?

Walleye ⩾ Chinook ≻ Lake Trout

Can native species maintain econ. value?

Lake trout: lose 14-37% of value

Walleye: increase value (maybe)

Data Collection

- Wisconsin Angler Survey 2016 (n=1000, 48% response)
- Licensed anglers + Trout and Salmon Stamp holders
- Choice Experiment: 6 questions each

11. Which of the following options would you prefer? Please choose only one.

	Option A	Option B	Option C
• Target species	Chinook Salmon	Lake Trout	
• Number of target species caught	2	1	
• Average size of target species	10 pounds / 30 inches	15 pounds / 35 inches	Do something other than fish Lake Michigan or Green Bay
• Secondary target species	Coho Salmon	Rainbow Trout	
• Likelihood of catching secondary species	High	Low	
• Trip cost per person	$150	$50	
Preferred option	☐	☐	☐

Random Utility Maximization (RUM) Model

- Predict angler behavior
- Choose trip that maximizes utility

$$\underbrace{U_{ijt}}_{\text{Utility}} = \underbrace{V_{ijt}(p_{jt}, q_{jt}, s_i)}_{\text{Observed}} + \underbrace{\varepsilon_{ijt}}_{\text{Unobserved}}$$

(known to angler)

Specification of Utility

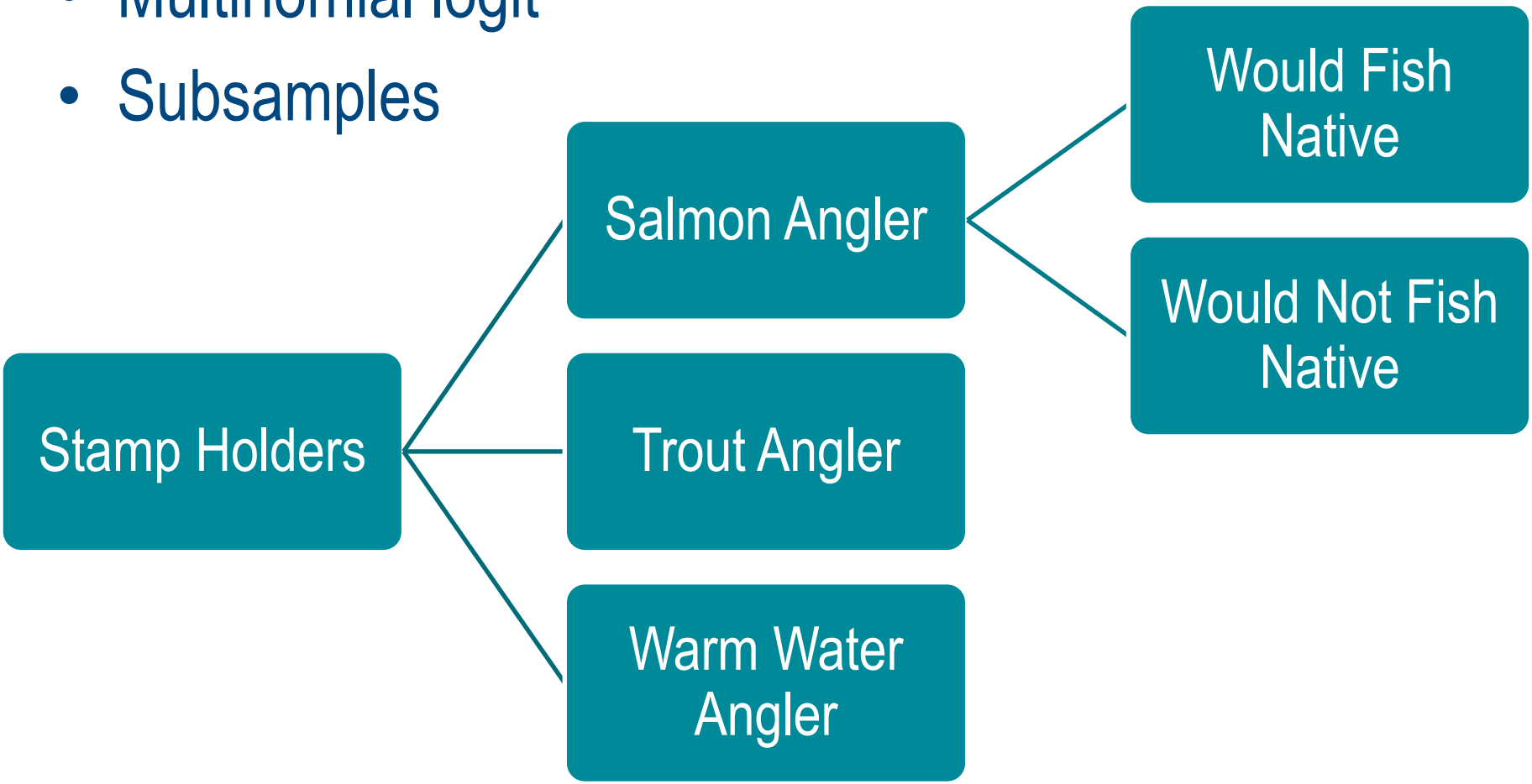
$$V_{ijt} = \underbrace{\sum_{f=1}^{4} \beta_f F_{ijt}^f}_{\text{Target Species}} + \underbrace{\sum_{f=1}^{3} \gamma_c^f C_{ijt} F_{ijt}^f}_{\text{Catch} \times \text{Target}} + \underbrace{\sum_{f=1}^{3} \gamma_w^f W_{ijt} F_{ijt}^f}_{\text{Weight} \times \text{Target}} + \underbrace{\sum_{f=1}^{3} \gamma_h^f H_{ijt} F_{ijt}^f}_{2^{nd}\text{ Target} \times \text{Target}} + \underbrace{\alpha_p P_{ijt}}_{\text{Cost}}$$

Welfare Estimates

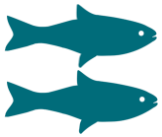
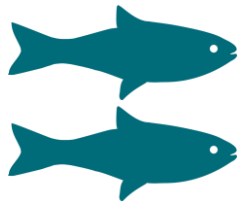
- Can only estimate conditional welfare changes
  - Fish v. not fish
  - Switch trips
- Trip scenarios, by sp.
  - Current
  - Good
  - Best-case

Estimation

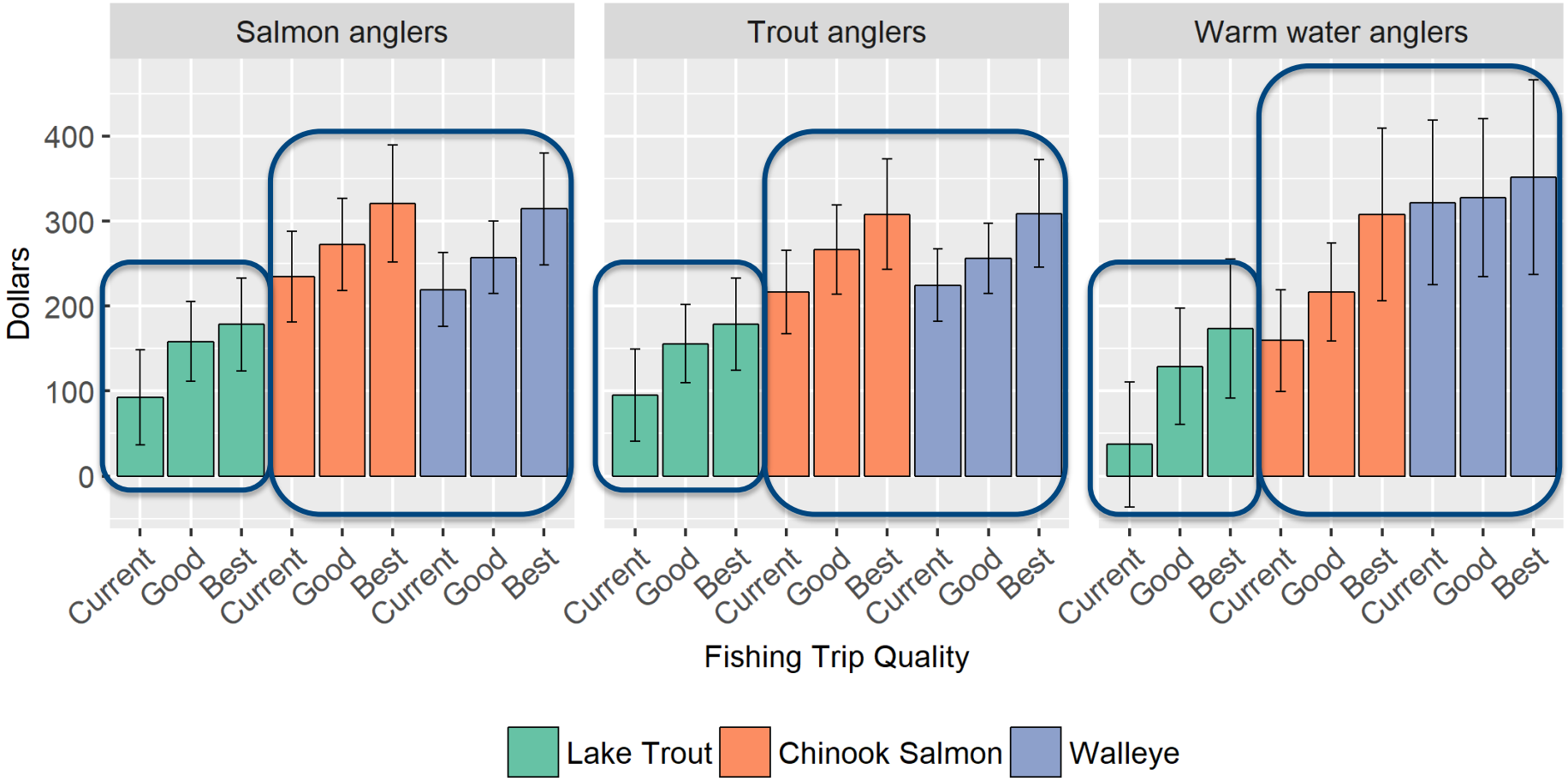
- Multinomial logit
- Subsamples



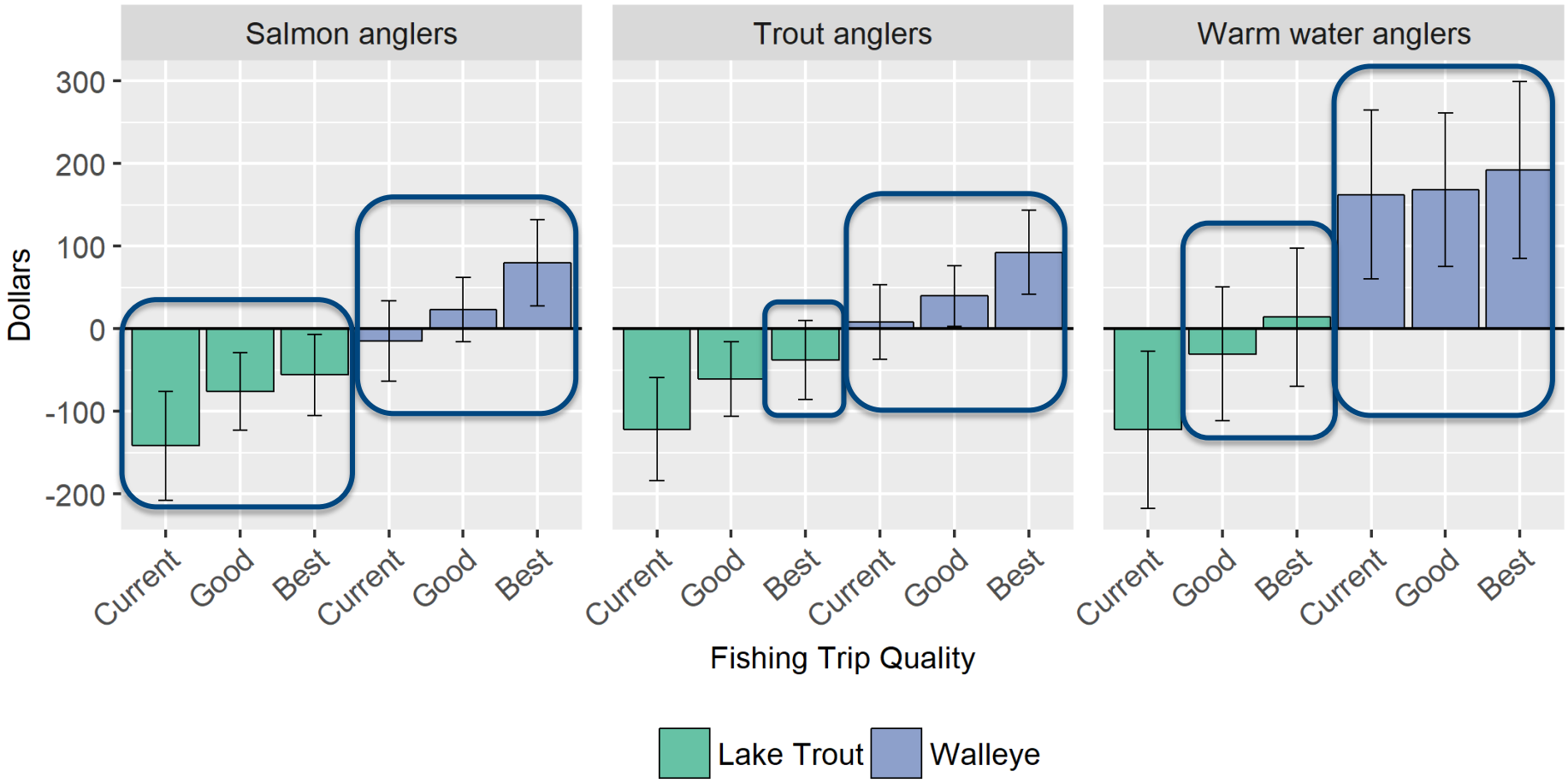
Thresholds to Fish

	Stamp-holder	Salmon Angler	Trout Angler	Warm Water Angler
Walleye	Always	Always	Always	Always
Chinook Salmon	Always	Always	Always	
Lake Trout (Low prob. 2nd)				
Lake Trout (High prob. 2nd)				

WTP for Fishing Trips (v. Not Fish)

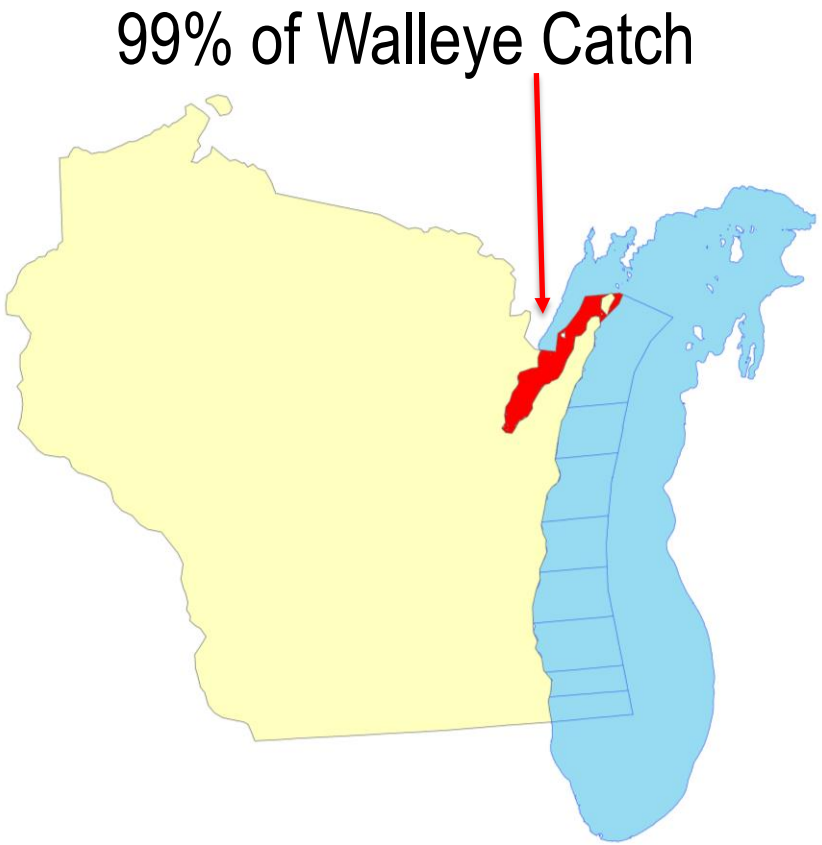


WTP/WTA to Switch from Chinook Salmon Trip to…

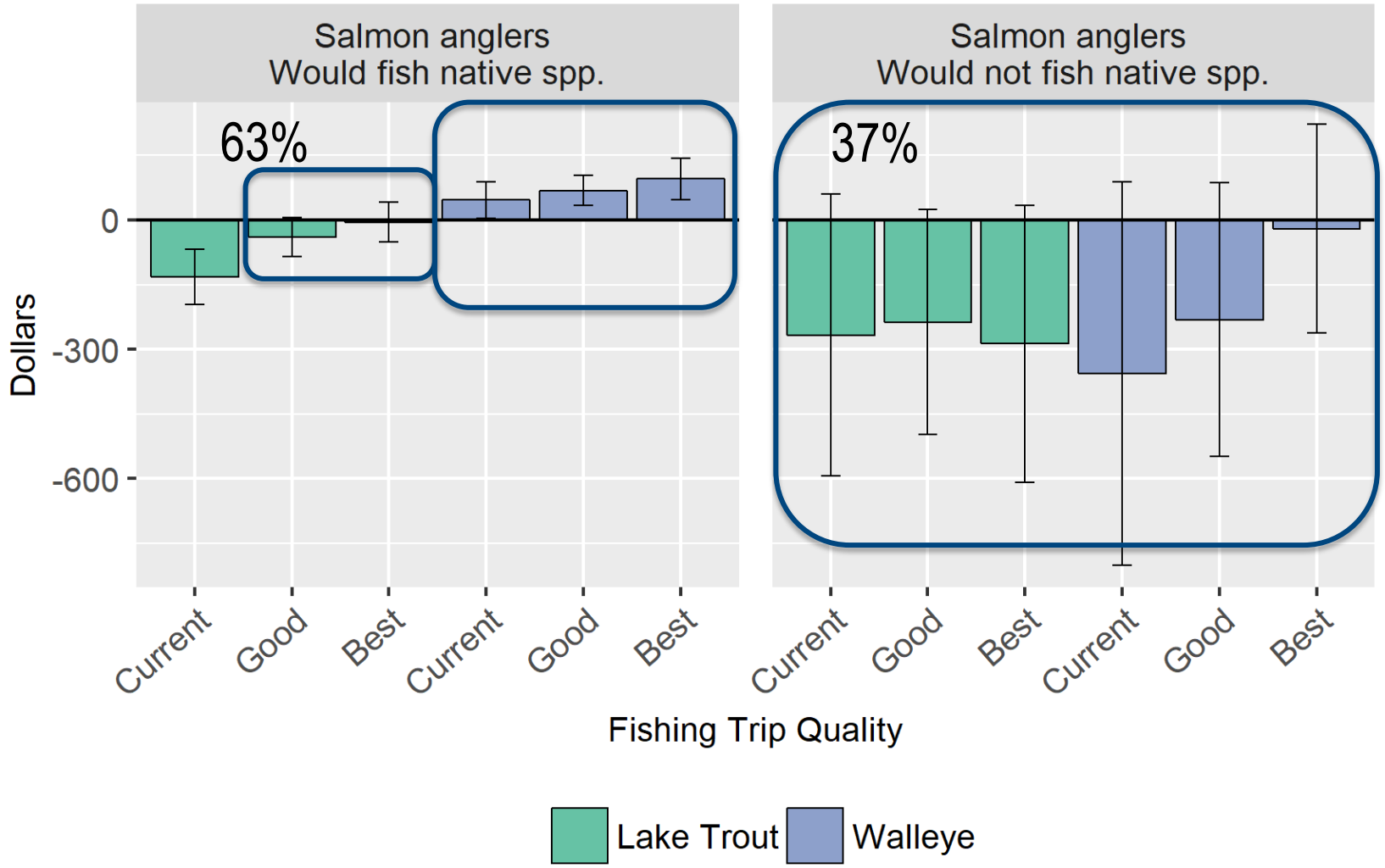


Feasibility of Switching Target Species

- Gear, expertise, accessibility
- Salmon → Trout = Trivial
- Salmon → Walleye = Hard

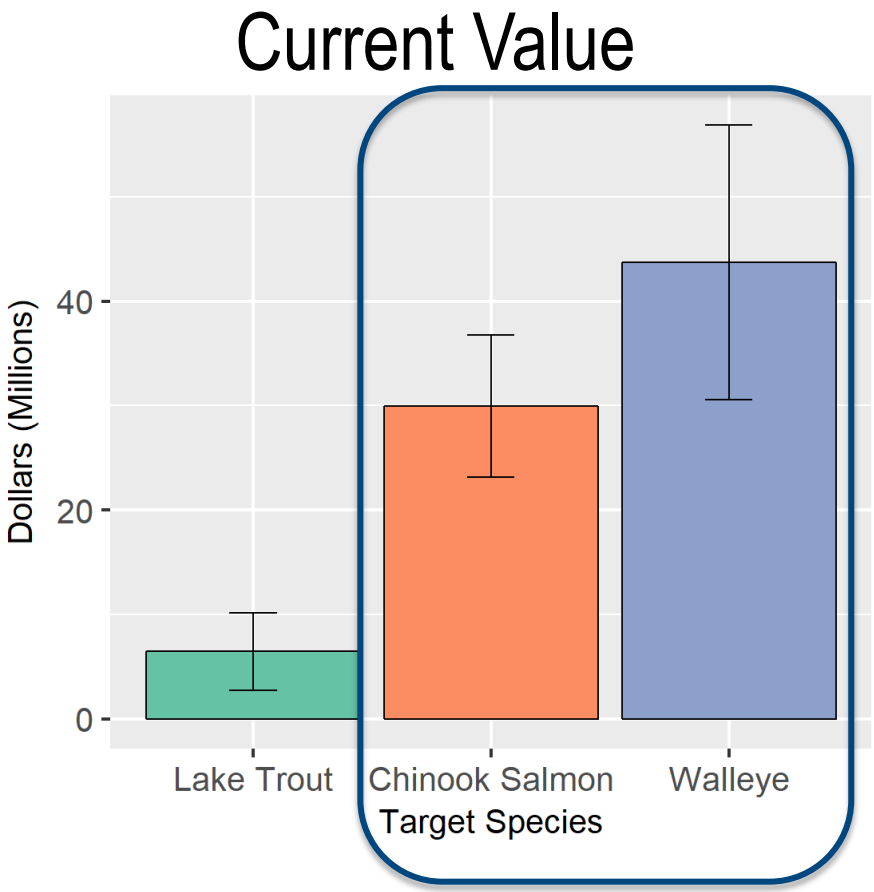


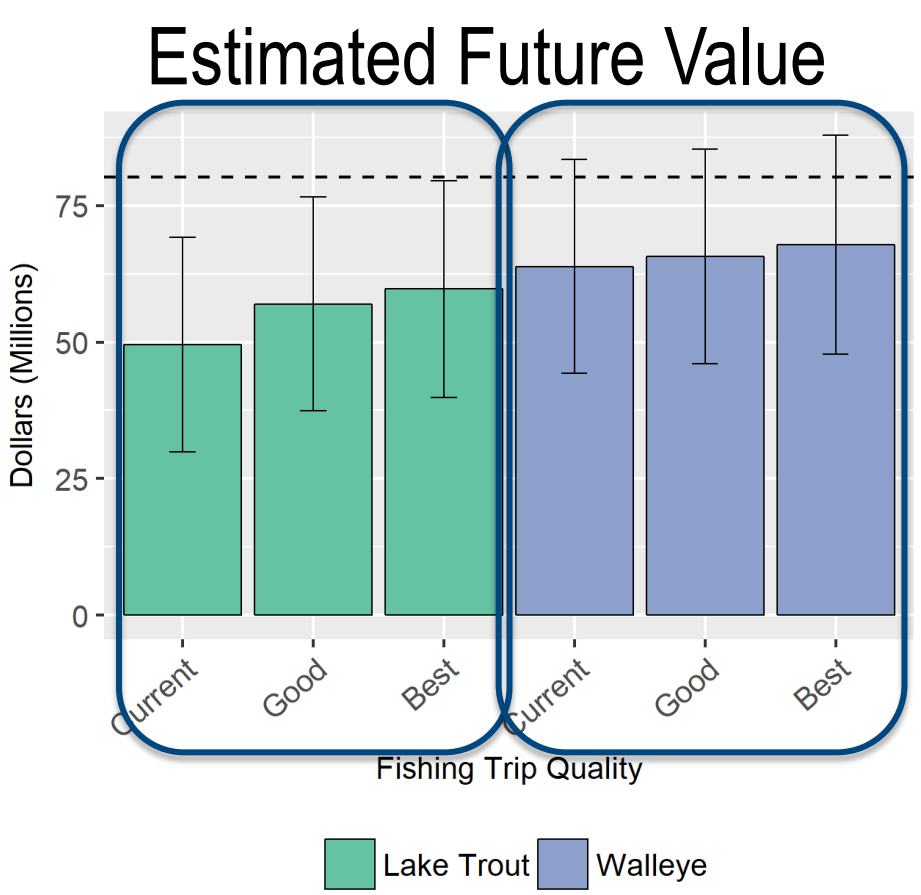
WTP/WTA to Switch from Chinook Salmon Trip to…



Aggregate Economic Value (Non-Market)

- WTP × trips = aggregate value = $81 million/year





Conclusions

- Chinook Salmon economically important, Walleye even more so

- Native species could maintain economic value if…
  - Walleye widely-accessible
  - Lake trout conditions improve
  - Managers recruit new anglers

Recommendations

- Maintain diverse sportfish base
- Rehabilitate Walleye more widely
- Publicize native species fishery
- Reassess preferences in future

Thank you! Questions?

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