Valuing In-stream Flows: Non-market Valuation and Evidence in Oklahoma

Tracy Boyer,
Associate Professor
Department of Agricultural Economics

Oklahoma Governor's Water Conference 2010
October 27, 2010
Norman, OK

Research Funded by :
OKLAHOMA WATER RESOURCES RESEARCH INSTITUTE,
OK Agricultural Experiment Station, and
Oklahoma Department of Wildlife (USFWS Coop Unit)

OK 3035 JX

You Are Entering A
Red Zone Area
Special Regulations Apply
AT·TENTION ANGLERS
Special Trout Regulations
Red Zone areas (see map):
• Lost Creek diversion down to first Hwy 259A Scenic bridge.
• State Park Dam down to Rough Branch Creek.
Red Zone Regulations:
• Brown trout - Daily limit: one (1); size limit: 20 - inch minimum.
• Rainbow trout - Daily limit: one (1); size limit: 20 - inch minimum.
• Use of bait or barbed hooks is prohibited.
• Fishing is restricted to barbless hooks, artificial flies and artificial lures only.
• Trout license required.
Blue Zone areas (see map):
• Broken Bow Spillway down to Lost Creek diversion.
• First Hwy 259A Scenic bridge down to State Park Dam.
• Mouth of Rough Branch Creek down to Hwy 70 bridge
Blue Zone Regulations:
• Brown trout - Daily limit: one (1); size limit: 20 - inch minimum.
• Rainbow trout - Daily limit: six (6); size limit: none
• Use of bait or barbed hooks is permitted.
• Trout license required except from Rough Branch Creek down to Re-regulation Dam (see map).
See Oklahoma Fishing Guide for details

Stream Values

- Ecosystem services
- Habitat for fish and wildlife.
- Natural purification of water, dilution of wastewater
- Recreation

- Irrigation/Agricultural
- Municipal
- Hydropower
- Industrial

Return flows.

Techniques to measure economic value of ecosystem services

- **Hedonic Property Method**
  - isolates property value paid for a home along a river, not public value.

- **Travel Cost Method**
  - Recreational Use Value Only

- **Conjoint & Contingent Valuation**
  - » Ecosystem & Bequest Values
  - » This is called a stated preference method.
  - » Potentially subject to bias, but direction and ordering of preferences insightful

Recreational Values can be large

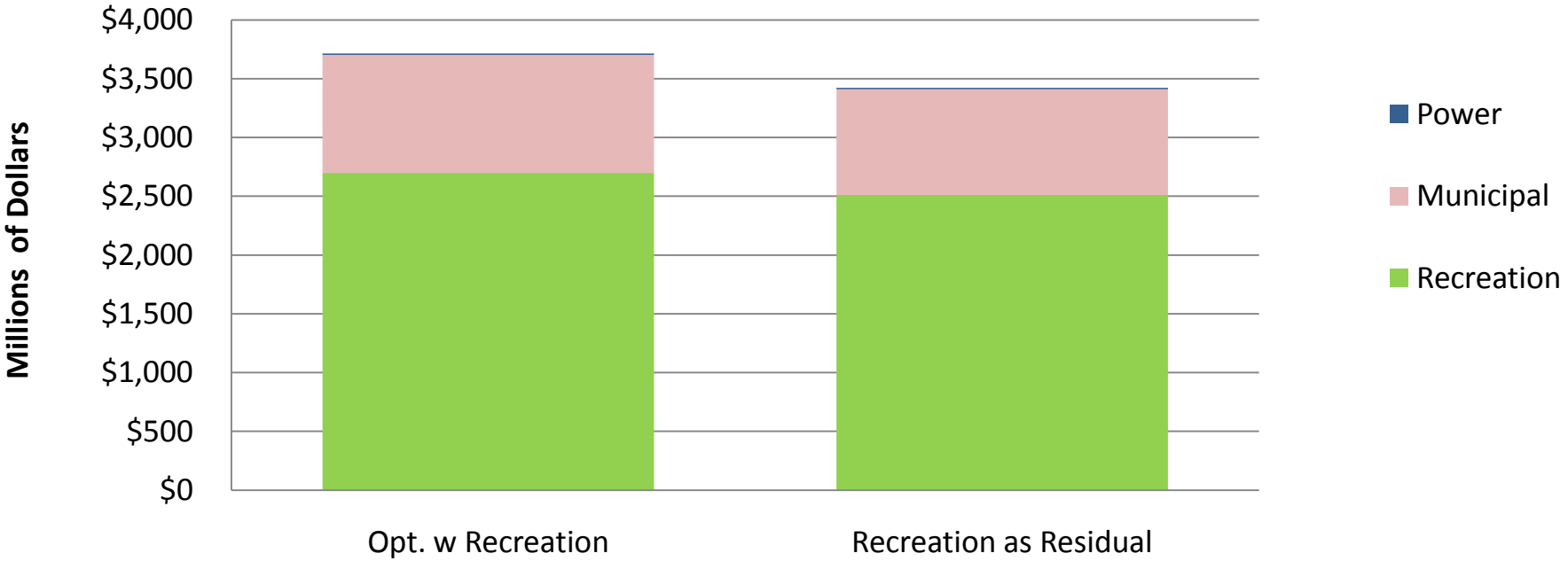
- The Value of Trout Fishing on Lower Illinois River was $2 million per year (ODWC Report, F-58-F-1).
- 2007 Oklahoma Lake Survey travel cost estimates the value of one trip to Tenkiller at $194/day.
- Willingness to pay for Recreation on Tenkiller Lake declined with the water level and increased with probability of algal bloom (Roberts et al, 2008)

IMPACT ANALYSIS:
Converts Expenditures to Financial Impact
LIR: Total Annual Economic Impact
"High Estimate"

16,357 Out of County Visitors	Direct Local Spending	Indirect and Induced Impact	Total Expenditure Impact
Lodging	$731,164.31	$1,327,063.23	$2,058,227.54
Food & Beverage	$518,683.16	$687,773.87	$1,206,457.04
Transportation	$376,454.00	$329,773.71	$706,227.71
Retail	$258,548.16	$276,646.54	$535,194.70
Services	$2,420.94	$3,074.59	$5,495.53
Other	$6,103.21	$7,586.29	$13,689.50
Total	$1,893,373.79	$2,631,918.23	$4,525,292.02

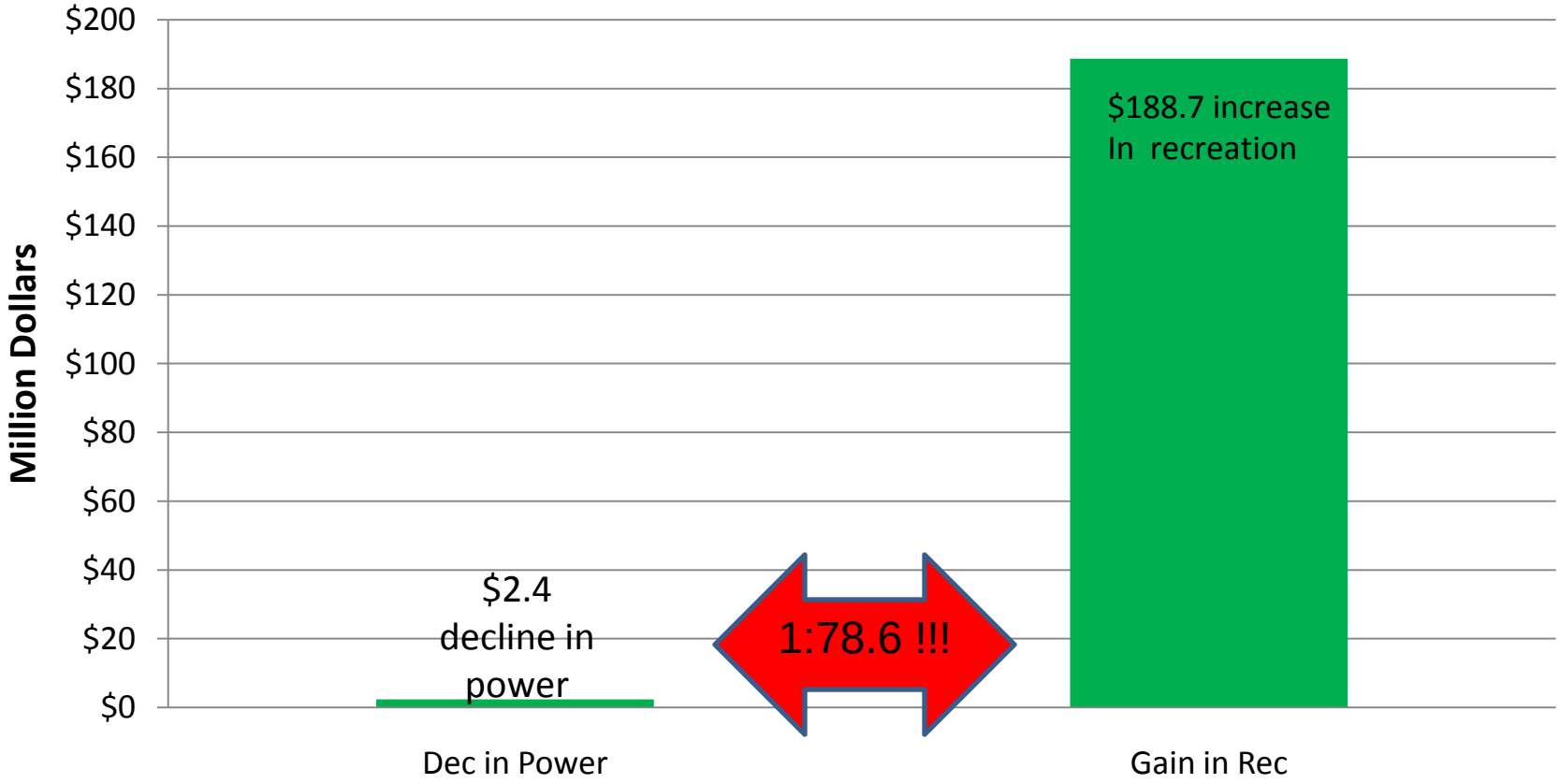
Tenkiller Example: Change in Net Present Value of Services from Lake Tenkiller when Recreation Values are Explicitly Included in the Optimization (constraint for downstream flows was included)

	Max w/ Rec	Max w/o Rec	Change
Power	$10.3	$12.7	($2.4)
Municipal	$1,004.8	$900.2	$104.7
Recreation	$2,698.8	$2,510.1	$188.7
Total	$3,713.9	$3,423.0	$290.9



*** Discounted of 4.875% from 2010 to 2060**

Trade of in Net Present Value* Between Power and Recreation From Directly Including Recreation in The Optimization



*** Discounted of 4.875% from 2010 to 2060**

Conclusions

- When non-market values such as recreation are ignored they are essentially counted as zero.
- Other non-market effects such as existence and ecosystem values may also affect stream management, but will not included if solely looking at quantity. The two cannot be separated in some systems and stream bank quality and land use will also be important (such as in the Upper Illinois Quality conflict).
- Flow amount, velocity, and timing matter for both values and ecosystem function, ie, high flow floods campground and bad for fishing
- These values have potentially large impacts in the local economy in terms of ripple effects and sales tax revenue depending on if recreators come from outside these counties.
- Different water uses may involve tradeoffs in value, ie, agriculture (consumptive) vs. recreation (non-consumptive).