Adaptive Waterfowl Harvest Management

AGENCY:	U.S. Fish and Wildlife Service (USFWS)
INVOLVED PARTIES:	Flyway Councils (Association of Fish and Wildlife Agencies)
POINT OF CONTACT:	Fred A. Johnson, 352-392-3035, fred_a_johnson@fws.gov
DATES:	*Began:* 1995 *Ended:* Ongoing
INTERNET SITE:	www.fws.gov/migratorybirds/mgmt/ahm/ahm-intro.htm

PROJECT DESCRIPTION:

The Migratory Bird Treaty Act (as amended) authorizes the Federal Government to establish annual regulations governing the sport hunting of waterfowl within the United States. Because of the need to collect and analyze biological data each year, the time available for developing regulatory proposals, soliciting public comment, and setting hunting seasons is extremely limited. Although the regulatory process has worked reasonably well from a biological perspective, it tends to be controversial because of uncertainties and disagreements about the impacts of regulations on harvest and waterfowl abundance. In 1995, the USFWS implemented an approach referred to as adaptive harvest management (AHM), in which managers seek to maximize sustainable harvests against a background of various sources and degrees of uncertainty. The key feature of this approach is an explicit accounting for uncontrolled environmental variation, incomplete control over harvest levels, and key uncertainties regarding waterfowl population dynamics. Using stochastic control methodology, regulatory policies are designed to provide optimal hunting opportunities relative to an explicit management objective, as well as the knowledge necessary to improve long-term management performance. The AHM process has proved to be an effective tool for considering the relative risks of alternative management outcomes, and for reducing uncertainty about regulatory impacts.

ADAPTIVE MANAGEMENT (AM) ELEMENTS:

What management issue was the primary driver?

The USFWS and State resource agencies (through the four Flyway Councils) share decision-making responsibilities over the setting of migratory bird hunting regulations. The rule-making process had become overly contentious because of uncertainties and disagreements about the impacts of regulations on harvest and waterfowl abundance.

What uncertainties led to an Adaptive Management approach being selected?

Understanding the nature of density-dependent population growth is critical to sustainable harvesting and yet continues to be the source of great debate among waterfowl scientists. AHM thus allows for competing hypotheses that involve the extent to which survival and reproductive processes are density-dependent.

How was the monitoring and science framework designed to support timely management adjustments to changing resource conditions and increased certainty?

With respect to the five components necessary to carry out AHM (clear objectives, management options, a set of competing models, measures of model credibility, and a monitoring program), the preexistence of an excellent monitoring program and well-articulated models of system response

were probably the two most important pre-adaptations useful in the establishment of AHM. But it took the existence of scientists who were knowledgeable about methods of optimal stochastic control and who wanted to apply these methods to harvest management that brought development of AHM to fruition. By making informed decisions each year (using the current system state from the monitoring program and predicting future system states from the models) and then observing how the system actually responds (again from the monitoring program), the mechanics of learning and adaptation were institutionalized.

Please describe the process used for involving partners/stakeholders.

The AHM process relies on the established public rule-making process for setting hunting regulations. However, it depends much more heavily than in the past on the close collaboration of managers and researchers from the Federal, State, and academic arenas. It has been necessary for both researchers and managers to be involved in all phases of the process, yet managers and researchers maintain distinct responsibilities appropriate to their respective roles in the decision-making process.

Please describe the mechanism for adapting decisions based on monitoring results. Was an Environmental Management System (EMS) used?

AHM process follows an EMS model. Each year an assessment process is used to develop a set of prescriptions that provide an optimal regulatory choice (e.g., liberal or restrictive) for each possible state of the ecological system. Based on the system state as observed through the monitoring program, the optimal regulatory alternative is identified and vetted through the public rule-making process. Given a regulatory decision, each alternative model of system dynamics makes a different prediction about system state in the subsequent year. When the new system state is observed through the monitoring program, models that better predicted the actual change in system state gain credibility. Those models in turn carry more weight in the assessment process for formulating a new set of regulatory prescriptions. In this way, the regulatory strategy evolves over time to account for what is learned about system dynamics through the management process. Thus, AM relies on an iterative cycle of monitoring, assessment, and decision-making to clarify the relationships among hunting regulations, harvests, and waterfowl abundance.

Was the AM approach established as a result of a National Environmental Policy Act (NEPA) process (analysis and documentation supporting the decision to implement the AM)? If so, how did the NEPA process address subsequent adaptive decisions and actions?

While AHM has not yet been reviewed and evaluated programmatically via an environmental impact statement (EIS), there have been environmental assessments (EAs) conducted each year since 1995 to promulgate regulations based on the AHM program. The EA first establishes four to five discrete levels of hunting regulations ranging from a closed season to the most liberal season. These regulatory alternatives are proposed early in the calendar year in the *Federal Register* and finalized after public comment and input from the International Association of Fish and Wildlife Agencies Flyway Councils in late spring. The AHM protocol is then used to identify optimal levels of hunting regulations based on results and analysis of resource monitoring programs along with unambiguous harvest-management objectives. The principal product of the AHM process is a set of prescriptions, in which an optimal regulatory alternative is identified for each possible level of observed waterfowl population size and habitat conditions. The preferred alternative is then identified in the EA using results from the current year's resource monitoring programs. The impacts of the regulatory alternatives, including the preferred alternative, are evaluated based on predictions of associated hunting pressure and subsequent waterfowl population changes. These

explicit predictions are at the heart of the AHM program and form the basis of learning by allowing for the comparison of predicted with observed impacts. As uncertainty is reduced, better predictions are possible, and this in turn leads to regulatory decisions with increasingly better performance relative to management objectives.

Has the AM approach been evaluated in a subsequent NEPA process? If so, what has AM contributed to the NEPA process?

A programmatic EIS concerning migratory bird hunting regulations was first issued in 1977, and the last supplement was issued in 1988 (SEIS 88). The preferred alternative of SEIS 88 was for "stabilized regulations," in which hunting regulations would remain largely unchanged for a specific period of years, barring significant changes in migratory bird populations. However, SEIS 88 did not establish the levels at which regulations would be stabilized, nor the criteria for when departures from stabilized regulations would occur, leaving this to consultation with Flyway Councils and the public at large. The development of AHM was largely motivated by the need to develop these guidelines and by the growing recognition that considerable uncertainty existed concerning system dynamics and regulatory impacts. AHM was first implemented in 1995 after endorsement by an interagency task force that was commissioned by the USFWS director and after review in the public rule-making process. The AHM process has greatly simplified and streamlined the annual process of preparing an EA. Regulatory alternatives are now well defined based on a public rule-making process, and their potential impacts are quantifiable and testable. AHM has made development of an EA more of an objective process, and it demonstrates explicitly how the best science is used in establishing the preferred alternative. The AHM process is by its very nature a systematic, coherent, and open process for decision-making; these features have great potential to enhance the annual EA process further. In August 2005, the USFWS notified the public that it was beginning preparation of a supplemental EIS for the Sport Hunting of Migratory Birds under the authority of the Migratory Bird Treaty Act. The EIS will consider a range of management approaches for the sport hunting of migratory birds, including the current AHM approach. Incorporating AHM into a preferred alternative will institutionalize an adaptive approach for setting annual regulations, as well as a protocol for application of AHM concepts, within the NEPA framework.

RESULTS:

Benefits provided by AM to date (i.e., reduced uncertainty, improved project efficiency and efficacy compared with other management options):

Benefits include (1) an explicit linkage between operational monitoring programs and management decision-making; (2) an explicit protocol for modifying actions based on what is learned; (3) better predictive models of duck population dynamics and, thus, increased probability of sustainable harvesting; (4) a coherent, systematic process for understanding the implications of various management goals, objectives, and constraints; (5) greatly reduced contentiousness in the rule-making process and as a consequence, a strengthening of partnerships. By iteratively updating model weights and optimizing regulatory choices, the process should eventually identify which model is most appropriate to describe the dynamics of the managed population. The process is optimal in the sense that it provides the regulatory choice each year necessary to maximize management performance. It is adaptive in the sense that the harvest strategy "evolves" to account for new knowledge generated by a comparison of predicted and observed population sizes.

Limitations of using AM:

Understanding the large-scale dynamics of migratory bird populations is difficult and is limited by the resolution of extant monitoring programs. The AHM process is passively adaptive; i.e., there are no probing actions to reduce major uncertainties because the perceived risk to short-term hunting opportunity is too great (biological learning is slow and the strength of inferences is limited).

Financial cost of implementing AM:

The necessary start-up costs for AHM were largely absorbed within existing monitoring, assessment, and decision-making programs.

How did the AM approach affect the timeline for managing the system?

The AHM process did not affect the timeline for setting hunting regulations because there was already a well-established, public rule-making process in place.

Degree of stakeholder buy-in:

The degree of support for the process has been overwhelming. Debate continues but by and large is no longer focused on biological issues that cannot be resolved with extant data. Constructive debate now revolves around appropriate management objectives and regulatory options, which involve social values.

CHALLENGES:

What impediments, constraints, and/or challenges were overcome? How?

The greatest challenge to any AM program is communication. The success of AM depends on a commitment to an open and inclusive process and on the skill and resources to ensure that it feels so to stakeholders. The success of AHM was in large part due to the investment we made in communicating with so-called internal audiences—those Federal and State personnel involved in the regulations-setting process. Workshops, seminars, presentations, interactive computer simulations, publications, and conferences all played a key role in building understanding and ownership in the process.

What aspects of the project need improvement?

Competing social values (i.e., management goals and objectives), a lack of empirical data on the values held by stakeholders, and the lack of effective procedures for organizing what is essentially a political debate pose a threat to the long-term viability of AHM (or any other informed approach to management).

How and when will the need for improvement be addressed, if at all?

The National Flyway Council and the Wildlife Management Institute, in partnership with the USFWS, recently convened a Communications Strategy Team. The team met on May 16, 2005, and requested that a systematic and sustained conversation be initiated with waterfowl stakeholders. The team identified several priority strategies, including a national duck hunter survey in 2005, panels/surveys of avid and influential waterfowl hunters, and waterfowl-hunter focus groups. Funding has been forthcoming and efforts are underway. The information obtained from these

communication strategies will be used to help understand what motivates hunters to participate in the sport, to understand their preferences for various regulatory options, and ultimately to understand what makes for a satisfying hunting experience.

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