Explaining compliance with recreational fishery regulations

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Background

- Salmon angling in Norway
- Anglers openly state that they cheat
- Example: Catch and release (C&R)
  - Traditionally not a catch and release fishery
- Regulations made C&R indirectly compulsory
  - Strict bag limits
- Expressions like «salmon for the grill»,«roof box salmon», and «Backpack salmon»
- Into the forest……

Background

- The spawning biomass targets in some of the most important Norwegian salmon rivers are not met (even if they should be according to countings and catch statistics)
  - Apparently more salmon is kept/killed than what is stated in the statistics

- This summer: a $1000 fine was issued to an angler for not respecting the one salmon per day bag limit

Theory

- The classical crime model
  - Becker (1968): Crime and punishment: an economic approach
- The expected utility of compliance or non-compliance with the law determines the agents` choices
  - An individual commits a crime if the expected utility exceeds the utility from engaging in legitimate activity
- In fisheries: Sutinenen and Andersen (1985)
  - Combined Beckers model with a bioeconomic model and showed how costly, imperfect enforcement of fisheries law affects the behavior of fishing firms and optimal fisheries management

Previous studies

- Kuperan and Sutinen (1998)
  - Beckers model fit poorly with fisheries
    - Empirical evidence
    - Probability of being caught very low (less than 1%): Punishment (fines) not in accordance (should be very high)
    - Hatcher et al (2000), Jagers et al (2012)

- Probability of being caught and punished in recreational fishing probably even lower

Previous studies

- Cooke et al (2012)
  - Informal voluntarily institutions is a good alternative to formal regulations in recreational fishing management
  - «There is an urgent need for research on the level of compliance that is required or can be expected with voluntarily regulations or actions»

- Evidence from commercial fishing not to optimistic:
  - «Fishery regulations are not, in general, self enforcing. Neither other fishermen nor the crew of other marine vessels inform the authorities of infringement that they witness» (Nøstbakken (2008))
  - «A fisher who wants to evade regulations will usually find a way out » (Jagers et al (2012))

Compliance

- Compliance in general?
- Compliance with a specific type of regulation?
- Here: Compliance with 11 types of regulations
  - General pattern or not?

What drives angler compliance?

- Legitimacy?
- Social norms/pressure?
- Influence on management practice?
- Fish population concern?
- Detection risk?
- Individual characteristics?

Survey: Norwegian salmon anglers

- Postal survey
- 270 respondents (54%)

1. Attitude questions: Questions with respect to legitimacy of 11 common types of regulations
2. Compliance questions: How often they violate each type of regulation during the fishing season
3. Detection risk questions: Most/least easily detected rule violation

Attitudes towards regulations

- Most popular:
  - Minimum size regulations (4.8)
  - Gear restrictions (3.6)
- Least popular:
  - Season length restriction (1.7)
  - Release all small (1-3kg) salmon (1.9)

Scale 1-5 (strongly disagree-strongly agree)

Most violated regulations

- Release all salmon (C&R only): 3.8
- Bag limit restriction (2.6)

- Scale: 1= never (0 times)-5= very often (more than 7 times)

Least violated regulations

- Least violated
  - Season length restriction (1.1)
  - Daytime (hour) restrictions (1.2)
  - Minimum size restrictions (1.2)
  - Release all female salmon (1.4)

  - Scale: 1-5 (never (0 times)-very often (more than 7 times))

Perceived detection risk

- Maximum detection risk:
  - Season length (71%)
  - Daytime (hour) regulations (8%)
  - Release all (8%)

- Minimum detection risk
  - Minimum size regulation (66%)
  - Release female (18%)
  - Bag limit (5%)

Regression results: non-compliance

Violate	Min size	Release-small	Release female	Release all	Baglimit1	Gear restrictions	Daytime reg	Season reg	Price
Attit	-			-	-	-		-	-
Social N				-	-			-	
Influence		+	-						
Concern		-			-	-			
Fdays	+			+	+			+	
Gender				+	+			+	
Age				-		-		-	
Inc				-	+				
R2adj	0.27	0.07	0.04	0.55	0.54	0.45	0.01	0.24	0.07

What about detection risk?

- No support that higher perceived detection risk drives compliance
  - Detection risk in general extremely low…..

- Seems like legitimacy of the regulation is more important

Conclusion

- What drives angler compliance?
  - Legitimacy? **Yes, for some regulations**
  - Social norms/pressure? Yes, for some..
  - Influence on management practice? Yes/no for some..
  - Fish population concern? **Yes, for some..**
  - Detection risk? No (?)
  - Individual characteristics? Yes, for some

Conclusion (cont)

- What drives angler non-compliance?
  - Few general patterns
    - Legitimacy of regulation (attitude) seems most important
    - Technical measures like gear restrictions and minimum size regulations seems most popular
      - in accordance with findings in commercial fisheries, e.g. Nielsen and Mathiesen (2003)
    - Season regulation and daytime (hour limitations) regulations most unpopular
      - in contrast to findings in commercial fisheries (e.g. Nielsen and Mathiesen (2003)

Conclusion (cont)

- «Legitimacy is clearly a complex issue, encompassing processes and institutions at many different levels, and we should not be surprised if it is difficult to find clear, consistent and unambiguous results when we investigate it and its implications for regulatory compliance» (Hatcher and Gordon 2005)

- Seems true for recreational fishing as well

- Main message: To trust in voluntarily informal regulation does not seem to promising (at least not in this case)