

CHAPTER 3. REGULATIONS

INTRODUCTION

One of the most common activities associated with fisheries management has been the utilization of regulations. In consideration of regulations, the most important consideration is biology. Our credibility as biologists is both respected and expected by the angling public. Therefore, the utilization of regulations for other than biologic reasons will necessarily lack the result the public expects, and will undermine our credibility with the angling public. Therefore, most fishery biologists would prefer not to regulate unless it is necessary.

However, although most biologists are more adept at dealing with fish than people, it is almost certain social and ethical concerns will arise, and a biologist will be forced to deal with these issues. Social limits were initially imposed with the hope they might distribute harvest among anglers, but research has not borne this out. This concept may occur in small, heavily fished waters or where daily bag limits are extremely restricted. Where liberal panfish limits are imposed it is done mostly for social reasons. Bag limits place a value on an important resource, but it also gives anglers a target to aim for and creates high-grading, which can lead to increased angling mortality. The recently instituted 25 bag limit on panfish (bluegill; crappie; yellow perch) was brought before the Natural Resource Commission as a strictly sociological regulation. Iowa DNR research has shown that very few anglers exceed this limit, which is why it has little or no biological impact on our water bodies. The few anglers that do catch large numbers of panfish create an impression that overharvest is occurring; this is a timeless issue, and the better the fishing, the more overharvest is perceived. Habitat, including water quality, remains the most important factor driving Iowa's fish populations.

When considering implementation of a regulation, biologists should first document that overharvest problems exist. Overharvest in freshwater sport fisheries is usually considered to be a point where size structure of a population (i.e., "quality" to anglers) is negatively impacted. While recruitment overfishing, that is harvest of adults to the point where they can not produce sufficient young, is primarily a marine issue, it has been suggested certain freshwater stocks have suffered from similar issues in recent years. However, for purposes of this Chapter, we will consider over harvest to mainly affect size structure of populations.

Regulations are tools to be used in conjunction with other management practices such as stocking, habitat manipulation, or even watershed protection. The key to fishery regulation is to utilize them with a given set of objectives, just as you would any other fishery management activity. Regulations can take a number of forms; however, most regulations will fall under bag or creel limits, length limits, gear restrictions, and season closures.

CREEL LIMITS

Often the public has multiple misconceptions regarding the utility of creel or bag limits in maintaining or improving Iowa fish populations. While there may be specific and very rare exceptions, it is generally accepted within the profession that creel limits need to be too restrictive to do any good, if over harvest truly exists. As a result, the very restrictive nature of such regulations has generally not been acceptable to most anglers. For example, Gabelhouse (1984) observed that 70% of adult largemouth bass were harvested from a Kansas lake in a 4 ½ month period, despite angler harvest rates of less than 1.5 bass per trip. Any change in bag limit would have had no impact on the rate or extent of over harvest in this fishery.

In Iowa, we have seen similar trends in panfish populations. In fact, we receive more complaints about panfish when the fishing is good, than when the fishing is fair, or even poor. When the fishing is good, anglers see a lot of panfish being harvested and they become very concerned about the potential over harvest of our panfish stocks.

To evaluate the efficacy of panfish bag limits we conducted extensive creel surveys on the Iowa Great Lakes (12 year data set), pools 9-13 of the Mississippi River (7 year data set), Swan Lake (3 year data set), and Lake Rathbun (2 year data set). These systems were selected since they are all known for their excellent panfish fisheries and they are geographically diverse representing most of the major habitat types in Iowa.

Completed trip information were obtained from boat, shore, and ice anglers. Using this information, we were able to determine the impact of Fish Hogs, and determine the effectiveness of various daily bag limit scenarios.

The first thing we noted is that the vast majority of anglers fishing for panfish harvested less than 10 fish on each fishing trip, and only a very small minority of anglers actually harvested more than 20 panfish on each trip. This was true for all the datasets we examined -- from the backwater pools of the Mississippi River to the natural lakes in NW Iowa, to the small and large impoundments in southern Iowa.

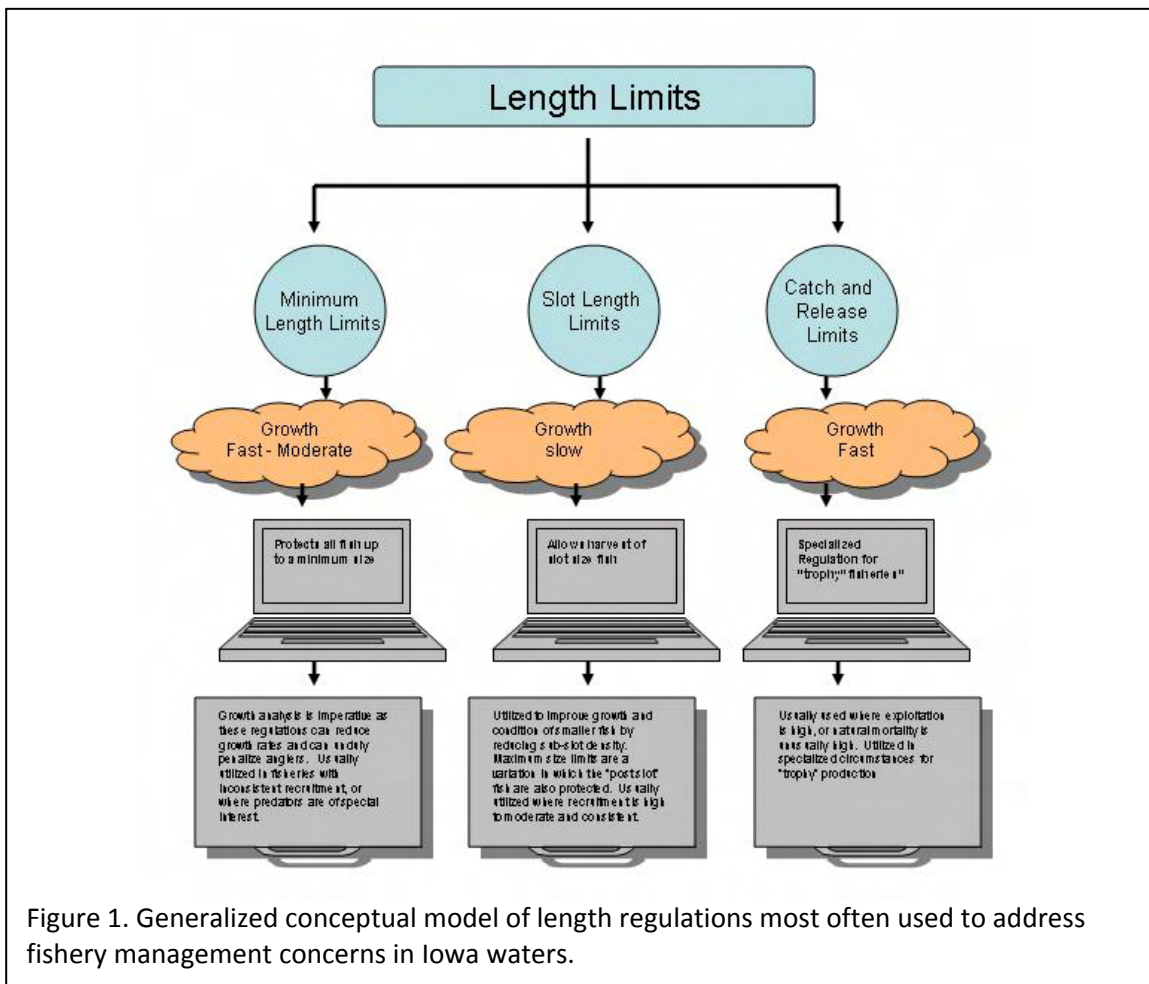
Table 1 demonstrates the potential effect of various bag limits on yellow perch, bluegill, and crappie populations across the State of Iowa. To be biologically effective, the daily bag limit on panfish would have to be reduced to about 5 fish per day, which would reduce panfish harvest about 38% statewide and may spread out the harvest of panfish to more anglers.

Table 1. Relationship between proposed daily bag limits and the percent of harvest reduction for Iowa panfish.

Proposed daily bag limit	Potential reduction in harvest (%)	Proposed daily bag limit	Potential reduction in harvest (%)
0	100%	16	10%
1	76%	17	9%
2	61%	18	7%
3	51%	19	6%
4	44%	20	5%
5	38%	21	4%
6	34%	22	3%
7	30%	23	2%
8	26%	24	1%
9	24%	25	0%
10	21%	26	0%
11	19%	27	0%
12	17%	28	0%
13	15%	29	0%
14	13%	30	0%
15	11%	31	0%

LENGTH LIMITS

If repeated fishery surveys indicate excessive harvest a special regulation may be implemented to prevent over harvest and depletion of fish stocks. Today a variety of size limits, including both minimum and maximum size limits, slot limits, and catch and release regulations have been successfully utilized to maintain favorable fish populations, community structure, and quality angling. Figure 1 is a generalized model for different types of length limits available for application in Iowa waters.



Minimum Length Limits

Under minimum length limits fish below a designated length must be released. Minimum length limits are generally imposed to lower both angling and total mortality in highly vulnerable populations and to reduce exploitation of fish before they reach sexual maturity.

Minimum size limits have often been successful in fisheries where harvest is high or recruitment is low or inconsistent. However, in some heavily fished waters the size composition may shift

with few individuals available at sizes above the minimum length limit and “stockpiling” (e.g. Johnson and Anderson 1974) may occur. Under this condition intraspecific competition may lead to reduced growth rates and “stunting” may occur.

Slot Length Limits

Slot length limits prohibit harvest from a designated length range and fish captured within that range must be released. Slot length limits are usually applied to fisheries where recruitment is high and growth of the target species is slow. In addition to allowing harvest of large individuals, the regulation encourages harvest of fish below a given length range to reduce the overall density of smaller fish in the population. Yet these regulations provide substantial catch and release angling for fish within the protected length range. The theory behind slot length limits is to channel the energy tied up in biomass of small fish up through the extended length range of the species.

Maximum size limits

Maximum size limits are rare but in situations where large fish must be protected (e.g. to protect spawning fish or to provide a “trophy” fishery) where growth rates need to be improved a maximum size limit may be considered. For instance, in a largemouth bass fishery where the biologist wishes to provide an increased opportunity of catching a large (>19 inches) largemouth bass, yet recruitment is high and growth is slow, they may consider a maximum size limit of 12 or 13 inches to promote harvest of small fish, but protection of large fish. A similar tool to a maximum size limit may be a high slot length limit. For instance, a slot length limit of 13-21 inches on largemouth bass would provide a similar result as a 13 inch maximum size limit. Maximum size limits, like slot length limits, are generally applied to fisheries with high and consistent recruitment.

Catch and Release Regulations

Catch and release regulations are usually applied to important fisheries (usually black bass or salmonids) where “trophy” product is desired. Under this type of regulation all fish are captured and returned immediately to the water. The principal objective is to reduce fishing mortality, thereby maintaining high catch rates for the target species, while improving the overall size distribution. Recruitment under this type of regulation is usually low to moderate and angling mortality is potentially high. Special attention to growth rates should be given as “stockpiling” can occur under such regulations and the “trophy” status of the fishery can be lost due to slowing growth coupled with moderate levels of natural mortality. In addition, fisheries subject to consumption advisories may also be subject to such regulations so as to allow for angling recreation despite the fact that the fish are classified as inedible.

Gear Restrictions

Although mainly utilized in coldwater trout streams, gear restrictions are another potential regulation. Currently, any trout fishery in Iowa with a special regulation, including 14-inch minimum length limits or catch and release regulations are also subject to artificial lure restrictions also. Artificial lures are defined as lures that do not contain or have applied to them any natural or human-made substance designed to attract fish by the sense of taste or smell.

Season Closures

While not widely utilized, season closures are an important means of managing overexploited fisheries in times of extremely high vulnerability, e.g., for walleye in the Iowa Great Lakes.

Data Requirements:

In addition to a well-established set of objectives, a regulation change should be preceded by several measures of the rate functions of the target species. Measures of growth rate, recruitment, and mortality are essential in determining which, if any regulation change should be made. Growth rate either length at age or incremental growth can suggest the utility of certain regulation choices prior to implementation. For example, if growth of walleye in a water body is slow, protection of the fishery with a minimum length limit is unlikely to have beneficial effects. In fisheries with low recruitment a slot length limit would be a suspect choice.

Data modeling is currently available and the utility of these programs will continue to improve. Currently, several models are available to model specific dynamics of fish populations. Models such as FAST (Slipke 2000) are available, allowing biologists to interpret large amounts of sampling data. The program provides for the evaluation of proposed minimum, slot, and bag limits on very low to heavily exploited fisheries.

FAST requires age-structure data and uses the Jones modification of the Beverton-Holt equilibrium yield equation (see Ricker 1975) to compute both a yield-per-recruit and a dynamic pool model. For the dynamic pool model, the entire population is simulated over time similar to Ricker's (1975) dynamic pool model. Besides yield, FAST provides the analyst with a host of predicted population parameters including for example the number of fish harvested and dying naturally, mean weight and length of harvested fish, number in the population above and below some lengths of interest, total number of fish and biomass in the population, stock density indices, number of age-1 fish, and the Spawning Potential Ratio (SPR).

Regulation Evaluation

Effects of regulations should be evaluated. These evaluations should always be relative to the specific biological objectives established prior to regulation implementation. Alterations to the regulation may be necessary. In addition, sometimes regulations may be removed if changes in the population are observed. Common changes might include changes in growth or recruitment. Consistent evaluation of the fishery is required to make such judgments.

REFERENCES

- Gabelhouse, D.W., Jr. 1984. An assessment of largemouth bass slot limits in five Kansas lakes. Federal Aide Project, FW-9-P-3, Kansas Fish and Game Commission, Pratt, Kansas.
- Johnson, D.L., and R.O. Anderson. 1974. Evaluation of a 12-inch length limit on largemouth bass in Philips Lake, 1966-1973. Pages 106-113 in J.L. Funk, editor. Symposium on over harvest and management of largemouth bass in small impoundments. American Fisheries Society, North Central Division, Special Publication 3, Bethesda, Maryland.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada, Bulletin 191, Ottawa.
- Slipke, J.W. and M.J. Maceina. 2000. Fishery analysis and simulation tools, FAST 1.0. Auburn University, Alabama.

