



Impacts of Animals on Earthen Dams

Course Number: CE-02-205

PDH: 10

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1 Introduction and Purpose of Course

1.1. Background

In 1999, the Federal Emergency Management Agency (FEMA) and the Association of State Dam Safety Officials (ASDSO) jointly conducted research and a workshop to shed light on the national problem of animal intrusion damage to earthen dams and the resulting safety issues. The FEMA/ASDSO survey and workshop united dam owners, engineers, state and federal regulators, wildlife managers, foresters, and academia to form an educated and experienced front against the growing problem of earthen dam damage and failures due to animal intrusion. The information generated by roundtable discussions and survey answers indicates that while most states recognize animal intrusion as a problem, only a handful know guidance on dams and wildlife management practices available to the dam professionals and owners. Based on input from the dam communities, FEMA/ASDSO's mission to develop a guidance course on the proper management of nuisance wildlife in the earthen dam environment became clear.

To determine the information needs of the dam community—and therefore the most appropriate focus of this course—FEMA/ASDSO issued a survey in 1999 and used the survey input from the 48-state dam safety officials representatives and 11 federal agencies representing the Interagency Committee on Dam Safety (ICODS). Additionally, a second survey was issued in 2003 to identify the current needs of each state, determine what nuisance wildlife and damages the states encounter, and understand which mitigation methods are being used with success or failure. Four main ideas emerged from the two survey efforts; these ideas consequently steered the direction of this course:

- Cumulatively, the states indicated a range of problems caused by numerous wildlife species relative to the operation of dams. This course discusses 23 species with regard to their habitat, behavior, threat to dams, food habits, identifying characteristics, and management options: Muskrat, Beaver, Mountain Beaver, Groundhog, Pocket Gopher, North American Badger, Nutria, Prairie Dog, Ground Squirrel, Armadillo, Livestock (cow, sheep, horse, pig and wild pig), Crayfish, Coyote, Moles and Voles, River Otter, Gopher Tortoise, Red Fox and Gray Fox, Canada Goose, American Alligator, and Ants.

- While the states are fully aware of the potential adverse impacts wildlife activity can have on earthen dams (such as failure), private dam owners and local dam operators are often not aware of potential problems, and thus may not conduct inspections with wildlife damage in mind. Local dam owners may not typically mitigate existing wildlife intrusion problems or prevent them in the future.
- States want to know how other states are successfully mitigating wildlife damages. Further, mitigation and prevention guidance should be developed and conveyed to the dam communities.
- Guidance booklets for local dam owners are needed to assist dam inspectors in identifying and mitigating animal intrusion issues.

25: number of states that indicate animal activity has caused or contributed to unsafe dam operation or outright failure within the state.

9: number of states aware of information or guidance on the effects of animal activity on dams.

Out of 48 states that responded to FEMA and ASDSO surveys, 25 document nuisance animals as the cause of dam failures or unsafe dam operations in their states. The U.S. Bureau of Reclamation, the National Park Service, and the U.S.

Department of Agriculture documents several similar cases at the federal level. State dam safety officials and federal agencies agree that animal burrows within dams can cause substantial and costly damage if left unmitigated and are consequently a major concern.

1.2. Target Audience, Purpose, and Application of This Course

This course provides technical guidance to dam specialists (including dam owners, operators, inspectors, state dam officials, and consulting engineers) in areas of focus identified through the two survey efforts and workshops. The purposes of this course are to:

- Assist dam specialists in understanding the impacts wildlife can have on earthen dams.

- Provide dam specialists with basic information on habitat, range, description, and behavior of common nuisance wildlife to aid in their proper identification at the dam.
- Describe state-of-practice methods to prevent and mitigate adverse wildlife impacts on earthen dams.
- Provide state-of-practice design guidance for repair and preventive design associated with nuisance wildlife intrusion.

It is envisioned that the entire dam specialist community will use this course to augment their routine duties in earthen dam management. This course is presented as a process for dam inspection and management that includes wildlife damage identification and control. This course provides technical information and guidance on:

- How wildlife damage adversely affects the safe operation of earthen dams; specifically, hydraulic alteration, internal and external erosion, and structural integrity losses (Chapter 2.0).
- Dam inspections that incorporate a biological component to sensitize dam specialists to the aspects of their dams that attract wildlife and to understand where nuisance wildlife are likely to occur on the dam (Chapter 3.0).
- Biological data for specific nuisance wildlife to assist the dam specialist in identifying which nuisance wildlife inhabits the dam. Biological data will also assist in controlling nuisance wildlife (e.g., listed food sources can be removed to encourage the animal to leave the area) (Chapter 4.0).
- Dam design specifications and methods that can be incorporated into repair of existing dams or new dam designs to prevent wildlife intrusions (Chapter 5.0).
- Guidelines to determine when wildlife management should occur at a dam (beyond dam repair and prevention actions) and wildlife management methods that can be implemented when control of specific nuisance wildlife populations is deemed

necessary. Specific methods discussed include habitat modification, use of toxicants and fumigants, trapping, and shooting (Chapter 6.0).

- The fiscal issues related to appropriate and timely wildlife management at earthen dams (Chapter 7.0).

1.3 Technical Resources Cited

The technical information provided in this course represents the most current practices in the areas of wildlife data and management and engineering inspection and repair, as they relate to nuisance wildlife and their effects on safe dam operations. While numerous technical sources are cited throughout the document, three main sources form the backbone of this course's technical understanding and recommendations. The first source is a course titled *Prevention and Control of Wildlife Damage* (University of Nebraska, 1994). The data contained in the 1994 course are considered the industry standard for pest control, and the course is used as the handbook for those testing for licensure as pest control managers. It should be noted that the 1994 course is under revision and a revised version will be completed in February 2005. Until the release of the revised course, the 1994 edition remains the leading guidance literature in this field and is accepted as the most current practice in nuisance wildlife management (Smith, Pers. comm., 2003; 2004). The second source is a booklet called *Prevention and Control of Animal Damage to Hydraulic Structures* (USDA, 1991). The 1991 booklet adapts some of the 1994 course data for application to the dam environment. The last source is technical data on remedial dam repair design by Dr. B. Dan Marks, as presented in the 2001 ASDSO West Region Seminar on Plant and Animal Penetrations for Earthen Dams (ASDSO, 2001). Many other sources are also used throughout this course to provide a cross-reference of data as well as a broad spectrum of information.



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