DECISION AND

FINDING OF NO SIGNIFICANT IMPACT FOR THE

EVIRONMENTAL ASSESSMENT:

MAMMAL DAMAGE MANAGEMENT IN ILLINOIS

January 2009

INTRODUCTION

In 2002, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program completed an environmental assessment (EA) on alternatives for the management of conflicts and damage caused by beavers in Illinois (USDA 2002)[1]. The EA documented the need for beaver damage management (BDM) in Illinois and assessed potential impacts of various alternatives to respond to beaver damage and associated risks to human health and safety, livestock health, natural resources and property. The EA's Decision and Finding of No Significant Impact (FONSI) allowed for the implementation of an Integrated Beaver Damage Management program to respond to requests to protect property, natural resources, and human health and safety from beaver damage at airports, municipalities, industrial sites, agricultural sites, public and private land within Illinois. WS monitors the impacts of its BDM actions annually to determine if the impacts are within the parameters analyzed in the EA. Review of Illinois WS' BDM activities indicated that although WS' beaver damage management activities remained within the parameters analyzed in the 2002 EA, WS was receiving increasing requests to help reduce damage and conflicts caused by mammal species other than beaver. WS prepared a new EA to analyze the environmental impacts of alternatives for WS' involvement in reducing damage and conflicts caused by a wide range of mammal species in Illinois. The new EA was made available for public comment April 2008. This document provides notice of WS' choice of a management alternative and determination regarding the magnitude of the environmental impacts associated with that alternative that were made using information in the EA, and information obtained in response to public comments.

The EA was prepared in cooperation with the USDA Forest Service Shawnee National Forest and in consultation with the Illinois Department of Natural Resources (IDNR) and the Illinois Department of Public Health to determine impacts on federal and state wildlife populations and to ensure that the proposed actions are in compliance with relevant laws, regulations, policies, orders and procedures. All WS MDM activities will be conducted consistent with the Endangered Species Act of 1973 as amended and all other applicable federal, state and local laws and regulations.

II. BACKGROUND

The determination of a need for WS assistance with MDM in Illinois is based on requests for assistance with mammal damage to airports, municipal sites, industrial sites, agricultural sites, public and private lands in Illinois, and mammal-related risks to public health and safety. Some of the types of damage that resource owners/managers seek to alleviate include: risks to public health and safety at airports, damage to agricultural crops, structures, and water retention basins, and risks to state and federally-listed threatened and endangered (T&E) species. WS may also receive requests for assistance with surveillance for and management of diseases in wildlife. Details on the need for mammal damage management in Illinois are provided in the EA. Mammal species addressed in the EA include: coyotes (*Canis latrans*), raccoons (*Procyon lotor*), Virginia opossums (*Didelphis virginianus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), mountain lion (*Puma concolor*), feral cats (*Felix* sp.), striped skunk (*Mephitis mephitis*),

[1] The EA and supporting documentation are available for review at the USDA-APHIS-WS State Office, 2869 Via Verde Dr., Springfield, IL 62703.

badger (*Taxidea taxus),* mink (*Mustela vison*), bobcat (*Lynx rufus*), weasel (*Mustela frenata* and *M. rixosa*), beaver (*Castor canadensis*), nutria (*Myocastor coypus)*, muskrat (*Ondatra zibethica*), river otter (*Lutra canadensis*), woodchuck (*Marmota monax*), eastern cottontail rabbit (*Sylvilagus floridanus*), feral swine (*Sus scrofa*), domestic/feral dog (*Canis familiaris*), nine-banded armadillo (*Dasypus novemcinctus*), brown (Norway) rat (*Rattus norvegicus*), black (roof) rat (*Rattus rattus*), house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), eastern mole (*Scalopus aquaticus*), short-tailed shrew (*Blarina brevicauda*), gray squirrel (*Sciurus carlolinensis*), fox squirrel (*Sciurus niger*), red squirrel (*Tamiasciurus hudsonicus*), Eastern chipmunk (*Tamias striatus*), and thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*).
State agencies in Illinois provide advice and issue permits to control damage but generally do not provide direct services. Private companies provide some management services, but they may be too expensive, not geographically available, or the company may not be knowledgeable about a particular damage situation. In addition, some resource owners/managers feel more comfortable with WS as the federal authority in MDM, or may have security reasons for preferring to work with a federal agency.

Subject to federal regulations and Section 3 of the Illinois Endangered Species Act, the IDNR may authorize owners and tenants of lands or their agents to remove or destroy any wild bird or wild mammal when the wild bird or wild mammal is known to be destroying property or causing a risk to human health or safety upon his or her land (Illinois Compiled Statute (ILCS): 520 ILCS 5/2.37). Consequently, property owners/managers do not need to use WS to take action to resolve mammal damage problems, and are likely to take action to resolve their problems with or without WS assistance. The EA only evaluated alternatives for WS involvement in MDM and cannot change Illinois State Statutes and IDNR policy permitting private landowners access to lethal and nonlethal alternatives for managing mammal damage. Therefore, a major factor in determining how to analyze potential environmental impacts of WS' involvement in MDM is that such management will likely be conducted by state, local government, or private entities that are not subject to compliance with NEPA, even if WS is not involved. This means that the federal WS program has limited ability to affect the environmental outcome (*status quo*) of MDM in the state, except that the WS program is likely to have lower risks to nontarget species and less impact on wildlife populations than some actions that may be taken by resource owners/managers. In the absence of a WS program, some individuals experiencing damage may take illegal or unsafe action against the problem species either unintentionally due to lack of training, or deliberately out of frustration with continued damage. In these instances, adverse impacts on the environment may be greater than with a professional MDM program. Despite the limitation to WS' influence on the environmental *status quo* and associated limit to federal decision-making, the EA process is valuable for informing the public and decision-makers of the substantive environmental issues and alternatives relevant to the management of mammal damage in Illinois.

III. ISSUES ANALYZED IN THE EA

The following issues were identified as important to the scope of the analysis (40 CFR 1508.25) and each of the proposed alternatives was evaluated relative to its impacts on these issues.

- $ Effects on target mammal species
- $ Effects on other wildlife species, including threatened and endangered species
- $ Effects on human health and safety
- $ Impacts to stakeholders, including aesthetics
- $ Humaneness and animal welfare concerns of methods used
- $ Effects on wetlands

IV. ALTERNATIVES ANALYZED IN DETAIL

Chapter 3 of the EA analyzes four potential alternatives that were developed to address the issues identified above. A detailed discussion of the anticipated effects of the alternatives on the issues is provided in Chapter 4 of the EA. The following summary provides a brief description of each alternative and its anticipated impacts.

Alternative 1 - *Technical Assistance Only* This alternative would not allow for WS operational MDM in Illinois. Wildlife Services would only provide technical assistance (advice) in response to requests for assistance with MDM. Currently, IDNR only provides direct MDM assistance in limited situations, but does provide technical assistance and issues permits for MDM activities as appropriate. Producers, property owners, agency personnel, or others could conduct MDM using any legal lethal or non-lethal method. Individuals might choose to implement WS recommendations, implement other methods not recommended by WS, use contractual services of private businesses, or take no action. Appendix B describes a number of methods that could be employed by private individuals or other agencies after receiving technical assistance from WS under this alternative.

Alternative 2 - *Integrated Mammal Damage Management Program (Proposed Action/No Action)*. The No Action Alternative is a procedural NEPA requirement (40 CFR 1502.14(d)) and is a viable and reasonable alternative that could be selected and serves as a baseline for comparison with the other alternatives. The No Action Alternative, as defined here, is consistent with guidance from the CEQ (CEQ 1981). In this guidance, the No Action Alternative for situations where there is an ongoing management program may be interpreted as "no change" from current management direction or level of management intensity.

Wildlife Services proposed to continue the current damage management program that responds to mammal damage in the State of Illinois. Wildlife Services involvement in MDM in Illinois is closely coordinated with the IDNR, and is conducted in accordance with permits and/or other authorities granted by the IDNR. The Integrated Wildlife Damage Management (IWDM) program implemented to reduce mammal damage under this alternative would involve the use and recommendation of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including the use of non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate non-lethal techniques like physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, mammals would be removed as humanely as possible using shooting, trapping, registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there may be instances where application of lethal methods alone would be the most appropriate strategy.

Alternative 3 - *Non-lethal Mammal Damage Management Only by WS*. This alternative would require WS to only use and recommend non-lethal methods to resolve mammal damage problems. Information on lethal MDM methods would still be available to producers and property owners through other sources such as IDNR, USDA Agricultural Extension Service offices, universities, or pest control organizations. Currently, IDNR only provides direct MDM assistance in limited situations, but does provide technical assistance and issues permits for MDM activities as appropriate. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, request WS direct assistance with non-lethal MDM, use contractual services of private businesses, or take no action. Persons receiving WS's non-lethal technical and direct damage management assistance could still resort to lethal methods that were available to them.

Alternative 4 - *No Federal WS Mammal Damage Management*. This alternative would eliminate WS involvement in MDM in Illinois. Wildlife Services would not provide direct technical or control assistance and requesters of WS' assistance would conduct their own MDM without WS' input. Information on MDM methods would still be available to producers and property owners through other sources such as IDNR, USDA Agricultural Extension Service offices, universities, or pest control organizations. Currently, IDNR only provides direct MDM assistance in limited situations, but does provide technical assistance and issues

permits for MDM activities as appropriate. Requests for information would be referred to these entities. Individuals might choose to conduct MDM themselves, use contractual services of private businesses, or take no action.

V. FEDERAL & STATE THREATENEDN AND ENDANGERED SPECIES CONSULTATIONS

At the time the EA was submitted for public comment, WS was in the process of conducting an informal Section 7 consultation with the United States Department of the Interior, Fish and Wildlife Service (USFWS) and IDNR regarding potential risks to federal & state-listed threatened and endangered species. Wildlife Services determined that the proposed action would either have no effect on or may affect but will not adversely affect federal or state-listed threatened and endangered species in Illinois. On September 28, 2008 WS received notice that, given the protective measures proposed by WS in the EA and the consultation letter, the USFWS concurred with this determination. On October 8, 2008 WS received similar concurrence from the IDNR regarding state-listed species.

VI. MONITORING

The Illinois WS program will annually monitor the impacts of its actions relative to each of the issues analyzed in detail in the EA. This evaluation will include reporting the WS take of all target and nontarget species to help ensure there are no adverse impacts on the viability of State native wildlife populations or non-target species including state and federally listed threatened or endangered species. Illinois Department of Natural Resources expertise will be used to assist in determining impacts on state wildlife populations.

VII. PUBLIC INVOLVEMENT

The EA was available for public review and comment during a 30-day period (03/14/08 – 04/14/08), which complies with public involvement guidelines/policies contained in NEPA, CEQ regulations, and APHIS NEPA Implementing Regulations, as well as all pertinent agency laws, regulations, and policies. A Legal Notice of Availability was placed in The State Journal Register, a daily newspaper with geographic coverage of all of the proposed project area, for three days (03/14/08 – 03/16/08). Wildlife Services also sent notices of availability and/or copies of the EA and amendment to individuals and organizations that WS knew might have an interest in the EA. Wildlife Services received two requests for copies of the Pre-Decisional EA. Wildlife Services received two comments on the EA during the comment period. No additional comments were received during the interval between the end of the EA and WS issuance of a final Decision on the alternative to be selected and its environmental impacts.

VIII. AGENCY AUTHORITIES

Wildlife Services Legislative Authority. Wildlife Services is the federal program authorized by law to help reduce damage caused by wildlife. The primary statutory authorities for the WS program are the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c). The mission of the WS program is to provide federal leadership in managing conflicts with wildlife. Wildlife Services' mission, developed through its strategic planning process (USDA 1999), is: 1) "to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety." Wildlife Services recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can cause damage to agriculture and property, pose risks to human health and safety, and affect industrial and natural resources. Wildlife Services conducts programs of research, technical assistance and applied management to resolve problems that occur when human activity and wildlife conflict.

Additionally, Memoranda of Understanding among WS and other governmental agencies also define WS' responsibilities in wildlife damage management. For example, a Memorandum of Understanding between the FAA and WS recognizes WS' role and expertise in providing wildlife hazard management assistance to the aviation community. It states, that the "FAA or the certificated airport may request technical and operational assistance from WS to reduce wildlife hazards."

United States Department of the Interior, Fish and Wildlife Service. The primary responsibility of the USFWS is fish, wildlife, and plant conservation. While some of the USFWS's responsibilities are shared with other federal, state, tribal, and local agencies, the USFWS has special authorities in managing the National Wildlife Refuge System; conserving migratory birds, endangered species, certain marine mammals, and nationally significant fisheries; and enforcing federal wildlife laws. The USFWS is charged with implementation and enforcement of the Endangered Species Act of 1973, as amended and with developing recovery plans for listed species.

Illinois Department of Natural Resources Legislative Authority. The Illinois Department of Natural Resources authority in wildlife management is given under ILCS Chapter 520. The mission of the IDNR is to manage, protect and sustain Illinois' natural and cultural resources; provide resource-compatible recreational opportunities and to promote natural resource-related issues for the public's safety and education.

Illinois Department of Agriculture. The mission of IDOA is to be an advocate for Illinois' agricultural industry and provide the necessary regulatory functions to benefit consumers, the agricultural industry, and our natural resources. The agency will strive to promote agri-business in Illinois and throughout the world. The IDOA registers pesticides for use in the state of Illinois.

Illinois Department of Public Health. The mission of the IDPH is to promote the health of the people of Illinois through the prevention and control of disease and injury. The IDPH is responsible for certifying structural pesticide applicators in the State of Illinois for both general use and restricted use pesticides in accordance with the Illinois Structural Pest Control Act. Illinois WS employees applying pesticides are certified pesticide applicators through the IDPH.

IX. DECISION and RATIONALE

I have carefully reviewed the EA. I believe the issues identified in the EA are best addressed by selecting Alternative 2, Continue the Current WS Integrated MDM Program (No Action/Proposed Action) and applying the associated Standard Operating Procedures and monitoring measures discussed in Chapter 3 of the EA. Alternative 2 provides the best range of damage management methods considered practical and effective, best addresses the issues identified in the EA, provides safeguards for public safety, and accomplishes WS' Congressionally directed role in protecting the Nation's agricultural and other resources including meeting its obligations to the IDNR, and cooperating counties and residents of Illinois. Wildlife Services policies and social considerations, including humane issues, will be considered while conducting MDM. While Alternative 2 does not require non-lethal methods to be used, WS will continue to provide information and encourage the use of practical and effective non-lethal methods (WS Directive 2.101). I have also adopted the EA as final because WS did not receive any comments that changed the analysis.

X. FINDING OF NO SIGNIFICANT IMPACT

The EA indicates that there will not be a significant impact, individually or cumulatively, on the quality of the human environment because of this proposed action, and that these actions do not constitute a major federal action. I agree with this conclusion and therefore determine that an EIS will not be necessary or prepared. This determination is based on the following factors:

1. MDM, as conducted by WS in the State of Illinois, is not regional or national in scope. Although MDM projects may occur anywhere in the state, individual activities will occur at localized properties.

2. Based on the analysis documented in the EA and response to public comments, the impacts of the Proposed Action will have no negative affects on public health or safety. The Proposed Action is expected to result in a direct beneficial impact on human health and safety, natural resources, property, and livestock health by reducing the potential health and safety risks posed by mammals at airports, dairies/feedlots, municipal sites, industrial sites, agricultural sites, public and private land in Illinois. Risks to the public from WS' methods were determined to be low in a formal risk assessment (USDA 1997 Revised, Appendix P).

3. The Proposed Action will not have a significant impact on unique characteristics such as park lands, prime farm lands, wetlands, wild and scenic areas, or ecologically critical areas. Built-in mitigation measures that are part of WS' standard operating procedures and adherence to laws and regulations that govern impacts on elements of the human environment will assure that significant adverse impacts are avoided.

4. The effects on the quality of the human environment are not highly controversial. Although there may be opposition to killing mammals, this action is not controversial in relation to size, nature or effects.

5. Standard Operating Procedures adopted and/or described as part of the Proposed Action minimize risks to the public, prevent adverse effects on the human environment, and reduce uncertainty and risks. Effects of methods and activities, as proposed, are known and do not involve uncertain or unique risks.

6. The Proposed Action does not establish a precedent for future actions. This action would not set a precedent for future MDM actions that may be implemented or planned within the state. Effects of the Proposed Action are minor and short-term in nature and similar actions have occurred previously in the state without significant effects.

7. No significant cumulative effects were identified through this assessment. The EA discussed cumulative effects of WS on target and non-target species populations and concluded that such impacts were not significant for this or other anticipated actions to be implemented or planned within the state. Adverse effects on wildlife or established wildlife habitats would be minimal.

8. This action will not affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places and will not cause loss or destruction of significant scientific, cultural, or historic resources. The proposed MDM program would not disturb soils or any structures and therefore would not be considered a federal undertaking as defined by the National Historic Preservation Act.

9. Wildlife Services determined that the Proposed Action would not result in any adverse effects on federally-listed threatened or endangered species.

10. The Proposed Action is consistent with local, state, and federal laws that provide for and/or restrict WS' MDM activities. Therefore, WS concludes that this project is in compliance with federal, state and local laws for environmental protection.

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For additional information regarding this decision, please contact Scott Beckerman, State Director, APHIS, WS, 2869 Via Verde Dr., Springfield, IL 62703 or by phone @ 217-241-6700.

Charles S. Brown, Regional Director
USDA-APHIS-WS – Eastern Region

1/8/09
Date

APPENDIX A

RESPONSES TO COMMENTS

Two comment letters on the predecisional EA were received from organizations and members of general public. This appendix contains issues raised by the public during the comment period for this EA and WS' response to each issue. Comments from the public are numbered and are written in bold text. The WS response follows each comment and is written in standard text.

1. Wildlife Services has provided valuable technical assistance to Illinois Department of Public Health and the public on issues regarding wildlife impacts on public health, especially in regards to management of risks associated with bats. Thank You. The need for professional wildlife damage management assistance with concerns regarding wildlife impacts on public health is included in the need for action (EA Section 1.2.1) and in Section 4.1.3.3.

2. The EA needs a more thorough review of current studies on flow devices and more recent publications by Lisle (2003, 1999) on the use of flow devices and Beaver Deceivers™. Discussion of maintenance costs of devices is inaccurate because does not include costs associated with improved devices. Noted, thank you. Material from Issue 2.3.6 has been removed and incorporated in a detailed discussion of beaver exclusion and water control devices in Appendix B of the EA. The revised information is as follows:

BEAVER EXCLUSION AND USE OF WATER CONTROL DEVICES

This section addresses exclusion and water control devices used to alleviate flooding damage without removing beaver. Although dams could be breached/ removed manually or with binary explosives, these methods are usually ineffective because beaver will quickly repair or replace the dam (McNeely 1995). Damage may be effectively reduced in some situations by installing exclusion and water control devices. Exclusion and water control devices can be designed so that the level of the beaver-created pond can be managed to eliminate or minimize damage while still retaining the ecological and recreational benefits derived from beaver ponds. In Illinois, WS also recommends modifications to site and culvert design (Jensen et al. 1999) as a nonlethal way of reducing problems with beaver dams at culverts.

Beaver Exclusion: Beaver exclusion generally involves the placement of fencing to prevent beaver access to water intake areas such as culverts. A variety of exclusion systems have been used including the Beaver Deceiver™, Beaver Bafflers™ and pre-dams (Lisle 2003, 1999, 1996, Partington 2002, Brown et al. 2001, Brown and Brown 1999). The Beaver Deceiver™ is a fencing system that is installed to prevent beaver blockage of culverts by minimizing environmental cues which stimulate dam construction, and by making culverts less attractive as dam construction sites (Lisle 2003, 1999, 1996). Beaver are deterred from blocking culverts by the installation of a fence on the upstream end of the culvert. Installation of a fence increases the length of the area which must be dammed, and if beaver build along the fence, may also increase the distance between the beaver and the source of the cues which stimulate damming behavior (e.g., water moving through culvert; Callahan 2005, Lisle 2003, 1999, 1996). Beaver prefer to build dams perpendicular to water flow, so fences are oriented at odd angles to water flow and are set so that they do not block the stream channel. Usually, fencing is also used to cover the up and downstream ends of the culverts to prevent beaver from entering the deceiver from the downstream side of the culvert and to prevent any beaver that might make it past the outer fence from plugging the interior of the culvert. Efforts are made to reduce the sound of water flowing through the culvert by raising the water level on the down-stream side of the culvert with dam boards or beaver-made dams; by constructing flumes to replace waterfalls, or, in extreme cases, by resetting the culvert (Lisle 1996). In situations where extra care is needed to ensure sufficient water flow through the culvert, Beaver Deceivers™ may be used in combination with water control devices (see below).

Cylindrical exclusion devices like the Beaver Bafflers™ are attached to culvert openings and reduce the likelihood that beaver will plug a culvert by spreading the water intake over a larger area (Brown et al. 2001). While effective in some situations (Partington 2002), in a study of beaver exclusion and water control devices, cylindrical shapes attached in-line with the culvert had a higher failure rate (40%) than trapezoidal shapes (e.g., Beaver Deceivers™ - 3% failure) and use of the cylindrical devices was discontinued in favor of trapezoidal fences (Callahan 2005).

Unlike Beaver Deceivers™ and cylindrical fences, pre-dam fences (aka, deep water fences, diversion dams; Brown and Brown 1999) are designed with the specific intention that the beaver build the dam along the fence. Pre-dam fences are short semicircular or circular fences that are built in an arc around a water inlet. The fence serves as a dam construction platform which allows beaver to build a dam and pond at the site but prevents beaver from plugging the water intake. If the size of the upstream pond is not an issue, no further modifications of the pre-dam are needed. However, in most cases, pre-dams are used in combination with water control devices to manage the size of the upstream pond.

Fence mesh size should be selected to minimize risks to beaver and nontarget species. Brown et al. (2001) noted that beaver occasionally became stuck in 6 inch mesh and that the risk of beaver entrapment was lower with 5 inch mesh. Lisle (1999) noted that the size of the mesh on the fence of the Beaver Deceivers™ (6 inch mesh) was such that it allowed most species to pass through the fence except beaver and big turtles. In remote areas where there is little traffic it may be acceptable for animals which cannot pass through the deceiver to travel across the road. However, for culverts under busy roads, it is necessary to design special "doors" which can allow the passage of beaver and large turtles through the device. For example, 30 cm-diameter T-joints have been used to allow access through Beaver Deceiver™ fences. The T shape reduces the likelihood that beaver can haul woody debris for dam construction inside the device (Lisle 2003). Fence caps are not attached to the up and down-stream ends of the culvert when it's necessary to allow passage of species like large turtles and beavers through the culvert.

Water Control Devices: Water control devices (aka pond levelers) are systems used to allow the passage of water through a beaver dam. The devices are used in situations where the presence of a beaver pond is desired but it is necessary to manage the level of water in the pond. Various types of water control devices have been described (Perry 2007, Clemson University 2006, Spock 2006, Simon 2006, Close 2003, Lisle 2003, 1999, 1996, Brown et al. 2001, Brown and Brown 1999, Organ et al. 1996, Wood et al. 1994, Miller and Yarrow 1994, Laramie and Knowles 1985, Roblee 1984, Arner 1964). The devices generally involve the use of one or more pipes installed through the dam to increase the flow of water through the dam. Height and placement of pipes can be adjusted to achieve the desired water level in the beaver pond. Beavers generally only check the dam for leaks, so, when site conditions permit, the inlet of the pipe is placed away from the dam to make the source of the water flow more difficult to detect and decrease the likelihood that beaver will attempt to plug the device. To minimize the sound/sensation of water movement and associated beaver damming behavior, the end of the pipe may be capped and water allowed to flow into the pipe through series of holes or notches cut through the pipe. Holes and notches may be placed on the underside of the pipe to further reduce signs of water movement. Alternatively, ninety-degree elbow joints are placed facing downward on the upstream end of the pipes to prevent the noise of running water from escaping and attracting beaver. A protective cage is placed around the upstream end of the inlet pipe to prevent beaver from blocking the pipe and reduce problems with debris blocking the pipe. As noted above, water control systems can be combined with exclusion devices to prevent beaver from blocking culverts while still maintaining a beaver pond at an acceptable level.

Efficacy of Beaver Exclusion and Water Control Systems. Exclusion devices and water control systems have been used for many years with varying degrees of success (USGAO 2001). Landowner management objectives play a role in how the efficacy of a level system is perceived (Nolte et al. 2001). Survey respondents classified pond levelers installed to manage wetlands for waterfowl habitat more successful than levelers installed to provide relief from flooding (Nolte et al. 2001). Success rates as low as 4.5% and 3% have been reported by the Massachusetts Division of

Fisheries and Wildlife and New York Department of Natural Resources (Langlois and Decker 1997). Nolte et al. (2001) reported only 50% of installed pond levelers in Mississippi meet landowner objectives and found that pond levelers placed in sites with high beaver activity more frequently failed if installed without implementing population control measures. Higher success rates have been reported for newer exclusion and water control systems ranging from 87% - 93% (Boyles 2007, 2006; Simon 2006; Callahan 2005). Lisle (2003) reported that use of the devices or a combination of a Beaver Deceiver™ and flow management device virtually eliminated the need for maintenance and beaver removal at 20 sites where clogged culverts and flooded roads had previously been a routine issue.

Exclusion and water control systems must be specifically designed to meet the needs of each site. Consequently, devices installed by inexperienced individuals may have a higher failure rate than those installed by a professional (Boyles 2006, Simon 2006, Spock 2006, Callahan 2003, Lisle 1996). Higher success rates reported for newer exclusion and water control devices may be indicative of increased understanding of the kinds of situations where these devices work best. For example, Callahan (2005) noted that exclusion and water control systems installed at culvert sites were more successful than similar systems installed at free-standing dams. Callahan (2005, 2003) also provides a list of sites that are not well suited to the use of exclusion or water control devices. Boyles (2007, 2006) reported some of the highest success rates for the new exclusion and water control systems, but only tested the devices at culvert sites.

Beaver build dams to raise water levels to meet their needs for security and access to forage. While pond levelers allow for the retention of some water, if the water level does not meet the needs of the beaver, they may move a short distance downstream and build a new dam (Clemson University 2006, Callahan 2003). This may merely result in moving the problem to a new landowner or, depending upon site characteristics, the resulting pond may result in new or increased damage problems for the original landowner. McNeely (1995) reported the most common reasons cited for lack of success were blocking caused by debris or silt and beaver construction of additional dams slightly upstream or downstream of the management device. In the study by Callahan (2005), construction of a new dam upstream or downstream of the device was the most common cause of failure for free-standing dams (e.g., dams not associated with a culvert or other similar constriction in water flow, 11 of 156 sites), but insufficient pipe capacity (6 sites) and lack of maintenance (2 sites) were also problems. Nolte et al. (2001) also reported need to address problems with dams upstream or downstream of the device. At culvert sites, lack of maintenance was the primary cause of device failure (4 of 227 sites). There was also a problem with vandalism at one of the culvert sites. At two culvert sites and two free-standing dams, the beaver appeared to be able to thwart the exclusion devices and water control systems and build dams that reduced or completely impeded the operation of the devices (Callahan 2005).

Most pond levelers and water control devices require maintenance. The amount of maintenance required can vary considerably among sites, depending on site conditions and the type of water control device (Boyles 2006, Spock 2006, Callahan 2005, Nolte et al. 2001). Stream flow, leaf fall, floods and beaver activity will continuously bring debris to the intake of the water control device. Ice damage and damage from debris washed downstream during high water events may also trigger need for maintenance. Although most exclusion and water control devices generally require some level of maintenance, there are reports of devices which have remained effective for a period of years with no maintenance (Nolte et al. 2001). Nolte et al. (2001) reported that post-installation maintenance had been performed on 70% of the 20 successfully operating Clemson pond levels installed by WS. The most common action was to adjust the riser on the pipe to manipulate water levels. Other maintenance included removal of vegetation and secondary dams built after the installation of the devices. In a survey of individuals who had received assistance with exclusion and water control devices from Beaver Remedies program (Simon 2006), half the survey respondents 18 of 36 reported maintaining their devices and device installation program staff monitored an additional 10 devices. Sixty one percent of respondents reported that routine maintenance took 15 minutes or less and 93% reported that maintenance took a half hour or less. Boyles (2006) reported that time spent in device maintenance ranged from 1 to 4.75 hours per year.

Illinois WS assists with the maintenance of the 7 levelers used by the Shawnee National Forest to address flooding issues. The pond levelers require maintenance every year to remove roots which can clog the intake pipe. If the levelers were not maintained they would have to be replaced approximately once every 5 years. A fire pump is used to clean out the levelers, and it takes 1-2 days for 3 – 5 people to clean out 2-3 levelers each year.

Costs: Installation and upkeep of water control devices vary from site to site. Callahan (2005) reported that the average cost for an exclusion fence at a culvert was $750 with average annual maintenance cost of approximately $200. Flexible leveler pipe systems cost an average of $1,000 to install and $100 per year in maintenance. Average cost to install a combination fence and leveler was $1,400 with approximately $150 per year in maintenance. Properly maintained, a fence or pipe system may be expected to last approximately 10 years. Annualizing the costs of maintenance and levelers ranged from $200 – $275/year (Callahan 2005). The cost of a Beaver Deceiver™ may range from $150 - $1,500, and an additional cost would be applied if pipes were needed at the site (S. Lisle, Penobscot Nation, letter to J. Cromwell, WS, September 7, 2000). Spock (2006) reported that exclusion and/or water control device installation costs ranged from < $600 to over $3,000 dollars. Slightly more than half the systems (58.2%) cost between $600 and $1,000 to install. In many cases the cost included the first year of maintenance. Maintenance costs, when available, ranged from $50 - $600 per year with 49.9% of maintenance agreements costing from $100 - $200. The more expensive installations tended to be extensive fence and leveler systems or systems with numerous leveler pipes. Boyles (2006) reported that device installation cost an average of $1,349 per device and $3,180 per site. Subsequent annual maintenance cost an average of $19.75 per site per year. However, unlike the study by Callahan (2005) the devices had only been in place for a relatively short time (Boyles (2006) average time in place 15 months, range 6 - 22 months; Callahan (2005) average time in place 36.6 months, range 3 to 75 months). Cost of maintenance may change over time as site conditions change in response to new conditions resulting from the devices and/or beaver activity.

As noted above, IL WS assists with the maintenance of the 7 levelers used by the Shawnee National Forest to address flooding issues. Average annual maintenance cost of just 2-3 of the 7 levelers is $7,358.

3. Reference for Lisle 1996 is missing from lit cited. Thank you for the correction. The appropriate citation has been added to appendix: Lisle, S. 1996. Beaver Deceivers. Wildlife Control Technology. Sept-Oct.:42-44.

4. Unlike findings by Nolte et al. (2001) on the use of Clemson Pond Levelers, modern flow devices (Callahan 2005, Boyles 2006, Perry 2007) eliminate the need to suppress beaver populations. Beaver serve and important ecological function and nonlethal options should be explored first prior to considering lethal, environmentally damaging alternatives.

Wildlife Services policy specifically directs that preference be given to nonlethal methods where practical and effective (WS Directive 2.101). Wildlife Services agrees that beaver serve an important ecological function (See Issue 7 below). The actions proposed in the EA would be directed at specific beaver and/or beaver colonies and are not intended to suppress the overall beaver population. Analyses in the EA indicate that the proposed action would not have a significant adverse impact on the Illinois beaver population or benefits resulting from the presence of beaver (EA Sections 4.1.1 and 4.1.6).

Although use of exclusion and water control devices can greatly reduce the need for lethal beaver removal, beaver removal may still be needed in some situations even though a flow device or water control system has been installed (Simon 2006, Spock 2006, Nolte et al. 2001, Wood et al. 1994). In these situations, some beaver usually remain on site and beaver removal does not damage the environment as claimed by the commenter. In Mississippi, beaver often build dams upstream and downstream of water control devices or block the device with mud and debris which makes the Clemson pond levelers ineffective. In these situations, some level of beaver removal is usually needed to resolve the problem (B. Sloan, WS, pers. comm.). Callahan (2005) reported that it may be necessary to remove beaver prior to device installation at

sites were it is necessary to lower the water level by at least one vertical foot. Spock (2006) reported that beaver had to be trapped out of one site when an exclusion system was augmented by the installation of a water control device. Lisle (1996) noted that it may be necessary to remove beaver that have learned to dam around exclusion and water control devices. Some authors reported that trapping continued at or near the area were the devices were installed but wasn't prompted by the failure of the devices (Simon 2006, Spock 2006, Lisle 1996). Maine WS program installed over 160 water control devices in 1998. Primary benefit of use of these devices in Maine is to minimize flooding damage while leaving beavers for fur trappers to remove during the regulated trapping season each year (E. Butler, WS, personal communication). So even though removal is not conducted for damage management, beaver removal likely occurs at some of the sites.

Exclusion and water control devices are not adequate to resolve all problems caused by beaver. Exclusion and water control devices are most effective in specific types of terrain and are not suitable for every site (Callahan 2005, Nolte et al. 2001, NYDEC 1997, Wood et al. 1994,). Callahan (2005, 2003) and Simon (2006) reported that exclusion and water control devices are not suitable for man-made, uniform channels such as agricultural drainage ditches and irrigation canals; reservoirs; areas where human health, property or safety would be threatened with even minor elevation in water level; and areas where the landowner has expressed zero tolerance for beaver activity on the property. Water control devices may be ineffective in beaver ponds in broad, low-lying areas because even a slight increase in water depth can result in a substantial increase in the amount of area flooded (Organ et al. 1996). Increased soil moisture both within and surrounding beaver flooded areas can result in reduced timber growth and mast production.

Water control devices may also be inappropriate in areas that are managed for aquatic species that need free-flowing water conditions and gravel substrate to survive. The still water and silt that accumulates behind beaver dams is detrimental to these species. For example, the Louisiana WS program has conducted beaver damage management activities to protect the Louisiana pearlshell (*Margaritifera hembeli*), which requires clear, free-flowing water to survive (D. LeBlanc, WS, pers. comm.). Beaver dams have been removed by Illinois WS to reduce water levels threatening the leafy prairie clover (*Dalea foliosa* - federal and state-listed endangered). As discussed in the EA (Section 1.2.4), beaver ponds can have a detrimental impact on trout streams in the Midwest by raising water temperatures, destroying immediate bank cover, changing water and soil conditions, and causing silt accumulations in spawning areas. Beaver dams also appear to be a significant impediment to movement of trout. In 13 treatment zones in Wisconsin with wild brook trout, removal of beaver dams resulted in substantial increases in the amount of area where trout can be found (Avery 2004). For example, a 9.8 mile treatment zone on the North Branch of the Pemebonwon River and an additional 17.9 miles of seven tributaries to the treatment section of river have been maintained free of beaver dams since 1986. In 1982, prior to dam removal, wild brook trout were found in only 4 of the 7 tributaries within the treatment zone and at only 4 of the 12 survey stations. In the spring of 2000, wild brook trout were present in all 7 tributaries and at all 12 survey stations (Avery 2004; See also issue 11 below). The Minnesota Department of Natural Resources has experimented with modifications to water control devices to improve fish passage (Close 2003) which would appear to indicate that the devices can be modified to improve fish passage, but these devices would not resolve other adverse impacts of beaver dams on brook trout noted above.

Exclusion and water control systems will not resolve problems related to beaver construction of bank dens. Depending upon site characteristics, beaver may build bank dens instead of lodges. When bank dens are built in earthen levees or in banks supporting roadways or railroad tracks, they can greatly weaken the earthen structure. In these situations, removal of the beaver (via, relocation or lethal methods) may be the only practical solution to the problem.

Although beaver serve a valuable role in wetland ecology, the presence of beaver dams in intensively managed wetlands can be problematic. In these areas, man-made water control structures are used to manage the water level in the wetland area in order to maximize habitat value for waterfowl and specific types of wetland-dependant wildlife (IDNR 2008, USDI 2008). While general elevations or reductions in water levels might conceivably be achieved by installing pipe systems through beaver dams, the devices tend to be more difficult to adjust than the water control structures. More importantly, the primary difficulty comes when drawdowns are used to achieve wetland management objectives. Drawdowns generally

involve reducing the water level until large sections of mudflat are exposed. Many plant species valuable to waterfowl and other wetland bird species need exposed mudflats to sprout. Shorebirds use the mudflats to forage for invertebrates (IDNR 2008, USDI 2008, WDNR 2007). Once the plants have matured, the water level is gradually increased until approximately half of the marsh has open water and half has standing plants (USDI 2008). Drawdowns may also be used in fall as a means of eliminating invasive fish (USDI 2008). The extent of the water level reduction conflicts with the beaver's desire for water deep enough to provide protection, and water area of sufficient extent to provide relatively easy access to foraging sites. The extent of the water level reduction during a drawdown will likely increase the risk of new dam creation in other locations which may cause new problems (Callahan 2003).

In a typical year for Illinois WS, approximately 25% of beaver management projects involve problems with blocked culverts, an additional 25% are related to water management structures (e.g., irrigation canals, water management devices used in restored wetlands and natural resource management areas), and 50% are related to flooding or threats of flooding caused by free-standing beaver dams. In the later instance, the issue is often not that the landowner with the dam is unwilling to have beaver and a beaver pond, but that the pond affects adjacent landowners who are unwilling to tolerate a beaver pond.

5. Modern flow devices, flexible levelers and trapezoidal fences resolve problems associated with Clemson devices. Clemson devices only suitable for small drainage basins. Lack of success in Nolte (2001) study where debris or silt blocked devices was due to improper installation. Blockage is not a problem with properly installed trapezoidal devices and flexible levelers.

Early water control systems such as the Clemson Pond Levels often were not able to handle high fluctuations in water flow (Wood et al. 1994). However, recently developed water control systems can include multiple pipe and large diameter pipe systems which should be able to handle higher levels of water flow (Perry 2007; Lisle 2003, 1999, 1996; Brown et al. 2001; Brown and Brown 1999). The statement made by commenter referencing debris and silt blockage is incorrectly attributed to Nolte et al. (2001). The comment was made in McNeely (1995). McNeely (1995) provides no information on the experience level of the individuals installing the devices. However, in Nolte et al. (2001) all devices were installed by experienced personnel from WS. If device failure was solely the result of improper device installation, then device failure should have been observed at most sites, no matter what the subsequent beaver removal strategy was for the site. Recent consultation with Mississippi WS program which was involved in the study by Nolte et al. (2001) indicates that their problems with the Clemson Pond Leveler design may be specific to certain types of sites (K. Godwin and S. Swafford, WS, pers. comm.). In clay/silt substrates common in Mississippi, clogging with debris and silt is a constant problem unless the devices are consistently and frequently cleared. Many sites in Mississippi have shallow ponds with slow-moving water, high sediment loads and substantial amounts of aquatic vegetation. These site characteristics seem to make it easier for debris to settle out and accumulate in pipe systems. Additionally, in shallow water ponds typical of the area, the intake section of the device is located close to the substrate which increases the likelihood that debris and silt from the substrate can be pulled into the pipes. Mississippi WS has experimented with digging out a 6-8 foot reservoir area where the intake pipes start to try and resolve problems with debris accumulation in the pipes. This change appears to result in an increase in the effective lifespan of the devices before the reservoir fills with accumulated silt and debris (S. Swafford, USDA, APHIS, WS, pers. Comm.). However, it is unclear if the increased performance warrants the additional time and expense associated with creation of this type of system. There is no current data indicating whether the new water flow device designs such as those reported by Boyles 2007, 2006; Spock 2006; Callahan 2005; Brown and Brown 1999 will work better in this situation than the Clemson devices. Virtually all data on the newer exclusion systems comes from the Northeastern and Northwestern parts of the country (Snohomish County 2008, Boyles 2006, Simon 2006, Spock 2006, Callahan 2005, King County 2004, Lisle 2003, 1999, 1996, Brown et al. 2001). To optimize use of these devices, additional information is needed that compares device performance under different environmental conditions.

6. With use of modern flow devices "most of the vital beaver wetlands can be saved". Saying that "dams obstruct normal flow" and the drained wetlands are not "true wetlands" ignores the fact that most of this nations original wetlands were drained by the mid-1980's...and that we may not understand exactly what is "normal". Beaver damming generally occurs only where wetlands once

existed because beaver are limited to waterways and their immediate environs. Loss of wetlands is significant because remediation of wetlands may cost 100,000 per acre and manmade wetlands often fail to duplicate vital natural functions.

This comment assumes that most of the areas where WS conducts beaver removal are established wetlands and that the removal of beaver would result in loss of an established wetland. This is not the case. Water impoundment does not immediately result in wetland conditions (EA Section 2.2.6). In Illinois, almost all dam removal activities are conducted on recently constructed dams in order to return an area to its condition prior to the establishment of the beaver dam and not to drain established wetlands. In the last 3 years, WS has received no requests to remove beaver or beaver dams from areas with established wetlands.

We understand that some areas where WS is requested to conduct beaver damage management might have historically supported wetlands. However, in most cases where WS is requested to provide assistance, the recent history of the site and associated landowner/manager objectives for site use do not include the presence of a wetland. Removal of recently constructed dams restores the environmental status quo for the site within context of its current land use and recent history. Where appropriate, WS informs landowners of the ecological, aesthetic and recreational benefits associated with a wetland and ways to achieve their management objectives without conducting beaver removal. However, the landowners at these sites are under no obligation to engage in/ support wetlands restoration by beaver. In some cases, current development and land uses may have resulted in conditions which are no longer compatible with the presence of a beaver pond (e.g., septic fields, buildings, etc.)

7. Beaver wetlands serve a number of important ecological functions including moderating problems with drought and floods, serving as critical habitat to a variety of species including threatened and endangered species and helping to reduce problems with climate change by absorbing carbon dioxide, an important greenhouse gas.

We agree that there are many benefits from beaver and beaver activities including ecological benefits associated with the creation of wetland habitats (Fouty 2008a, b; Hood and Bayley 2008; Pollock 2007; Bergman et al. 2007; Rossell et al. 2005; Wright 2002; Munther 1982), aesthetic and recreational opportunities for wildlife observation (Ringleman 1991, Wade and Ramsey 1986), and cultural and economic gains from fur harvest (IDNR 2006; Lisle 2003, 1996; McNeely 1995; Hill 1976).

Beaver ponds increase surface and groundwater storage which can help reduce problems with flooding by slowing the downstream movement of water during high-flow events and help to mitigate the adverse impacts of drought (Fouty 2008, Hey and Phillips 1995, Naiman et al. 1988, Wade and Ramsey 1986). Hood and Bayley (2008) determined that the presence of beaver can help reduce the loss of open water wetlands during warm, dry years. The presence of active beaver lodges accounted for over 80% of the variability in the amount of open water wetlands in the mixed-wood boreal region of east-central Alberta. Temperature and rainfall also influenced the amount of open-water wetlands, but to a much lesser extent than the presence of beaver. During wet and dry years, the presence of beaver was associated with a 9-fold increase in open water area over the same areas when beaver were absent. The authors note that beaver could mitigate some of the adverse impacts of global warming through their ability to create and maintain areas of open water. Beaver ponds and associated wetlands can provide a potential water source for livestock, serve as basins for the entrapment of streambed silt and eroding soil (Hill 1982), and help to filter nutrients from the water thereby maintaining the quality of nearby water systems (Arner and Hepp 1989).

Beaver may increase habitat diversity by opening forest habitats via dam building and tree cutting which results in a greater mix of plant species, and different-aged plant communities (Hill 1982, Arner and Hepp 1989). Creation of standing water, edge habitat, and plant diversity, all in close proximity, results in excellent habitat for many wildlife species (Medin and Clary 1991, Medin and Clary 1990, Arner and Hepp 1989, Arner and DuBose 1982, Hill 1982, Jenkins and Busher 1979). The wetland habitat associated with beaver ponds is beneficial to some fish (primarily warm water species), reptiles, amphibians, waterfowl, shorebirds, and furbearers such as muskrats, otter, and mink (Miller and Yarrow 1994, Naimen et al. 1986,

Arner and DuBose 1982). In Mississippi, beaver ponds over three years in age were found to have developed plant communities valuable as nesting and brood rearing habitat for wood ducks (Arner and DuBose 1982). Reese and Hair (1976) found that beaver pond habitats were highly attractive to a large number of birds year-round and that the value of beaver pond habitat to waterfowl was minor when compared to other species of birds (Novak 1987). Beaver ponds are beneficial to some threatened and endangered (T&E) species. The USFWS estimates that up to 43% of T&E species rely directly or indirectly on wetlands for their survival (EPA 1995).

8. Anonymous 1999 is not a reliable source which may be cited and should not be in analysis.

The information from the citation relevant to the analysis was quotes from Susan Langlois, the Massachusetts Department of Fish and Game Furbearer Biologist, and, as such, was considered appropriate and applicable to the analysis. Nonetheless, we feel that we are able to make our point regarding low early success rates for the use of leveler devices with the information presented in Issue 2 and have dropped the use of Anonymous (1999) from the analysis. S. Langlois is one of the authors of the citation used in the response to Issue 2 (Langlois and Decker 1997).

9. "Beaver do not pose a threat of giardiasis according to *Giardia* expert Dr. Stanley Erlandsen (Erlandsen et al. 1996)."

We do not believe that the commenter's statement is an accurate representation of the material presented by Erlandsen et al. (1996). Erlandsen did state that there was no information available at the time of publication indicating that wild beavers in the environment are infected with or carry the species of *Giardia* that causes illness in humans (*Giardia lamblia*). However, the author noted that beaver had been infected with *G. lamblia* under laboratory conditions (Erlandsen et al. 1988). Erlandsen et al. (1996) stated that because beavers could be infected with *G. lamblia* under laboratory conditions:

> *"beavers should be perceived as a potential health threat if they inhabit watersheds which are ultimately used for drinking water purposes. Precautions should be taken to either restrict beavers from reservoir locations serving as outflows for drinking water, such as being done..., or in other instances involving smaller reservoirs, to remove the animals."*

Research completed after the publication by Erlandsen et al. (1996) indicates that wild beaver can carry the genotypes of *Giardia* proven to cause disease in humans and can potentially be a source of water contamination (Fayer et al. 2006, Sulaiman et al. 2003, Appelbee et al. 2002). A study conducted in Illinois found an unusually high rate of Giardia infection in beaver (30.8%) but did not conduct genetic analysis to determine if the Giardia detected were species known to infect humans (McNew et al. 2003).

Although the term "beaver fever" is used to refer to giardiasis, as Erlandsen et al. (1996) noted, beaver are not the only source for *Giardia* contamination. Other wildlife species such as muskrats, voles and wading birds can have higher rates of infection with *Giardia* than those observed in beaver (Trout et al. 2005, Dunlap and Theis 2002, Heitman et al. 2002). Contamination with human waste or runoff from livestock facilities can also be a significant source of *Giardia* contamination (Heitman et al. 2002, Erlandsen and Bemrick 1988, Erlandsen 1993, Suck et al. 1987). In the study conducted by Heitman et al. (2002) contamination with human waste and runoff from livestock facilities appeared to be the primary sources of *Giardia* contamination in their study. However, they noted that the impact of aquatic mammals on water quality needed separate assessment. It is possible that aquatic mammals may contract *Giardia* from water infected by human or livestock waste. The aquatic rodents, in turn, may serve as reservoirs for these agents and may amplify background levels of contamination (Heitman et al. 2002).

10. The concept that beaver ponds increase mosquitoes was dispelled by study showing that beaver ponds have fewer mosquitoes (Butts 1992).

The impact of a beaver pond on mosquitoes depends on the initial conditions at the site and the types of mosquitoes endemic to the area in question. For example, the New York study area evaluated by Butts (1992, 1986) originally contained a small bog surrounded by an area of poorly drained forest. The

temporary pools that formed in this area prior to colonization by beaver supported large populations of *Aedes* spp. mosquitoes which breed in temporary pools (e.g., snowmelt pools) and do not use permanent standing water. Surveys of additional sites in upstate New York (Butts 2001) supported previous findings that the majority of pest mosquitoes in the region were *Aedes* spp. that used temporary pools (Means 1979). Dam construction by beaver flooded the temporary pool areas at the study site thereby eliminating the majority of breeding habitat used by the *Aedes* spp. and resulting in a decrease in mosquitoes. In contrast, in Warren County New Jersey, Duckworth and Musa (2002) recorded a steady increase in the number of most mosquito species at their study site from 1997-2001 after the appearance of a beaver dam and subsequent flooding in 1997. The overall area of standing water increased at the study site after the construction of the dam as did the amount of edge at which water recedes and floods. Counts of permanent water mosquitoes (primarily *Anopheles* spp.) doubled and in some case tripled after the establishment of the beaver dam. Counts of some floodwater mosquito species (e.g. *Culex restuans*, *C. salinarius* and *C. territans*) also increased, but not as much as the permanent water species. Mosquito species from the area around the dam that tested positive for West Nile Virus included *Culex* spp. *Ochlerotatus triseriatus* and *Anopheles quadrimaculatus*. *A. quadrimaculatus* had increased substantially since the appearance of the beaver impoundment. The detection of West Nile Virus in mosquitoes from the pond prompted the Warren county Mosquito Commission to take action to reduce the pond. Frustration with the need to repeatedly remove beaver, the Commission switched to using a water control device (pipe system) to reduce the size of the pond. The report (Duckworth and Musa 2002) did not have information on the impact of the water control device on mosquito numbers at the time of publication. The difference between the sites is best summarized by Butts (2001), "*Analysis of these results suggests that the commonly heard indictment of beavers as a source of mosquito problems deserves further attention and that generalized treatment without previous surveillance is counter-indicated....Equally important to note is that the relationships indicated herein may not hold for other geographic areas where larger populations of permanent-water mosquitoes are more common.*"

11. Old studies are used to cite that beaver adversely impact trout habitat. Studies failed to measure water temperature at lower depths. Bottom layers may remain cool while top warms. More recent studies indicate that beaver ponds can be quite beneficial to some species of fish. Beaver and trout evolved together. Why are beaver a problem now?

The impact of beaver ponds on fish populations depends on the area and the species under consideration. We agree that there are many examples of situations where beaver ponds have a beneficial impact on fish populations (Bergman et al. 2007, Pollock 2007, Rossell et al. 2005). However, as discussed in the EA (Section 1.2.4), beaver ponds have been shown to have an adverse impact on trout populations in areas like Wisconsin. A recent review of trout stream habitat development techniques conducted by the WDNR (Avery 2004) found that in Class I trout streams (high quality trout waters having sufficient natural reproduction to sustain populations of wild trout at or near carrying capacity) beaver dam removals resulted in the highest success rates achieved by any type of habitat development. At 92% of the 24 treatment sites evaluated there was at least a 25% increase in combined trout population measures (total number of trout, number of trout > 6 inches, number of legal size trout, and total trout biomass (pounds per mile)), and 88% of sites had a 50% or greater increase in combined trout population measures. In 13 treatment zones with wild brook trout, brook trout per mile increased 191% and the number of brook trout >6 inches increased 283% in 12 zones where this variable was measured. An evaluation of fish community and habitat responses 18 years after the initiation of a beaver dam removal program on a section of the north branch of the Pemebonwon River (Pemonee River) in Wisconsin (Avery 2002) indicated that wild brook trout populations in the treated section of the river and associated tributaries increased. Fishing pressure, angler harvest, and the size of fish taken also increased. Water temperatures in the river and associated tributaries were significantly cooler in 2000 than in 1982 when the project was initiated. The Index of Biotic Integrity ratings for the Pemonee River also increased during the study period indicating improvements in the coldwater ecosystem. Because the impact on beaver removal does depend on the species of fish involved and local environmental conditions, WS would only conduct beaver removal projects for the enhancement of fish populations at the recommendation of fisheries managers/biologists with the IDNR or the appropriate land management entity.

The current concerns about the impact of beaver on trout streams are interrelated with issues of human habitat alteration and land use. Human land use, water contamination, dam construction and forestry

practices in the area around trout streams has greatly reduced the number of streams that still support self-sustaining wild populations of trout. Consequently, fishery biologists have placed a great deal of emphasis on preserving and enhancing the few remaining streams that still support self-sustaining wild trout populations. Logging practices have also altered the relationship between beaver and trout in these streams. Prior to European settlement, most of the trout streams ran through areas of mature forest which provided canopy cover for the streams and relatively limited riparian food sources for beaver interspersed with patches of early-succession stage forest in areas recently disturbed by fire or flooding. When the mature forest areas were clear cut, the early succession plant communities that developed provided a more abundant food supply for beaver than the previous mature hardwood forest (Knudsen 1963). Consequently the trout streams went from a system with canopy shade and relatively few beaver colonies to a system with less canopy cover and substantially increased beaver populations. Trout fishery management efforts in these areas recognize the importance of mature hardwood forest to trout populations and are working with foresters on strategies to enhance development of riparian vegetation to achieve mature hardwood forest communities. It is the hope of the biologists working on these projects that the need for beaver management will be reduced or eliminated with the return of more natural habitat conditions.

12. The EA discusses need to protect T&E species but does not address the issue that rare species habitat is destroyed by beaver trapping and removal. Forty-three percent of rare species rely on freshwater wetlands (US EPA 1995).

We are aware of the importance of wetlands to a wide range of wildlife species including threatened and endangered species (EA Sections 2.2.6, 4.1.2 and 4.1.6). As stated in the response for issue 6, incidents were WS would be requested to conduct beaver damage management at a site with an established wetland are very rare. When responding to a request for assistance with a beaver conflict, WS personnel survey the site or impoundment to determine if conditions exist for classifying the site as a true wetland. In the last 3 years, WS has received no requests to remove beaver or beaver dams from areas with established wetlands. The EA includes provisions to avoid adverse impacts on state or federally-listed threatened and endangered species established in consultations with the USFWS and the IDNR regarding the potential risks to state and federally-listed threatened and endangered species from the proposed BDM program. In these consultations, WS has established that we will contact the USFWS prior to conducting beaver and beaver dam removal activities in areas with established wetlands in counties known to support Eastern Massasauga (*Sistrurus catenatus* - candidate) or Hine's emerald dragonflies(*Somatochlora hineana* - Endangered). Wildlife Services will also contact the USFWS prior to conducting beaver dam removal activities in waters where the federally-listed Clubshell mussels (*Pleurobema clava* - endangered) Sheepnose mussels (*Plethobasus cyphyus* - candidate) and Spectaclecase (*Cumberlandia monodonta* - candidate) may occur. Wildlife Services will implement USFWS recommendations for the protection of federally-listed species at these sites. Wildlife Services will consult with the IDNR prior to removing beaver dams from sites where wetland conditions have developed as a result of beaver dams (i.e., areas where the dam has been in place for 3 or more years) and will implement IDNR recommendations for the protection of state-listed species that may be using the site. Both the USFWS and IDNR have concurred that, given the established protocols for preventing adverse impacts on state and federally-listed species, the proposed action will not adversely impact state or federally-listed species.

13. Studies indicate that beavers tend to reoccupy vacant habitats (Houston 1995) so how can WS beaver removal projects only be small one-time projects? Trapping and wetland destruction would have to occur repeatedly.

As stated in detail in Issue 6, the impoundment of water does not immediately result in wetland conditions. In most instances, the dam has only been in place for a short period of time and has not resulted in the establishment of wetland conditions. Removal of beaver and beaver dams at these sites does usually result in the removal of impounded water but does not qualify as the "destruction of wetlands".

We do not concur that beaver removal is only a short term solution for all sites. The likelihood that a site will be recolonized varies depending on the type of site and damage situation. For example, removal of beaver and a beaver dam from a relatively uniform section of irrigation canal may resolve the problem for an

extended period of time because the relatively uniform nature of the canal doesn't predispose a site to repeat problems. As noted in Issue 4, in Illinois it is not unusual to find that the landowner with the beaver dam may not have an issue with the beaver or may be willing to compromise on pond size, but the problem is that the dam is situated on the property so that a less tolerant neighbor's land is flooded. In the case of free-standing dams, although beaver may, on occasion, reoccupy once utilized habitat, flooding to the level which was determined to be unacceptable may not reoccur and necessitate damage management. Recolonization will also depend on the proximity and density of the beaver population in the surrounding area. Areas with isolated or lower density beaver colonies will usually take a far longer for beaver to recolonize than areas with higher beaver densities.

14. Commenter does not agree with statement that capture in nonlethal devices may cause pain, stress and distress to captured animals. As someone with experience using Hancock traps, properly used, this method causes little stress. Tippie of Wildlife 2000 has carried beaver in her arms and can attest to fact that they need not be stressed by live capture.

The natural response of wild animals to capture and confinement is to seek to escape. The speed and degree to which an animal acclimates to the capture will vary among species and among individuals within a species. While many beaver do seem to acclimate rapidly to capture, it is not universally the case. Nor does rapid acclimation mean that the animal does not initially go though a period of stress and distress immediately after being captured. Tippie (1996) acknowledged the variability among individuals. While noting that she could often pick up and handle many beaver, she also stated, "Every beaver is unique and most are non-aggressive...I've learned to tell which beaver might bite by their body language". Injuries that WS personnel have occasionally noted in live-trapped beaver include raw skin on face where beaver have repeatedly stuck their nose through the mesh of the trap while seeking escape and tooth injuries from animals which bite or pull on the wires of the trap.

15. Several studies indicate drowning and kill traps are not humane for beaver.

The issue of humaneness relative to the use of drowning and kill traps is addressed in detail for each alternative considered in EA Section 4.1.5. Specific information relative to the use of traps and snares for beaver is provided in Section 2.2.5. Capture devises used for beaver damage management by Illinois WS meet the current international Best Management Practices Standards.

16. Wildlife Services states that Technical Assistance would have no impact on T&E species, but since rare species are accidentally caught in traps – this is debatable.

Wildlife Services actions under a Technical Assistance Only Alternative (Alternative 1) would have no impact on T&E species because WS would not be conducting beaver damage management. The actions of other individuals and organizations in the absence of assistance from WS do have the potential to impact threatened and endangered species. This issue is address in EA Section 4.1.2.

17. Beaver traps and snares kill nontarget species including pet dogs.

Risks to nontarget species from the actions likely to be conducted under each of the alternatives are an issue addressed in detail in the EA Section 4.1.2. This section includes a list of the nontarget species which have been taken by the IL WS program. Since 1993, when the Illinois WS program began capturing data on operational damage management activities, no dogs or cats have been captured in traps set for beaver damage management.

APPENDIX B

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