

MIDWEST FURBEARER GROUP ANNUAL REPORT 2013

MEETING TIME AND PLACE

This year's furbearer workshop was hosted by the Illinois Department of Natural Resources at Riverbank Lodge from 26-28 March 2013.

ATTENDANCE

Participants at this year's workshop included state furbearer biologists from 11 Midwest member states (IL, IA, KS, KY, MI, MO, NE, ND, OH, OK, WI) as well as representatives from Cook County Forest Preserve District, Wildlife Control Technology Group, USDA APHIS-Wildlife Services, Illinois Natural History Survey, University of Illinois, and Southern Illinois University. A complete list of attendees and contact information for state furbearer biologists is available in Appendices 1 and 2.

EXECUTIVE SUMMARY

Numerous speakers presented information about furbearer research and management (Appendices 3 and 4). Topics included:

- Value of long-term research for monitoring wildlife diseases and developing proactive strategies for prevention and public education
- Management of urban coyotes and perceived risks to residents of the Chicago metropolitan area
- Management of feral swine in Illinois
- Food habits and activity of river otters
- Relationships between furbearer populations and habitats at large spatial scales
- Use of surveys and studies to guide harvest strategies
- Parasites and contaminants
- Role of furbearers as nest predators
- Cougars in the Midwest
- Using technology to improve efficiency and accuracy of surveys

State furbearer biologists shared results of harvest and population surveys during the preceding year. The workshop provided a good venue for discussing issues that affect multiple state agencies. Summaries of these issues are presented briefly as Director Information Items and in greater detail in Appendix 5.

DIRECTOR ACTION ITEMS

None

DIRECTOR INFORMATION ITEMS

1. Last year, Directors passed a resolution to support multi-state collaboration in collection and analysis of otter and bobcat harvest data. A grant administered by the Illinois Department of Natural Resources will enable the first step toward this goal by 1) cataloguing current harvest regulations and harvest data in Midwestern states, 2) developing coordinated data collection plans, and 3) initiating software development for Statistical Population Reconstruction. These products will allow states to evaluate benefits and costs of full implementation.
2. USFWS received a petition to list the Prairie Gray Fox and Plains Spotted Skunk under the Endangered Species Act. Biologists attending the Midwest Furbearer Workshop acknowledged a dramatic decline in the historical range and abundance of the Plains Spotted Skunk. Biologists are concerned about implications of listing the Prairie Gray Fox because of its similarity to other sub-species in the region. Biologists recognized that designation of the Prairie Gray Fox as a separate sub-species during the 1800's was based on minor morphological differences and small sample sizes that precluded accurate delineation of its range. Biologists recommend a cooperative effort among Midwest states to collect tissue samples and use genetic analyses to test validity of sub-species designation of the Prairie Gray Fox and, if supported, better delineate its range.
3. The Association of Fish and Wildlife Agencies received a request to review the National Wildlife Control Training Program developed by Cornell University and the University of Nebraska. The request asked AFWA to consider whether the program should be used by states to train and certify wildlife control operators. Biologists attending the Midwest Furbearer Workshop recognized 1) the Training Program is a valuable educational resource, 2) some states might choose to adopt the Training Program to train and certify wildlife control operators, 3) regulatory provisions vary widely among states, and 4) state's regulatory provisions are not part of the Training Program. Biologists recommend that states evaluate the Program individually to determine its compatibility with regulatory and procedural frameworks.
4. Biologists discussed management of cougars because 1) breeding populations are now established in parts of the Midwest, 2) transient males have been found with increasing regularity, and 3) suitable habitat occurs in most, if not all states. Biologists recommended the following actions regarding management of cougars in the Midwest: 1) manage cougars at appropriate spatial scales by coordinating research and monitoring efforts among states, 2) inform the public about expanding populations, habits of cougars and risks to people and livestock, 3) assign a legal status to cougars in each state, including states where cougars are encountered irregularly, and 4) develop management plans to guide conservation efforts within and among states.

5. Although individual states may possess substantial biological data on furbearer species within their respective states, some biological trends warrant further investigation at a regional scale. This may include joint state, federal and tribal exchange of information (i.e., harvest data), coordination of data collection and population monitoring, and in some instances cooperative research projects. Some present examples of species where these cooperatives are warranted include a decline in abundance of fisher in the Great Lakes Region (MI, MN, WI and NY) and the petition to list Prairie Gray Fox. Biologists recommend continued support for efforts to monitor and manage species at appropriate spatial scales, including those that cross jurisdictional boundaries.
6. The Midwest Furbearer Working Group thanks state Directors for their continued support of travel of state furbearer biologists to the annual Midwest Furbearer Workshop. With tight budgets and restricted travel this annual workshop continues to be a critical component of sound resource management in the Midwest. Annual meetings allow for an open, thorough exchange of information and knowledge resulting in efficient, effective, and science-based management of these unique species.

TIME AND PLACE OF NEXT MEETING

A joint meeting with Northeastern and Southeastern states was discussed. Suzie Prange from Ohio Department of Natural Resources offered to host the workshop if a joint meeting falls through. A complete list of past host states is available in Appendix 6.

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Appendix 1. 2013 Midwest Furbearer Workshop Attendees

Name		Agency/Affiliation
Ahlers	Adam	University of Illinois
Albers	Gerianne	Wisconsin DNR
Alessi	Mark	Illinois DNR
Anchor	Chris	Cook County FPD
Beckerman	Scott	USDA-APHIS Wildlife Services
Benson	T.J.	University of Illinois (Champaign)
Beringer	Jeff	Missouri DOC
Bluett	Bob	Illinois DNR
Bottom	Christopher	Southern Illinois University
Brooks	Marjorie	Southern Illinois University
Carpenter	Samantha	University of Illinois (Champaign)
Chen	Da	Southern Illinois University
Erickson	Rob	Wildlife Control Technology Group
Etter	Dwayne	Michigan DNR
Evelsizer	Vince	Iowa DNR
Feltrop	Preston	Southern Illinois University
Ghaemi	Aaron	Oklahoma Dept Wildlife Conservation
Hiestand	Shelby	Southern Illinois University
Jackson	Angela	Southern Illinois University
Jooste	Esmarie	Southern Illinois University
Kramer	Joe	Kansas Dept Wildlife, Parks & Tourism
Mateus-Pinilla	Nohra	University of Illinois (Champaign)
McTaggart	Stan	Illinois DNR
Miller	Craig	Illinois Natural History Survey
Monick	Katie	University of Illinois (Champaign)
Nielsen	Clay	Southern Illinois University
Patton	Laura	Kentucky Dept Fish & Wildlife
Peek	Matt	Kansas Dept Wildlife, Parks & Tourism
Prange	Suzanne	Ohio DNR
Shah	Sagar Bhaskar	University of Illinois (Springfield)
Spacepan	Molly	Illinois Natural History Survey
Ting	Tih-Fen	University of Illinois (Springfield)
Tucker	Stephanie	North Dakota Game & Fish
van der merwe	Jorista	Southern Illinois University
Wilson	Sam	Nebraska Game & Parks

Appendix 2. Midwest Furbearer Biologists – Contact Information

Illinois

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Appendix 3. 2013 Midwest Furbearer Workshop - Agenda

TUESDAY, MARCH 26, 2013

7:00–8:30 am	Registration	
8:30–8:50 am	Welcome; opening remarks; introductions	Bluett
8:50–9:15	Wildlife Management in Cook County	Anchor
9:15–9:40	Using Technology and Common Sense to Capture Coyotes	Erickson
9:40–10:05	Managing Feral Swine in IL	Beckerman
10:05–10:25	Break	
10:25–10:45	Introductions	
10:45–11:10	Perceived Risks of Coyotes in Chicago Metro Area	Spacapan/Miller
11:10–11:35	Fatty Acid Analysis to Infer Diet of Otter	Mateus-Pinilla
11:35–12:00	Otter Activity at Two Latrines	Monick
12:00–1:00	Lunch	
1:00–1:20	Introductions	
1:20–1:45	Occupancy of Mink and Muskrat	Ahlers
1:45–2:10	Occupancy of Four Semi-aquatic Furbearers	Jackson
2:10–2:35	Responsible Expansion of Bobcat Harvest in MI's Lower Peninsula	Etter
2:35–2:55	Break	
2:55–3:15	Introductions	
3:15–4:15	Group Discussion – Regional SPR Modeling	

WEDNESDAY, MARCH 27, 2013

8:30–8:50 am	Housekeeping	Bluett
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8:50–9:15	Heavy Metals in Terrestrial Carnivores	Jooste
9:15–9:30	Stable Isotopes to Detect Invasive Carps in Diet of River Otter	Feltrop
9:30–9:55	Spatial Analysis of Bobcat Parasites in IL	Hiestand
9:55–10:15	Break	
10:15–10:40	Using Cybertracker for KDWPT Wildlife Surveys	Peek
10:40–11:05	Shrubland Bird Conservation	Benson
11:05–11:20	Spatial Interactions of Carnivores and Prey	Bottom
11:20–11:45	Cougar Management in IL	Nielsen
11:45–12:45	Lunch	
12:45–1:05	Movements of a Cougar in Kansas	Peek
1:05–1:30	Trace metals in bobcats from Southern Illinois	Brooks
1:30–1:50	State Report (MO)	Beringer
1:50–2:10	State Report (OH)	Prange
2:10–2:30	Break	
2:30–2:50	State Report (NE)	Wilson
2:50–3:10	State Report (ND)	Tucker
3:10–4:00	Group Discussion – NWCO National Certification	

THURSDAY, MARCH 28, 2013

8:30–11:30am	Business Meeting (State Biologists)
	<ul style="list-style-type: none"> • State Reports • Location for 2014 Midwest Furbearer Workshop • Other

Appendix 4. 2013 Midwest Furbearer Workshop – Abstracts

Title: Environmental change and habitat occupancy of semiaquatic mammals

Authors: Adam A. Ahlers (presenter), Patrick J. Wolff, Robert L. Schooley, Department of Natural Resources and Environmental Sciences, University of Illinois, Urbana, IL 61801; and Edward J. Heske, Illinois Natural History Survey, 1816 South Oak St., Champaign, IL 61821; Phone (217) 419-2090; Email: aahlers2@illinois.edu

Abstract: Habitat loss has negatively affected wildlife species worldwide. Additionally, climate-change effects, such as increased droughts and increased frequency and intensity of seasonal precipitation, are also predicted to negatively influence wildlife populations. Habitat specialists occurring in landscapes dominated by human land use may be more susceptible to climate change because dispersal to suitable habitat or temporary refugia may be unlikely. Using six years of presence-absence data (2007-2012), spanning years of record-breaking drought and flood conditions, we evaluated the habitat occupancy dynamics of American mink (*Neovison vison*) and muskrat (*Ondatra zibethicus*) occurring in a highly altered ecosystem. In this region, >90% of historic wetlands have been drained, thus limiting both species' distributions to flashy streams and agricultural ditches. Habitat occupancy by mink (0.92) and muskrat (0.69) were high during a year of above-average precipitation (2008). However, occupancy declined substantially for both mink (0.55) and especially muskrat (0.08) after the severe drought of 2012. Mink are generalist predators and may switch use to upland habitat during periods of low precipitation. However, muskrats have limited mobility in terrestrial areas and may have suffered high mortality during the drought. Of the five sites occupied by muskrats in 2012, four were located in urban watersheds. Urban streams may serve as temporary refugia for muskrats during drought because of higher base flows. Semiaquatic mammals could be particularly sensitive to increases in summer droughts and winter-spring flooding expected under climate change scenarios for the Midwest.

Title: Wildlife Management in a Heavily Urbanized Region – Cook County Illinois

Author: Chris Anchor (presenter); Cook County Forest Preserve District, 28W040 State Route 58, Elgin, IL 60120; Phone (847) 798-0354

Abstract: Chicago is one of the largest cities in the nation and lies within the Cook County metropolitan area. Cook County is also one of the most highly urbanized counties in the country. Even with all the urbanization Cook County is roughly eleven percent or 68,000 acres that are forest preserve. The types of habitat on these 68,000 acres consist of marshes, forests, prairies, and recreational lands (turf, ball fields...). Many of the lands have been impacted by urbanization around them. Wildlands are managed to regain there presettlement condition. Our mission to "...restore, restock, protect and preserve... said lands together with their flora and fauna.. for the education, pleasure, and recreation of the public" is fulfilled by our Department of Resource Management through a wide variety of educational programs, wildlife management and restoration. The Wildlife Division is responsible for maintaining records of flora and fauna, collaborating and coordinating research projects. This type of urbanized environment provides opportunity for research relating to urbanization, fragmentation and human/animal interactions. Some

of the past and ongoing projects include of The Cook County, Illinois, Coyote Project, Canada Goose Studies, Grey Fox Study, Urban Deer Study, Wetland Bird Study, Raccoon, Opossum and Skunk Studies, Eastern Massasauga Rattlesnake and Bats. The Wildlife Division is also responsible for management of white-tailed deer and the use of wildlife as zoonotic disease biomonitors.

Title: Liver accumulation of trace metals in bobcats (*Lynx rufus*) collected in Southern Illinois

Authors: Marjorie L. Brooks (presenter), Sara Ressing, Shelby Hiestand, Agustín Jiménez-Ruiz, Clay Nielsen

Abstract: A growing awareness of the ubiquitous distribution of anthropogenic contaminants in the environment is prompting surveys of trace metal accumulation in wildlife in relation to body condition. Body condition is important because elimination and detoxification of contaminants can drain energy from growth and fat reserves. Moreover, body condition is strongly related to reproductive success meaning that if pollutants impact condition and reproduction, then populations may decline. As top predators, carnivores may be at particular risk from high accumulations of dietary contaminants depending on the length of a given food chain. We collected liver samples from 42 road-killed and 21 live-trapped bobcats (*Lynx rufus*) in Southern Illinois. Of these, 30 females and 33 males were collected with nearly identical gender distribution between the two collecting techniques. Aluminum (Al), cadmium (Cd), copper (Cu), iron (Fe), nickel (Ni), lead (Pb), and Zinc (Zn) concentrations were determined using atomic absorption spectrometry. Levels of all metals in liver tissue were below levels known to cause overt toxicosis in mammals. Among this population metals concentrations were independent of age (adult vs sub-adult) and total weight, but females had significantly higher Cd and Pb levels in their liver tissue than males. Potential explanations may be higher feeding rates among females during their reproductive years or selective feeding by females on lethargic prey weakened by high contaminant exposure.

Title: Identifying Habitat Quality for Shrubland Birds: Implications for Shrubland Bird Conservation

Authors: Scott Chiavacci, Thomas Benson (presenter) and Michael Ward; Illinois Natural History Survey and University of Illinois, 1816 S. Oak St., Champaign, IL 61820; Email: tjbenson@illinois.edu

Abstract: We located and monitored 813 nests of 28 shrubland species during 2011; 504 and 309 nests were located in northeast and east-central Illinois, respectively. We estimated daily nest survival rates (DSR) using the logistic-exposure method and generated sets of *a priori* models to determine factors influencing nest survival. Our models included individual and combinations of temporal (e.g., date, nestling age, nest stage), biological (e.g., presence of cowbird eggs or young, brood size), and habitat variables (e.g., landscape [urban vs. rural], nest height, invasive vs. native nest substrate). We ranked candidate models using Akaike's information criterion corrected for small sample sizes (AICc) and calculated model weights. The model including the additive effects of landscape type, nest stage, and nest height best fit the data (Akaike weight =

0.81). Overall, nest success in urban landscapes (45%) was nearly double that of nests in rural landscapes (23%). We monitored 194 nests with video recording systems to document nest predation events. We found predation was the most common cause of failure and accounted for approximately 88% of documented failures. We recorded 58 predation events in rural and 15 in urban shrublands involving 20 predator species. However, dominant nest predators varied by study site and landscape. For instance, the vast majority (82%) of snake-caused failures occurred at the Kennekuk Cove County Park site, whereas most (85%) raccoon (*Procyon lotor*) depredations occurred at the Vermilion River Observatory site, both of which are located in rural, east-central Illinois. In contrast, long-tailed weasels (*Mustela frenata*) were the most common predator in urban landscapes (n = 6), but were also documented relatively frequently at our rural sites (n = 6). Risks of nest failure caused by different predators varied with nest height, nest site vegetation density, nest stage and other factors. Our results suggest that patterns in shrubland bird nest survival are largely driven by patterns in nest predation within shrublands embedded in urban and rural landscapes. Indeed, the abundance of raccoons, the most common predator we documented, is thought to be unnaturally high in Illinois and has been proposed as a contributing factor in declines of the state's shrubland birds.

Title: Spatial interactions among sympatric mesocarnivores and their prey in southern Illinois

Authors: Christopher R. Bottom (presenter), Ryan G. Tebo, and Clayton K. Nielsen, Cooperative Wildlife Research Laboratory, Southern Illinois University, Carbondale, IL 62901; Phone (618) 453-5495; Email: christopher.bottom@siu.edu

Abstract: Extirpation and habitat fragmentation have resulted in the loss of large carnivores throughout much of North America. As a result, mesocarnivores have filled the ecological roles left by their larger counterparts, becoming de facto apex predators in many ecosystems. In southern Illinois, this role has been filled mainly by 2 species: bobcats (*Lynx rufus*) and coyotes (*Canis latrans*). The increase of bobcats and coyotes has fueled the need for in-depth research into their ecology, including interactions with prey species. We are assessing the effects of bobcats and coyotes on an important game species (i.e., eastern wild turkey, *Meleagris gallopavo*) and other mammalian prey in a portion of southern Illinois comprised of a mixture of grassland, agriculture, and bottomland forest cover types. Since 2012, we have radiomarked 8 bobcats, 12 coyotes, and 28 wild turkeys, and will use radiotelemetry and other field techniques to address 2 primary objectives. Our first objective is to investigate spatial interactions among bobcats, coyotes, and wild turkeys based on analyses of spatiotemporal overlap. Our second objective is to examine the role of cover type and prey distribution on bobcat and coyote space use and interactions. This study will provide insight into predator impacts on wild turkey populations and inform habitat management activities.

Title: Using Technology and Common Sense to Solve Coyote Conflicts in the Chicago Metropolitan Area

Author: Robert Erickson (presenter), Wildlife Control Technology Group, Inc., 16263 Chase Road, DeKalb, IL 60115; Phone (815) 286-3073; Email: wctech@ix.netcom.com

Abstract: The recent surge in coyote attacks on domestic animals and the presence of habituated coyotes around humans in Chicago and its surrounding suburbs has prompted municipalities to inquire about the removal of problem coyotes. After all the co-existing techniques have been exhausted, which to date, has shown to have little, if any effect on the habituated animals and the coyotes continue to have lethal conflicts with domestic animals, action needs to be taken. I will discuss the importance of creating a comprehensive program to assist municipalities in resolving these conflicts. The municipalities are in agreement that the issue is not that all coyotes are bad and in need of removal, but that aggressive coyotes cannot be tolerated. The techniques and strategies I use, demonstrate sensitivity to varying opinions on coyote management, and city officials and residents who have become victims of coyote attacks on their domestic animals, have been positive toward my methods. The use of modern technology to pre-scout areas of concern, avoiding non-target captures by alleviating the problem before it happens. The use of selective restraining devices has been very successful as have the use of the 4-coil, padded jaw Jake trap (J. C. Conner, Newcomerstown, OH) and the Minnesota offset 650 with laminated jaws, both inside and out. The Reichart snare lock, with 3/32 7x7 galvanized (South Korean manufactured) aircraft cable. The innovative use of the Smart Scouter cellular surveillance camera has been instrumental in maintaining safety, and instant response when using footholds. A comprehensive plan to educate residents on how not to attract the animals to human areas needs to be provided along with the removal of the alpha coyotes (pairs) involved in these conflicts. I encourage the necropsy of all dispatched coyotes to gain additional information on their health status at the time of capture. In many cases, the animals have been feeding on domestic dog food, which reinforces the need for education programs for all residents.

Title: Using Principles of Sound Scientific Management in Making Decisions Regarding Expansion of Bobcat Harvest in Michigan's Lower Peninsula

Authors: ¹Dwayne Etter (presenter), ¹Sarah Mayhew, ¹Adam Bump, ²Thomas Gehring, ²Timothy Preuss, ³Nathan Svoboda; ¹Michigan Department of Natural Resources, 8562 East Stoll Rd., East Lansing, MI 48823; ²Department of Biology, Central Michigan University, Mount Pleasant, MI 48859; ³Carnivore Ecology Laboratory, Forest and Wildlife Research Center, Mississippi State University, Mississippi State, MS 39762

Abstract: In recent years, incidental catch of bobcats by coyote trappers has increased in portions of Michigan's Lower Peninsula closed to bobcat harvest since 1955. This prompted some local trapping organizations and Michigan Department of Natural Resources biologists to inquire about opening a bobcat harvest season in these areas. To assess bobcat populations, we took advantage of pre-existing scent-station transect datasets collected from 2003-2006 (sample period 1); one in an area previously closed to harvest (closed area) and the other in an area open to harvest (open area). We established scent-station transects in two additional "closed areas" for sampling in 2011-2012 (sample period 2). Because bobcats are territorial, we used occupancy modeling to assess two objectives, 1) evaluate changes in bobcat occupancy (relative abundance) in open and closed areas between sample periods 1 and 2, and 2) assess differences in relative abundance between open and closed areas in sample period 2. In sample period 1, we sampled scent station transects for 2 consecutive days. In sample period 2, we sampled

scent station transects for three consecutive days in each of the four study areas; repeating transects previously sampled in sample period 1. Detection was slightly higher in sample period 1, likely a result of a more conservative approach to interpreting bobcat tracks in sample period 2. Relative abundance increased from sample period 1 to sample period 2 in both the open and closed areas. Abundance was similar in all three closed areas in sample period 2, and combined abundance in closed areas in sample period 2 was equivalent to abundance in the open area in sample period 1. When compared to combined closed areas, abundance was greater in the open area in sample period 2. Results of this survey will be used with additional information to evaluate the potential for closed areas to support a limited bobcat harvest. If a harvest is authorized, we will conduct additional scent station surveys in the future to evaluate potential effects to localized bobcat populations.

Title: Using Stable Isotopes to Determine the Role of Bigheaded Carps on the Trophic Position of River Otters in Illinois

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Abstract: Populations of North American river otters (*Lontra canadensis*) began declining in Illinois in the mid-1800s. They were listed as a state threatened species in 1977 and state endangered in 1989. A very successful state recovery plan was enacted in the early 1990s and otter numbers continue to increase. We are studying the influence of consuming bigheaded carps (i.e., silver carp [*Hypophthalmichthys molitrix*] and bighead carp [*Hypophthalmichthys nobilis*]) on the isotopic signature of Illinois otters. Stable isotopes of nitrogen ($\delta^{15}\text{N}$) have commonly been used to estimate the trophic position of consumers. Illinois trappers will collect tissue samples from harvested otters during November-March 2012-14. Calculating the isotopic signature of consumers does not indicate the trophic position of that individual without calculating the isotopic baseline of the system. Therefore, we also will be conducting isotope analysis on prey items collected from the locations where otters were harvested. Dietary composition will be determined from the analysis of scat. The consumption of bigheaded carps will be determined by the presence of bigheaded carp otoliths and pharyngeal teeth in the scat. The striations on the pharyngeal teeth of silver carp will be used to differentiate silver carp from bighead carp because they have different $\delta^{15}\text{N}$ signatures. We will monitor a total of 110 sites, located throughout central and southern Illinois, during January-April 2012-14. Our study will indicate the role of invasive bigheaded carp on the ecology of river otters and the structure of aquatic food webs.

Title: Spatial analysis of bobcat parasites in Illinois

Authors: Shelby J. Hiestand (presenter), F. Agustín Jiménez, and Clayton K. Nielsen, Cooperative Wildlife Research Laboratory and Department of Zoology, Southern Illinois University, Carbondale, IL 62901; Phone: (618) 453-6930; Email: shiestand@siu.edu

Abstract: Bobcats (*Lynx rufus*) are the most abundant and widely-distributed wild felid

species in North America. Increasing population densities of bobcats raises concerns about how they may influence the wildlife community as a host for parasites. Although many parasites found in bobcats also infect other wild and domestic animals, bobcat parasite loads and potential impacts on other species has received relatively little study. Our objectives were to determine endoparasite presence and intensity within Illinois bobcats and identify areas of parasite risk using program MAXENT. Necropsies were performed on 67 road-killed or trapped bobcats collected during 2003-12. We found infections of cestodes, nematodes, and trematodes including *Taenia* spp. (78%), *Toxocara cati* (36%), and *Alaria* spp. (43%). The highest mean abundance was found for *Alaria* spp. (80.3) followed by *Taenia* spp. (4.7) and *Toxocara* spp. (4.6). *Alaria* spp. had the highest intensity (185.5) with a range of 1-2872. Parasite presence data were then used with environmental data layers of water, soil, land cover, human density, and climate variables in MAXENT to create maps of potential presence of 3 parasite species in a 46,436-km² portion of southern Illinois. Precipitation variables were the highest contributing variables used by MAXENT to create probability maps of *T. rileyi* and *Alaria* spp. For *Toxocara cati*, landcover and soil were the highest contributing variables. Variables of importance likely represent habitat requirements necessary for the completion of parasite life cycles. Larger areas of suitable habitat were found for generalist parasites such as *Toxocara* while a more selective suitable area was indicated for parasites with complex life cycles such as *Alaria*. Our study provides information to wildlife biologists regarding the potential impacts of growing bobcat populations as a health risk for both wild and domestic animals.

Title: Multi-season occupancy of semi-aquatic furbearers in southern Illinois

Authors: Angela M. Jackson (presenter), Eric C. Hellgren, Clayton K. Nielsen, and Eric M. Schaubert, Cooperative Wildlife Research Laboratory, Southern Illinois University, Carbondale, IL 62901; Phone: (618) 453-6930; Email: amjackson@siu.edu

Abstract: Mammals in freshwater aquatic systems play important roles as ecosystem engineers, trophic transfer agents, and apex predators, thus acting as indicators of freshwater ecosystem health. To better understand which habitat and watershed features affect the occurrence of these species in Illinois, our objectives are to model the probability of occupancy, detection, and species co-occurrence of 4 aquatic furbearers in southern Illinois (mink [*Neovison vison*], otter [*Lontra canadensis*], beaver [*Castor canadensis*], and muskrat [*Odontra zibethicus*]). To estimate multi-season occupancy we sampled 33 bridge sites during 4 seasons (Jan-Feb 2012, Mar-Apr 2012, Aug-Nov 2012, and Jan-Feb 2013) in the Big Muddy, Cache, and Ohio watersheds in southern Illinois. A survey unit was a 400-m stream segment that was surveyed for tracks and other signs of the target species. Each unit was visited twice by 2 observers for a total of 4 observations per site per season. Occupancy and detection of all 4 species decreased during the third season primarily due to decreased water and substrate availability. We will model occupancy and detection with a suite of covariates including watershed structure, watershed habitat composition, and climatic variables.

Title: A global review of heavy metal contamination in terrestrial mammalian carnivores

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Abstract: The bioaccumulation of heavy metals in humans and wildlife is a global concern. Due to anthropogenic activities (e.g., mining, motorization), heavy metals have been accumulating to toxic levels in biotic and abiotic media. Since mammals are physiologically similar to humans, they are considered useful bioindicators for environmental monitoring in ecosystems with pollution loads. Mammalian carnivores may be especially useful for evaluating toxin levels in ecosystems because they occupy a high trophic position and accumulate ingested substances, including heavy metals. Although bioaccumulation of heavy metals in aquatic ecosystems has been studied extensively, there is less known about heavy metal loads in terrestrial ecosystems. Here, we provide a global review and analysis of heavy metal accumulation in semi-aquatic and terrestrial mammalian carnivores. We will discuss temporal and spatial patterns in accumulation of heavy metals including mercury, cadmium, and lead among species of carnivores from North America and Europe. This research has important implications for predicting the circumstances under which these heavy metals are most likely to accumulate in top predators.

Title: Fatty acid analysis as a tool to infer diet in the Nearctic river otter (*Lontra canadensis*).

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Abstract: Fatty acids (FA) have recently been used in several studies to infer the diet in a number of species. While these studies have been largely successful, most have dealt with predators that have a fairly specialized diet. In this paper, we consider the possibility of using FA analysis as a tool to infer the diet of the nearctic river otter (*Lontra canadensis*). The river otter is an opportunistic predator known to subsist on a wide variety of prey including, fishes, crayfish, molluscs, reptiles and amphibians, among others. We analyzed the principle components of 60 FA from otters and 25 potential prey species in Illinois, USA. Prey species came from 4 major taxonomic divisions: fishes, crayfish, molluscs and amphibians. Each of these 4 taxonomic divisions had significantly different fatty acid signatures. Within each division, most, but not all, species had significantly different profiles. A fuller understanding of the otter's metabolism of FA is necessary for a precise inference of the diet from FA, but these results suggest that fish species are the most significant component of Illinois river otters, and that, with a better understanding of the metabolism, a finer-grained inference of the diet should be possible.

Title: Otter activity at two latrines in central Illinois

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Abstract: We compared otter visitation rates and scat detection rates associated with two adjacent latrine sites in Illinois and developed an ethogram to document the recorded behaviors of otters. The latrine sites were within the Vermillion River Conservation Opportunity Area in Fairmount, Vermilion County, Illinois. Latrine 1 was on a dam adjacent to a private fish pond; Latrine 2 was adjacent to the Salt Fork tributary of the Vermilion River. The latrines were 34 m apart and connected by a crossover trail. We recorded 183 otter visits between August 2011 and August 2012. Cameras operated for 192 camera days at the dam and 188 camera days at the river. Visitation rates were lower at the river, peaking at 0.5 visits per camera day in March compared to the dam with 2.5 visits per camera day in December. At the dam, monthly scat detection rates peaked from November to February. At the river, scat detection peaked multiple times during the year and were lowest in August 2011 and highest in August 2012. We classified recorded behaviors by whether otters walked through the latrines without stopping or spent time in the latrines. During 48% of visits recorded, otters traveled through the latrines without engaging in activity. Behaviors recorded during the remaining 52% of visits included allogrooming, self-grooming, wrestling, sniffing, digging, and defecating. Continued focus on visitation, scat deposition, and behavior of otters in latrines will shed light on the biology that underlies latrine use and lend support to management and conservation efforts.

Title: KDWPT wildlife surveys incorporating Cybertracker

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Abstract: Wildlife population, harvest, and habitat surveys are an integral part of wildlife management. Traditional surveys have been recorded on paper, mailed and entered into a database. All three steps present ample opportunity for data loss or error. For the past several years, the Department has been transitioning wildlife surveys to Cybertracker (<http://cybertracker.org/>); a freeware Windows AccessTM based program with georeferencing and spatial display capabilities. The system was designed with simplicity and efficiency in mind. Users customize an Application for their own data collection needs, which is then downloaded onto a Smartphone or handheld computer for field data collection. The georeferenced data can then be electronically transferred using the internet into an automated database. I'll discuss some of the Department's uses and my experiences with this program.

Appendix 5. Director Information Items (Detailed Background)

Petition to list Prairie Gray Fox and Plains Spotted Skunk under Endangered Species Act

- USFWS received a petition requesting that the prairie gray fox and plains spotted skunk be listed as endangered or threatened under the Endangered Species Act (ESA).
- USFWS conducted a 90-day finding. The 90-day finding does not mean that the Service has decided it is appropriate to give the prairie gray fox and plains spotted skunk federal protection under the ESA. Rather, this finding triggers a more thorough status review of all the biological information available.
- USFWS is now conducting a 12-month finding to determine whether the petitioned action is warranted. This involves a thorough review of the species' status. Three outcomes are possible. USFWS could determine protection under the ESA *is not* warranted, protection *is* warranted, or protection *is warranted but precluded* by other, higher priority activities. If warranted, the official listing process could take several years after the 12-month finding is completed.
- Biologists who represented 11 state agencies at the 2013 Midwest Furbearer Workshop acknowledged a dramatic decline in the historical range and abundance of Plains Spotted Skunk.
- Biologists are concerned about implications of listing the Prairie Gray Fox, which closely resembles other sub-species that are hunted and trapped in the Midwest.
- Biologists recognized that the sub-species designation of the Prairie Gray Fox, described in the 1800's, was based on minor morphological differences. Biologists also recognized that small sample sizes precluded accurate delineation of the sub-species' range.
- Biologists recommended a cooperative effort among Midwest States to collect tissue samples and use genetic analyses to test validity of a sub-species designation and, if supported, better delineate its range.

National Wildlife Control Training Program

- The Association of Fish and Wildlife Agencies received a request to review the National Wildlife Control Training Program developed by Cornell University and the University of Nebraska
- The request asked AFWA to consider whether the program should be used by the states to train and certify wildlife control operators. AFWA solicited comments from biologists attending the Midwest Furbearer Workshop

- Biologists recognized that the Training Program, available online or in print, is a valuable educational resource
- Biologists recognized that some states might choose to adopt the Training Program to train and certify wildlife control operators
- Biologists recognized that regulatory provisions vary widely among states. In some cases, regulatory and procedural frameworks would not allow seamless integration of the Training Program
- Biologists recommend that states evaluate the program individually to determine its compatibility with their regulatory and procedural frameworks

Cougar Management in the Midwest

- Cougars have established breeding populations in western states, including some that are considered part of the Midwest.
- Dispersing males have been encountered as far east as Indiana.
- The number of cougars encountered outside their breeding range has increased dramatically in recent years
- Cougars are native to the Midwest. Suitable habitat occurs in most, if not all states.
- Policies regarding their management of cougars, including their legal status, varies widely among states
- Biologists recommended the following actions regarding management of cougars in the Midwest:
 - Manage cougars at appropriate spatial scales by coordinating research and monitoring efforts among states
 - Inform the public about expanding populations, habits of cougars and risks to people and livestock
 - Assign a legal status to cougars in each state, including states where cougars are encountered irregularly
 - Develop management plans to guide conservation efforts among and within states

Regional approaches to monitoring and managing furbearers

Although individual states may possess substantial biological data on furbearer species within their respective states, some biological trends warrant further investigation at a regional scale. This may include joint state, federal and tribal exchange of information (i.e., harvest data), coordination of data collection and population monitoring, and in some instances cooperative research projects. Some present examples of species where these cooperatives are warranted include:

Decline in abundance of fisher in the Great Lakes Region: Data collected by individual states (MI, MN, WI and NY) indicate substantial declines in abundance of fisher and a shift in abundance from traditional range to non-traditional fisher habitats. Because these trends are common among the individual states this warrants further cooperative investigations to determine what common factors may be leading to a regional decline.

USFWS status review of “prairie gray fox” for listing under the ESA: Common gray fox are a harvested species in most Midwest states. The recent ESA review of the subspecies “prairie gray fox” by USFWS warrants particular attention by the Midwest states.

Appendix 6. Host States of Midwest Furbearer Workshops

Year	State
1979	Kansas
1983	Wisconsin
1984	Illinois
1985	Iowa
1987	Minnesota
1988	Indiana
1989	Missouri
1990	Nebraska
1991	South Dakota
1992	Ohio
1993	Oklahoma
1994	North Dakota
1995	West Virginia
1996	Michigan
1997	Illinois
1998	Kansas
1999	Wisconsin
2000	Missouri
2001	Ohio
2002	Iowa
2003	Minnesota
2004	Illinois
2005	North Dakota
2006	Michigan
2007	Nebraska
2008	Kansas
2009	Kentucky
2010	South Dakota
2011	Wisconsin
2012	Missouri
2013	Illinois