

Common Loon (*Gavia immer*) Mortality and Human Attitudes

Brooke Hafford MacDonald, M.S.

LakeSmart Program Manager
Maine Lakes Society







Common Loon (*Gavia immer*)

- Nest on freshwater lakes and ponds during the summer months in Canada and northernmost U.S.
- Lead poisoning has been documented to be the leading known cause of death in Northeastern loons (Sidor et al, 2003) and Maine (Maine Audubon, 2013)

- Primarily piscivorous
- Swallow stones from lake bed (“gizzard stones”) presumably to help grind up food

(MacIntyre and Barr, 1997)



Common Loons and Lead Fishing Tackle Ingestion

Exposure 1: Sinkers and Jigs Mistaken for Gizzard Stones



Exposure 2:
Consumption of Fish with Attached Fishing Gear

Outward Signs of Lead Poisoning



- Disorientation
- Heavy breathing
- Weakness or Paralysis
- Regurgitation
- Polydipsia/Polyuria
- Seizures
- Blindness
- Vocal changes
- “Wing Droop”

Prolonged exposure can lead to suppressed immunity, kidney impairment, liver dysfunction, gastrointestinal problems, neurological damage, and lower reproductive rates.



Maine Lead Legislation

- 2002: Banned sale of lead sinkers 0.5 oz or less
- 2013: Banned sale and use of lead sinkers weighing 1 oz or less, and measuring 2.5 inches or less*
- 2016: Ban sale of bare lead jigs weighing 1 oz or less, and measuring 2.5 inches or less*
- 2017: Ban use of bare lead jigs weighing 1 oz or less, and measuring 2.5 inches or less*

*L.D. 730: An Act to Protect Maine's Common Loons (passed in 2013)

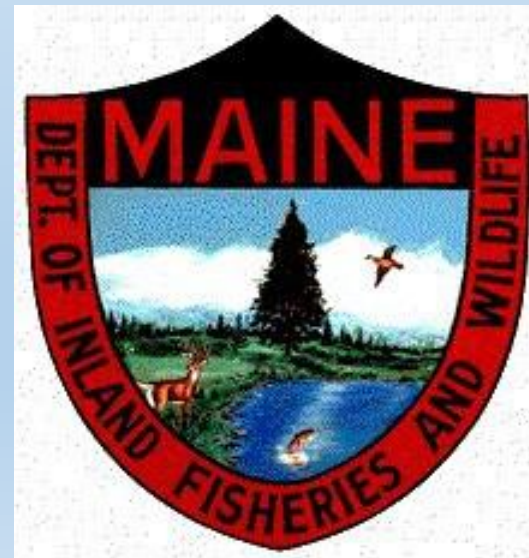


Sinkers (no hook)



Jigs (hook attached)

Fish Lead Free: L.D. 730





- Since human behavior is the root cause of lead in freshwater environments from fishing tackle, understanding behaviors can facilitate more targeted initiatives (Teel, 2008)
- “If we just educate them they will change their behavior!”

Study Objectives:

- Measure lead mortality rates in Maine's common loons over time (beyond 2012).
- Explore Maine resident perceptions regarding lead tackle toxicity.



Component 1:

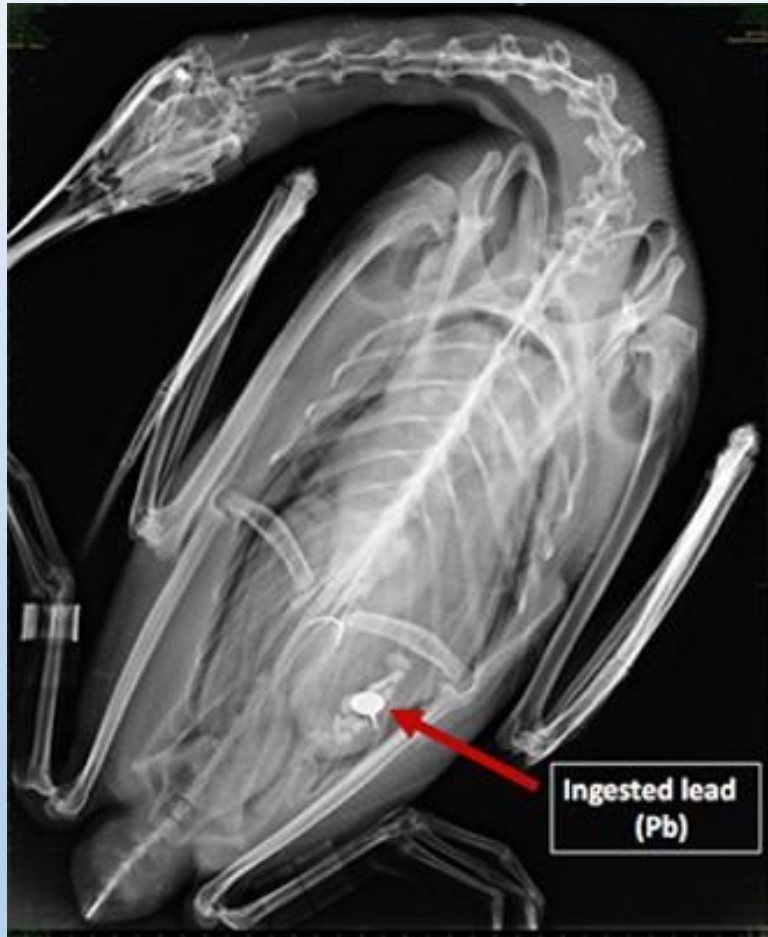
Lead Mortality in Maine's Common Loons

Hypothesis:

Lead poisoning will be the leading known cause of death in adult common loons in Maine (1990-2016).



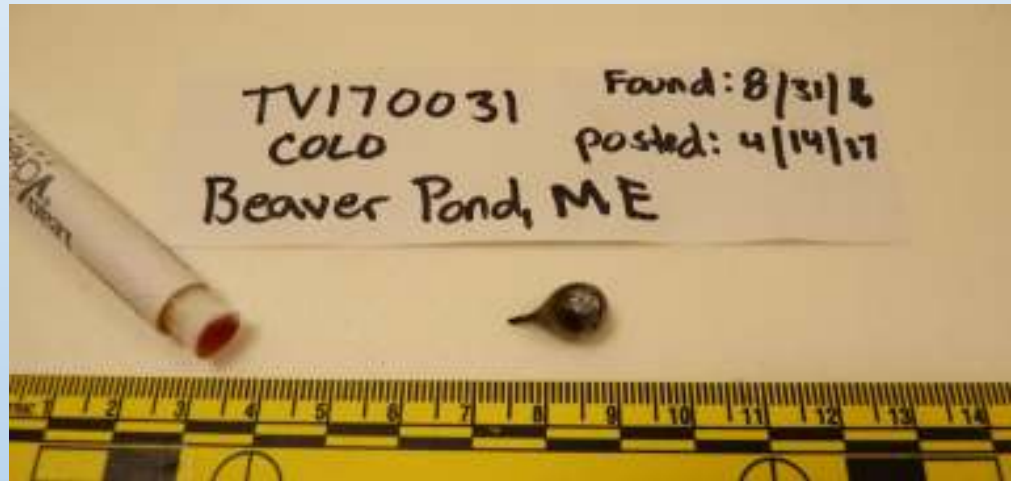
Methods: Post-Mortem Examinations



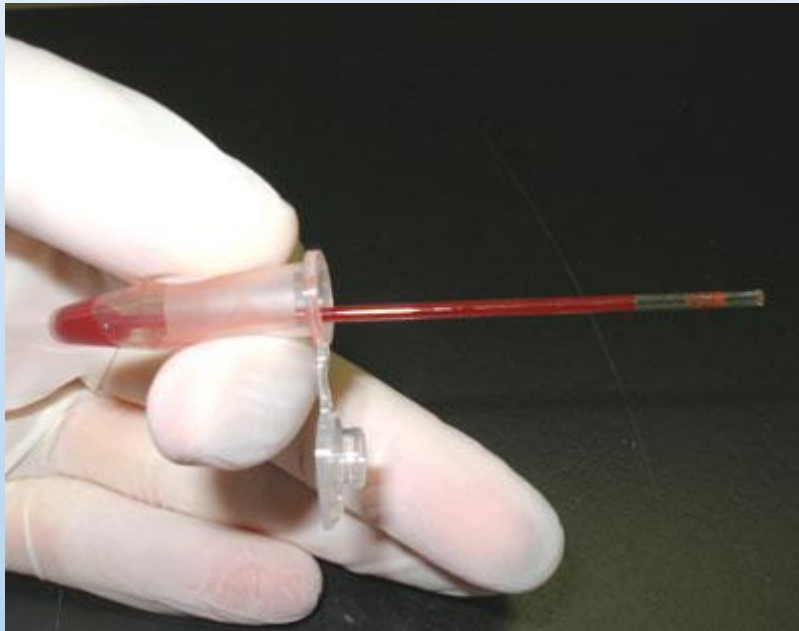
Methods: Post-Mortem Examinations



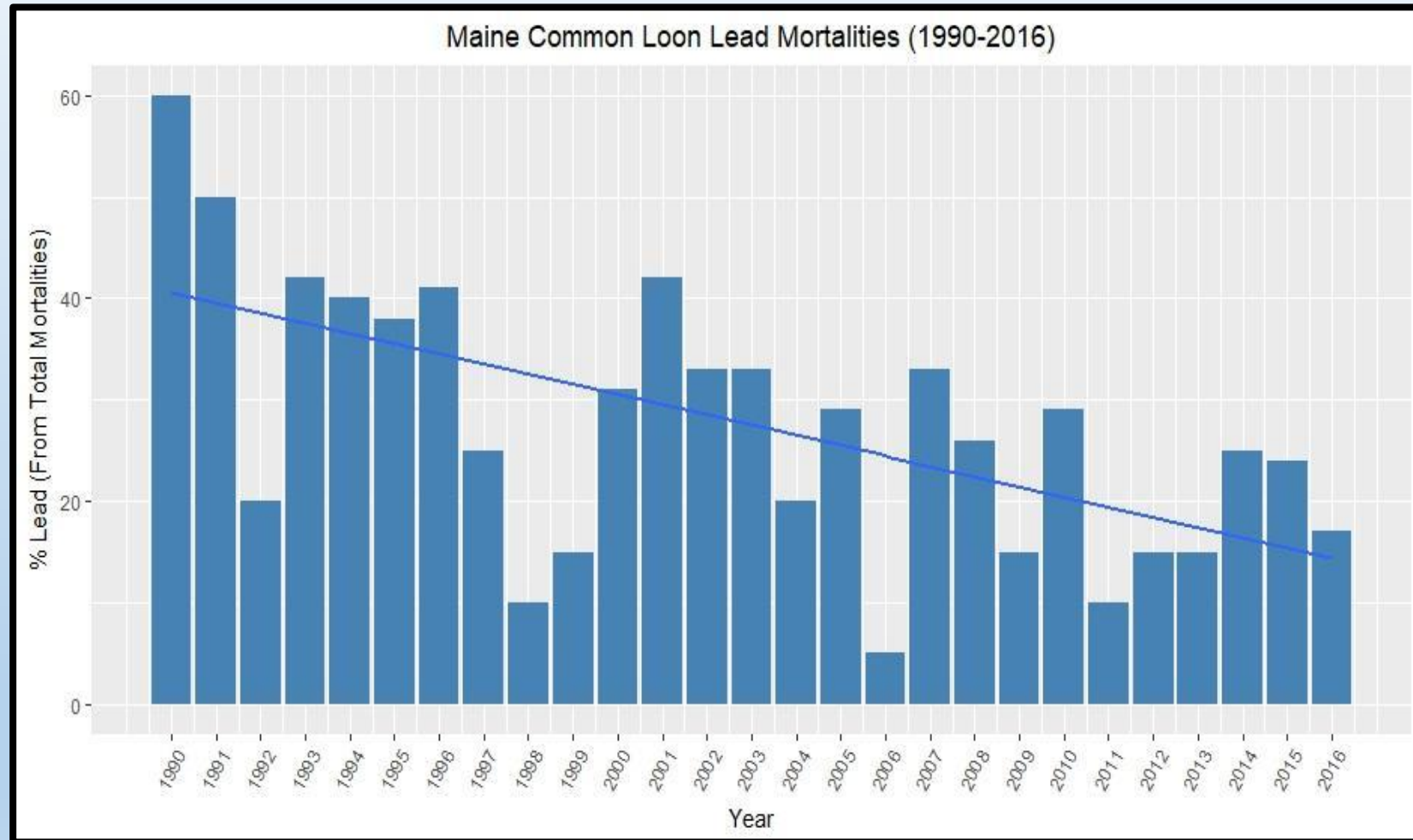
Methods: Post-Mortem Examinations



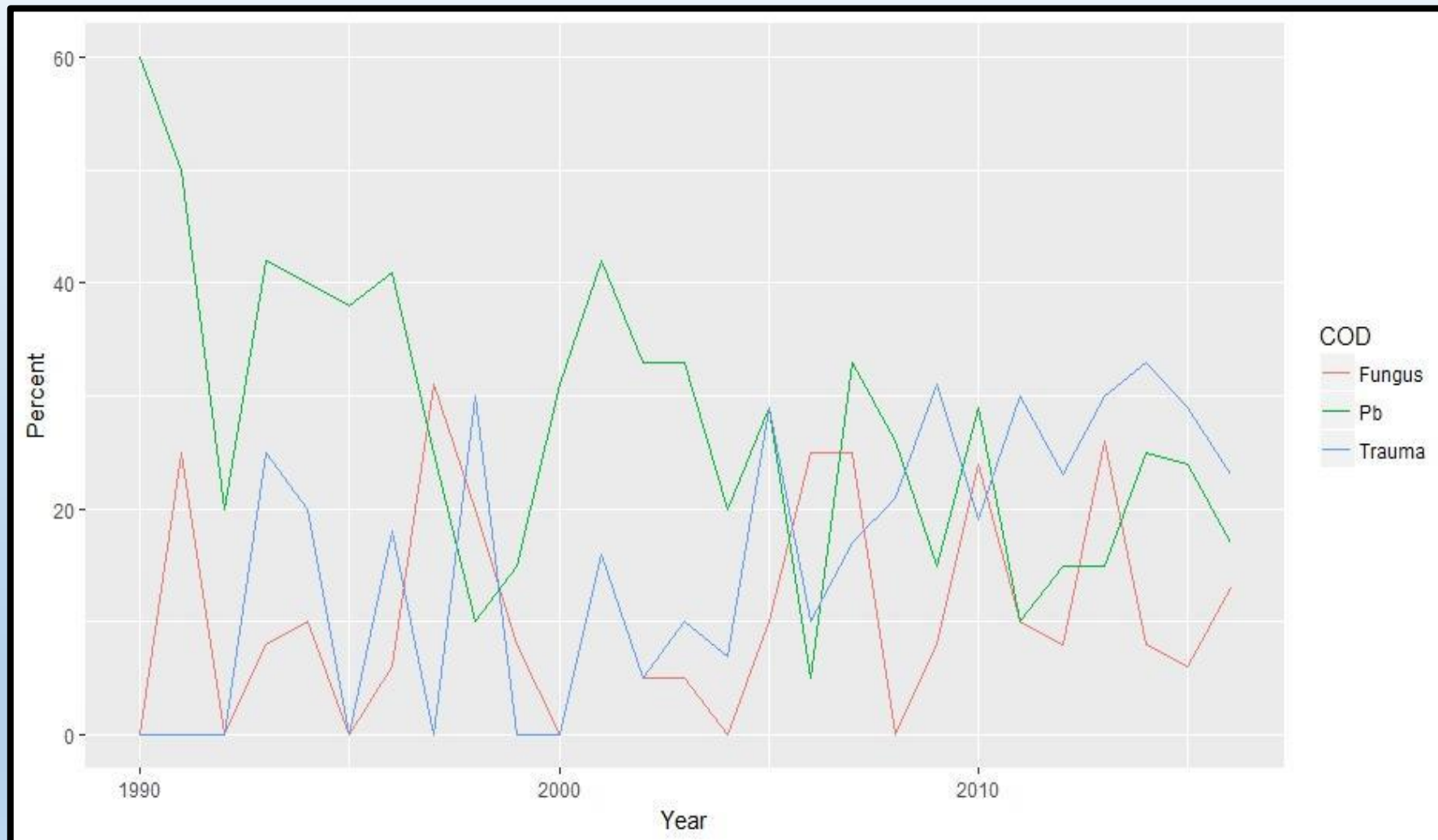
Necropsy Methods: Post-Mortem Examinations



Results



Results



Conclusions

- Lead leading COD overall (1990-2016)
- Lead deaths decreasing over time
- Trauma increasing, first surpassing lead in 2009, and leading cause of death 2011-2016



Component 2:

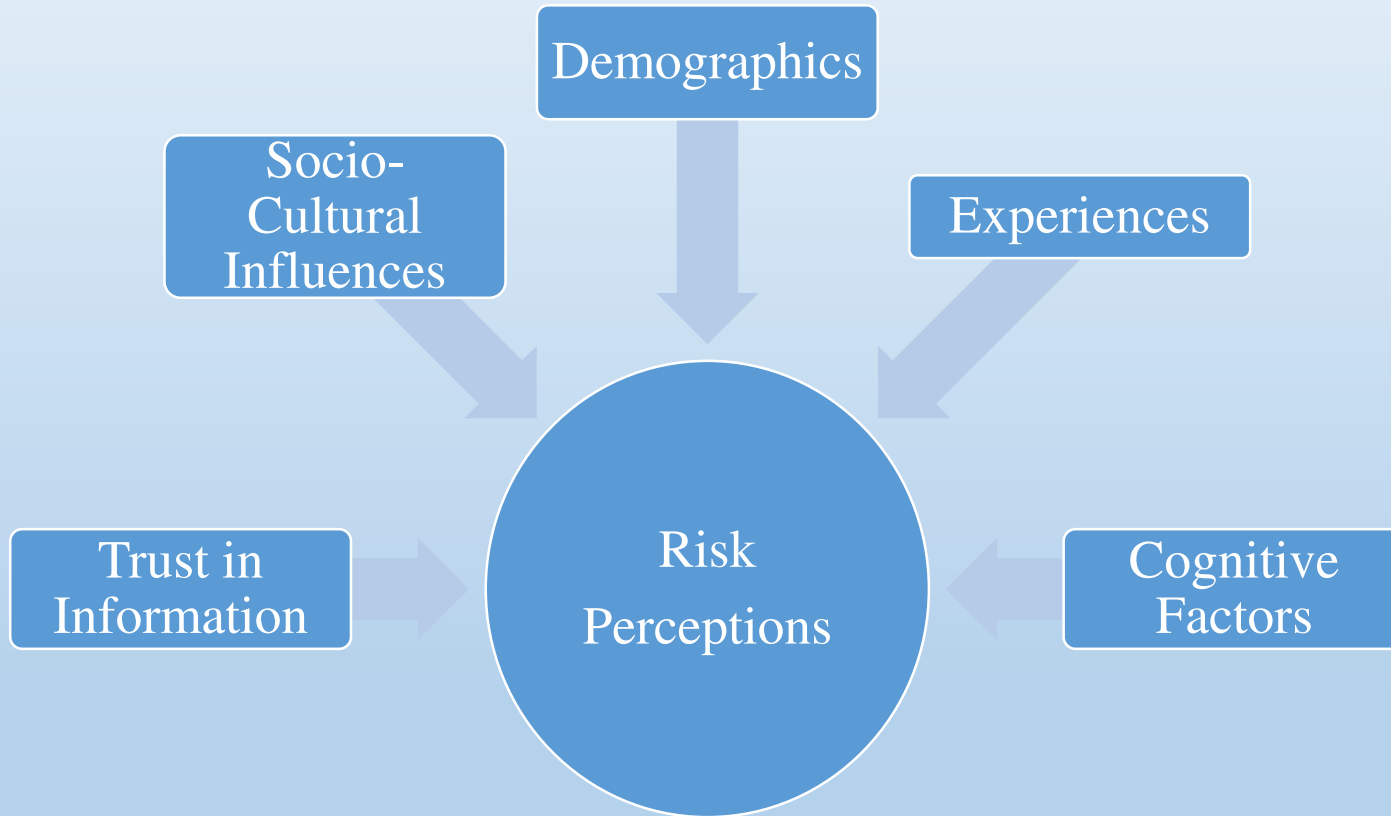
Lead Poisoning in Common Loons: Maine Resident Risk Perceptions

Survey Methods

- Random sample of 2,500 Maine residents
- Questions influenced by Risk Perceptions model (van der Linden, 2015; Mase et al, 2015)
- Mail invitation, online survey
- 13% response rate
- 7 point Likert Scale (Demo)

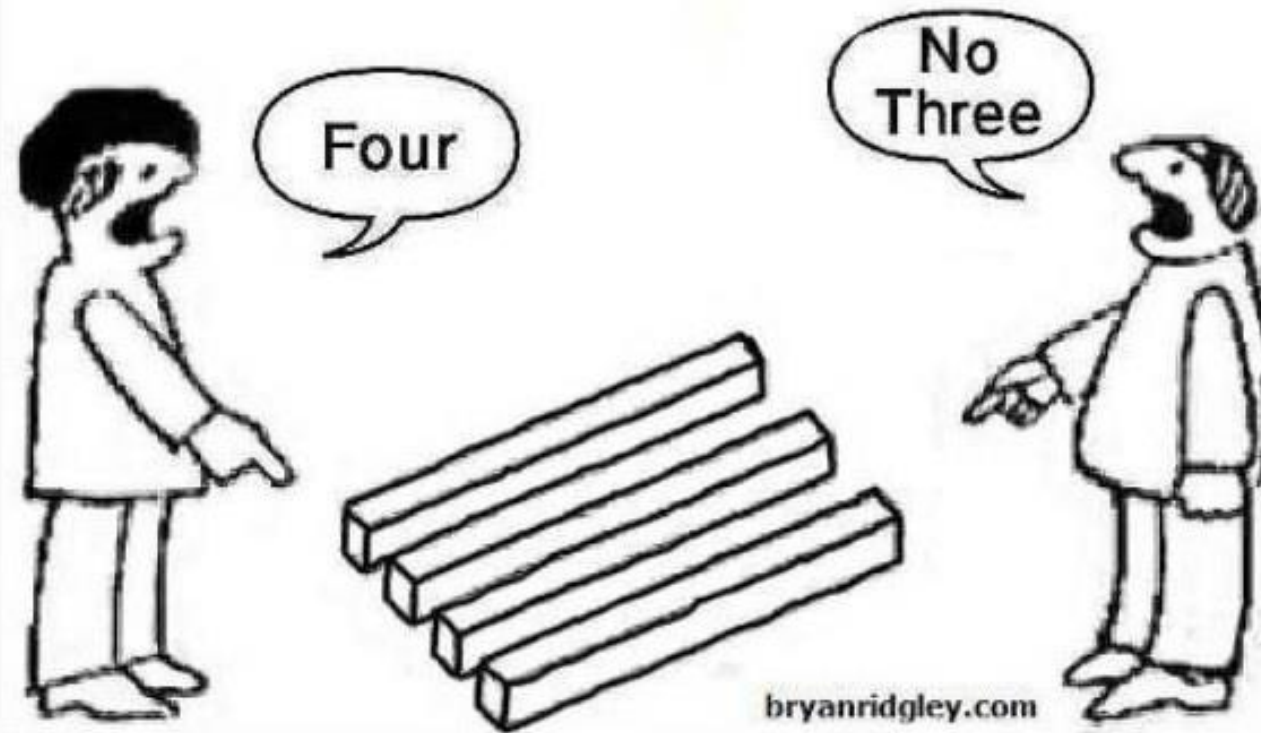


Maine Resident Risk Perceptions



- Risk Perceptions are judgements we make about the severity of a risk
- Understanding the factors that contribute to risk perceptions help us understand why certain individuals feel a certain way, thus behaving a certain way

Perception Matters



Socio-demographics: Gender, Race, Age, Location, Political Affiliation, Education, Income

Cognitive factors: How much people know about an issue – or how much they *think* they know

How much do I know about lead and loons?

Does it matter?



Trust:

When people do not fully understand the complexities surrounding a risk they may rely on the opinions of experts they find trustworthy (Siegrist and Cvetkovich, 2000).



Is the messenger trustworthy?

Do I believe them?

Norms: Conduct accepted by your family, friends and peers

Do my friends fish with lead tackle?



Experiences:

Direct, personal experiences can impact attitudes and/or increase perceptions of risk

Have I witnessed a loon or other animal with lead poisoning?

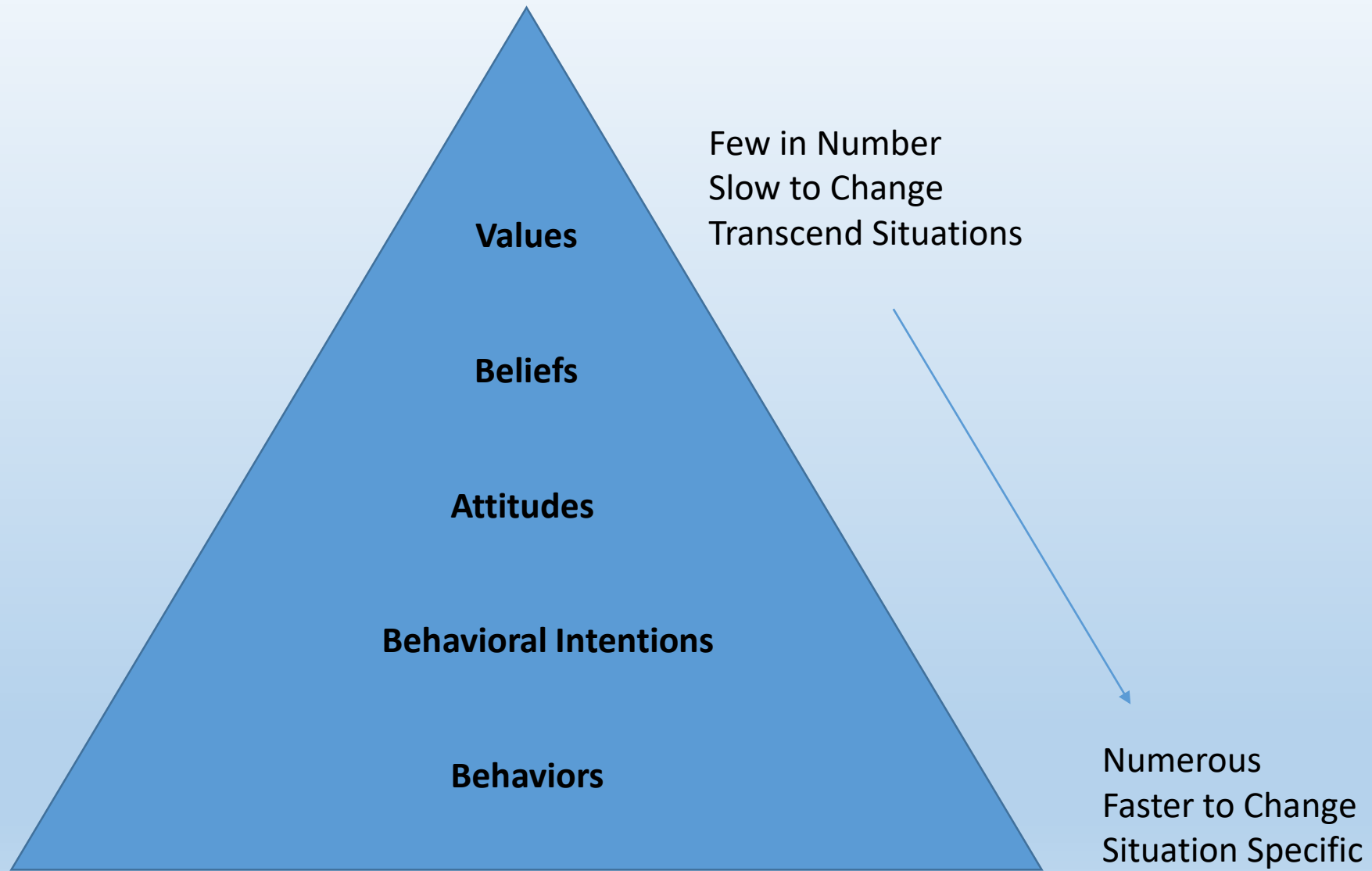


Values

(Stern, Dietz, & Kalof, 1993).

- (1) egoistic values (i.e., maximizing individual outcomes)
- (2) socio-altruistic values (i.e., caring about others)
- (3) biospheric values (i.e., caring for non-human nature and the biosphere itself).

These broad value orientations help understand risk perception (De Groot, Steg, and Poortinga, 2013)



Values:

Act as “background” factors that influence behaviors by guiding attitudes and beliefs (Daigle et al, 2002).

Do I have high environmental (biospheric) values?



Hypothesis

Respondents who have high biospheric values will have higher risk perceptions.



Conclusion:
Biospheric values
positively influenced risk
perceptions

In other words...
People who care about the
environment are more
concerned about lead
poisoning in loons



A wide-angle photograph of a large, deep blue lake under a clear sky with scattered white clouds. In the distance, a range of green mountains stretches across the horizon. The shoreline is lined with dense green trees. A small boat is visible on the left side of the lake, and a person is swimming in the water in the center. A semi-transparent white rectangular box is overlaid on the lower half of the image, containing the text "So what??" in a black serif font.

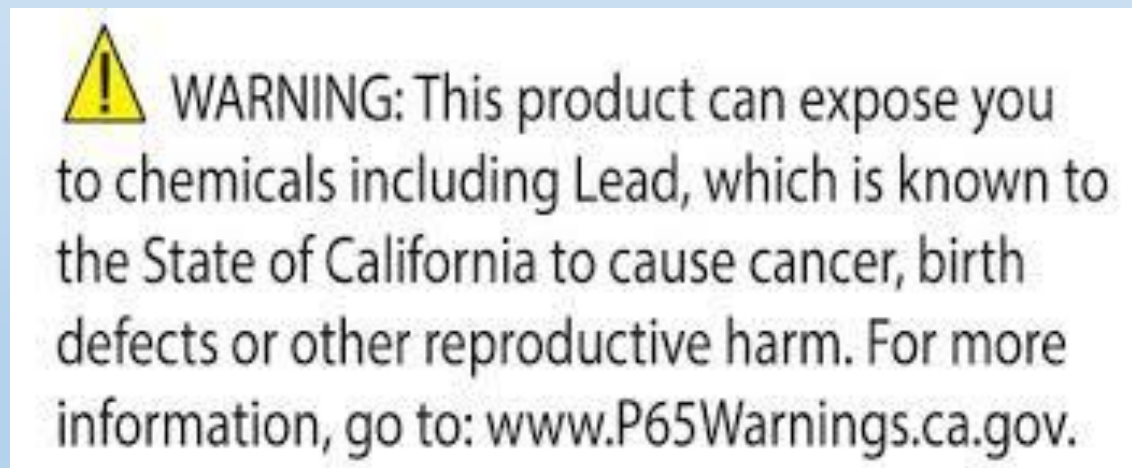
So what??

Since value systems are nearly impossible to change....

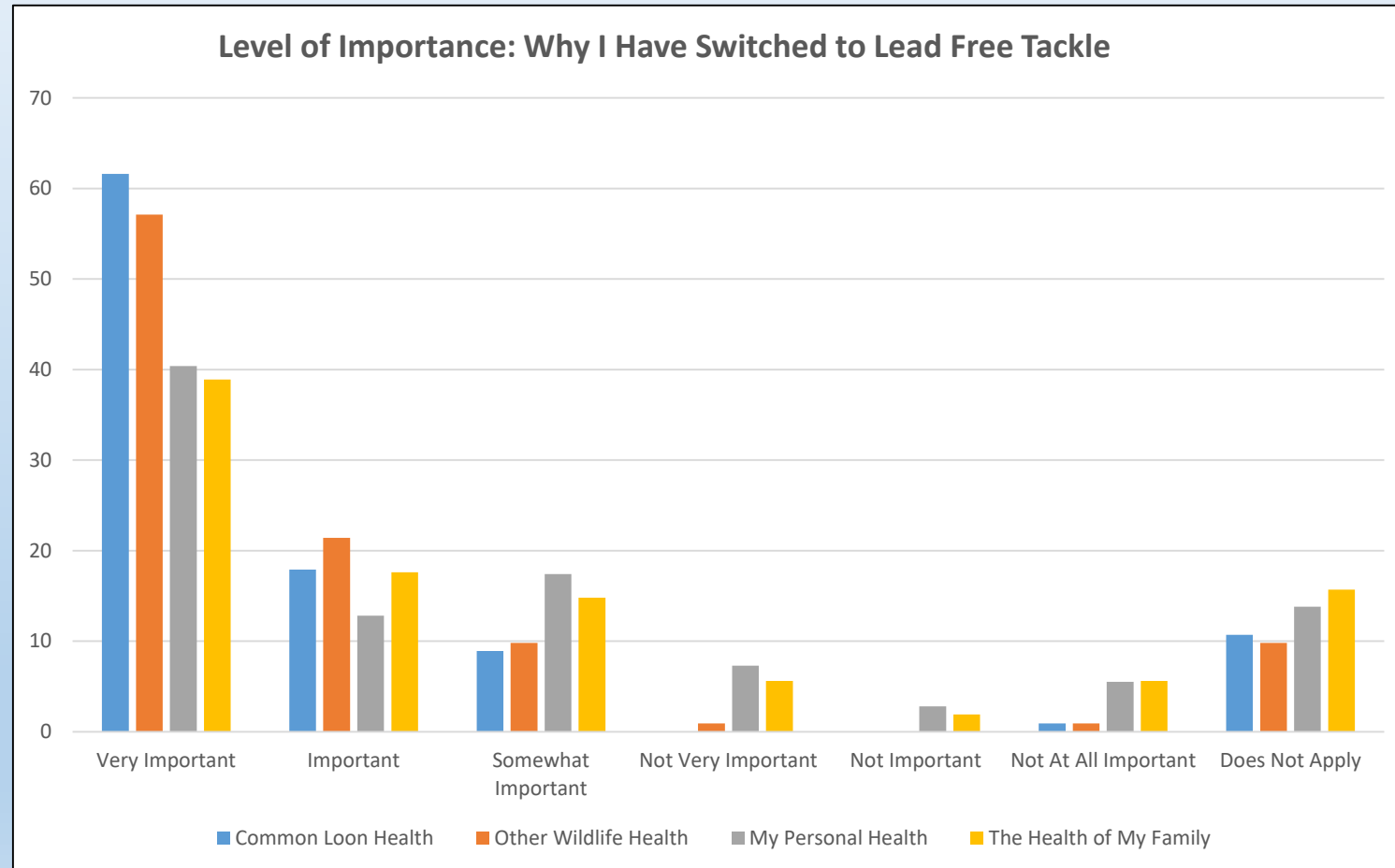
Rather than attempting to change environmental values, another strategy is to communicate messages differently.



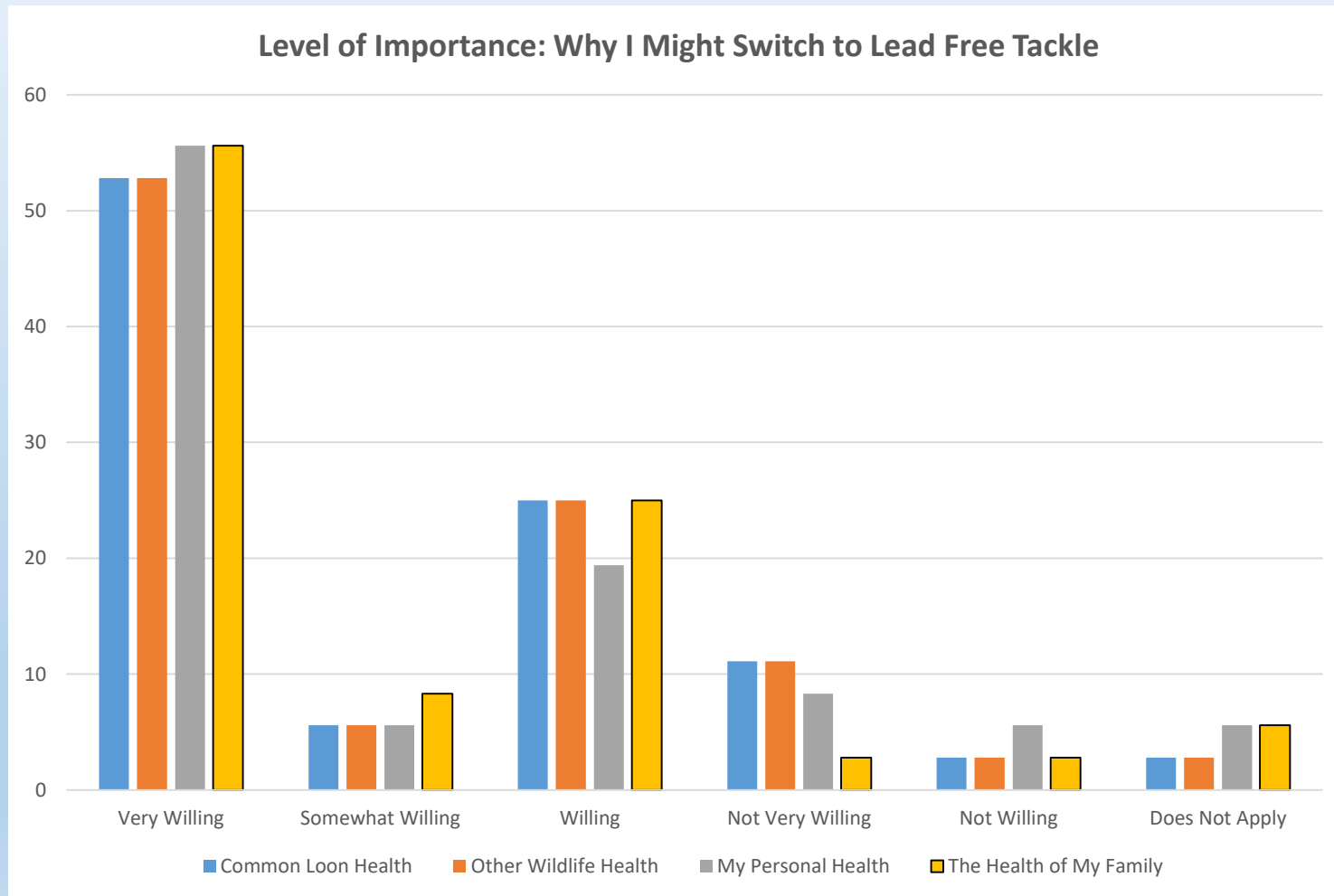
Reframing your message to address human health concerns, for example, might appeal more to those expressing fewer concerns about common loon or wildlife health but who are more concerned about their own personal health (egoistic) or health of humans (altruistic).



The #1 reason anglers have already made the switch to lead-free tackle is common loon health.



The #1 reason anglers *might* switch is human health



A few take away messages...

- Continue to fish lead free and encourage others to do the same
- Recognize boat strikes as an emerging conservation issue
- Incorporate a wide variety of messages that appeal to different value systems - but be authentic!





TRADE IN YOUR LEAD! GO LOON SAFE INSTEAD!

Why is fishing lead free better for our lakes and wildlife?

Lead that enters our lakes as lost or discarded fishing gear is a leading cause of death for adult Common Loons. To protect loons and other wildlife, Maine state law bans the use and sale of lead sinkers and bare (unpainted) lead-headed jigs that weigh one ounce or less, or that measure 2 1/5 inches or less.

Help keep lead out of Maine's lakes and ponds. Make the switch to lead-free tackle.

Maine Audubon and Maine Department of Inland Fisheries and Wildlife are working together to encourage anglers statewide to switch to non-lead fishing tackle. We are partnering with local tackle shops to issue a limited number of \$10 store vouchers to customers who turn in one ounce or more of lead fishing tackle to purchase lead-free alternatives.



How do I participate?

Starting April 1, 2020, anglers can visit participating retailers and turn in at least one ounce of lead fishing tackle (lead-headed jigs or sinkers containing any amount of lead) for a voucher worth \$10 off the purchase of lead-free tackle at participating stores.* (One voucher per person. Offer valid until March 31, 2021 or until all vouchers are claimed.)

fishleadfree.org/me

* Participating Retailers Subject to change. Please refer to the website for up-to-date information.

1. Indian Hill Trading Post (Moosehead Lake)
2. Dag's Bait Shop (Auburn)
3. Back Woods Bait and Tackle (Chesterville)



For information about where to buy lead-free fishing tackle or where to deposit your old lead tackle visit:

fishleadfree.org/me

SPECIAL THANKS



Academic Committee:

Dr. Sandra De Urioste-Stone, University of Maine

Dr. David Evers, Biodiversity Research Institute

Dr. Brian Olsen, University of Maine

Dr. Mark Pokras, Tufts University

Dr. Michelle Kneeland, Biodiversity Research Institute

**Danielle D'Auria, Maine Department of Inland Fisheries
and Wildlife**

Susan Gallo, Maine Lakes Society

Tiffany Grade, Loon Preservation Committee

Lydia Horne, University of Maine, Orono

Financial Support

Ricketts Conservation Foundation

Maine Outdoor Heritage Fund

University of Maine



Questions?

(Hi Mom!)

BIBLIOGRAPHY

Corner A, Markowitz E, Pidgeon N (2014) Public engagement with climate change: the role of human values. *WIREs Climate Change*. 5:411-422.

Daigle JJ, Hrubes D, Ajzen I (2002) A comparative study of beliefs, attitudes, and values among hunters, wildlife viewers, and other outdoor recreationists. *Human Dimensions of Wildlife*. 7:1-19.

DeGroot J and Steg L (2007) Value orientations and environmental beliefs in fire countries: validity of an instrument to measure egoistic, altruistic, and biospheric value orientations. *Journal of Cross-Cultural Psychology*. 38: 3128-332.

Dillman DA, Smyth JD and Christian L (2014) *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. (4th Ed). Hoboken, NJ: John Wiley & Sons, Inc.

Fulton DC, Mangredo MJ, Lipscomb J (1996) Wildlife value orientations: a conceptual and measurement approach. *Human Dimensions of Wildlife*. 1(2): 24-47.

Galeotti A and Goyal S (2009) Influencing the influencers: a theory of strategic diffusion. *RAND Journal of Economics*. 40(3): 509-532.

Leszek M (2015) Changing angler behavior to reduce the impacts of lead fishing tackle in New Hampshire: Applied social science using community based social marketing. Master's Thesis. Plymouth State University, NH.

Mase AS, Cho H, Prokopy LS (2015) Enhancing the social amplification of risk framework (SARF) by exploring trust, the availability of heuristic, and agricultural advisors' belief in climate change. *Journal of Environmental Psychology* 41:166-176.

Sidor IF, Pokras MA, Major AR, Poppenga RH, Taylor KM, Miconi RM (2003) Mortality of common loons in New England 1987-2003. *Journal of Wildlife Diseases* 39:306-315.

Siegrist MG, Cvetkovich G, and Roth C. (2000) Salient value similarity, social trust, and risk/benefit perception. *Risk Analysis*. 20:353-362.

Slimak MW and Dietz T (2006) Personal values, beliefs, and ecological risk perception. *Risk Analysis*. 26(6): 1689-1705.

Stern P, Dietz T, Kalof L (1993) Value orientations, gender, and environmental concern. *Environment and Behavior*. 25:322-348.

van der Linden S (2015) The social-psychological determinants of climate change risk perceptions: towards a comprehensive model. *Journal of Environmental Psychology*. 41:112-124.

Vaske JJ (2008) *Survey research and analysis: applications in parks, recreation, and tourism*. Venture Publishing, Inc. State College, PA.

Vogt PW (1999) *Dictionary of statistics and methodology: a nontechnical guide for the social sciences*. 2nd Edition. Sage Publications. Thousand Oaks, CA.

Whittaker D, Vaske JJ, Manfredo MJ (2006) Specificity and the cognitive hierarchy: value orientations and the acceptability of urban wildlife management actions. *Society and Natural Resources*. 19:515-530.