



CONTENTS

Page

Presentations

Keynote Presentation	1
Session 1: Species of Concern in the Midwest	2
Session 2: Agriculture and Pesticides	6
Session 3: Partnering for Conservation	8
Session 4: Habitat Management and Conservation	11
National PARC Update	14

Discussion & Breakout Sessions

Website	17
Research Working Group	17
Brochure Revision Task Team	17
Midwest HMG Task Team	17
Roads Task Team	17
Guidelines for using Amphibians & Reptiles in Education & Outreach .	18
State Wildlife Action Plans Task Team	18
Turtle Races Task Team	18
Agriculture's Effects on Amphibians & Reptiles Task Team	18
Increasing Partnerships Task Team	19

Future Meetings	20
Acknowledgements	20

Keynote Presentation: Industrial strength herpetology in a post-industrial landscape: Herpetological investigation in NW Indiana- Alan Resetar (aresetar@fieldmuseum.org). Alan spoke of the changes in the amphibian and reptile assemblages along the shoreline as industry has come and gone along the Lake Michigan shoreline.

Session 1: Species of Concern in the Midwest

Ozark Hellbender Conservation - Jeff Briggler (jeff.briggler@mdc.mo.gov)

- Believed extirpation of Ozark hellbender is likely in the next 20 years
- Eastern hellbender is larger on average than Ozark Hellbender
- (EH ave. ~48 cm and OH ave. ~40 cm)
- *Why do hellbenders occur in Missouri?*

Meeting Minutes Page 2 of 20

- -high association with springs, ~15° C water temp on average
 - even in summer, springs do not usu. exceed 20° C,
 - dolomite limestone streambeds
- *Hellbender natural history:*
 - bottom-walkers, small home ranges, skin secretions, respiration largely through folds in skin,
 - prey in Missouri = 90% crayfish.
 - Mid-September peak breeding in Missouri- males compete for females, external fertilization only. Females produce 200-700 eggs that hatch in 4-6 weeks—very rare to find eggs. Yolk sac retained as food source after hatching. At hatching 10-12 cm → gills recede.
 - It takes 7-9 years to reach maturity. Long-lived: 35-70 years
- *Population decline of hellbenders in MO:*
 - 80% pop decline for Eastern hellbender and 70% decline for Ozark hellbender. Eastern hellbender is MO endangered. Ozark hellbender is federal candidate for ESA listing and is MO endangered.
- *Ozark Hellbender Working Group:*
 - comprised of government agencies, university personnel, and unaffiliated hellbender enthusiasts.
 - Purpose: identify, prioritize and implement actions necessary to arrest the decline of Ozark hellbenders and to increase public awareness.
 - Conservation Strategy: develop action plan for Ozark hellbender, captive propagation, pop augmentation, research.
- *Known Threats to Ozark Hellbender:*
 - impoundments (reservoirs, low water dams)
 - illegal collecting (pet trade, food, medicine)
 - legal collecting (scientific)
 - incidental take (sucker giggers and anglers)
- *Potential threats to Ozark Hellbender:*
 - stream siltation (loss of riparian corridors)
 - gravel mining
 - habitat loss (removal of rocks/boulders)
 - recreational use
 - water quality (siltation, hormones, contaminants, agricultural runoff)
 - non-native species (trout)
 - diseases (*Batrachochytrium dendrobatidis*)
 - electroshocking (may interfere with breeding)
- *Ozark hellbender working group projects:*
 - *Project 1: Survey of hellbender streams* – Snorkeling/scuba, collect: length, mass, sex, PIT tag, tissue sample (blood), skin scrapings, record aggressive behavior, physical abnormalities, leech presence, fecal sample



- *Project 2: Investigation of Hellbender Abnormalities:* On average, 50% of eastern hellbenders and 72% of Ozark hellbenders have abnormalities. Ozark hellbender are more likely to have multiple abnormalities per animal.
- *Project 3: Investigate incidence of Bd:* North Fork 15-20% test positive, Niangua 4.7% test positive, Current 20% test positive—positive results confined to a few locations. Majority of positive animals were adults except 1 juvenile. –Other spp swabbed inc frogs, fish, turtles.
- *Project 4: Determined general health condition and heavy metal levels of wild adults throughout MO.*
- *Project 5: Determine survival and movement of released captive-raised hellbenders*
- *Project 6: Evaluation of health conditions, reproductive hormones, and metals in juvenile hellbenders*
- *Project 7: Effects of fish presence on hellbender larvae (native/non-native fish)*
- *Project 8: Hellbender genetic diversity, gene flow assessment*
- *Project 9: Investigation of captive propagation (St. Louis Zoo and Shepherd Hills Hatchery)*
- *Population models: Population Viability and Habitat Analysis with Vortex for Ozark Hellbender:* -negative growth rate, high risk of extinction, 96% extinction within 75 years. Eastern hellbender exhibits same trends
- *Donations to Ron Goellner Center for Hellbender Conservation at St. Louis Zoo*

Invasive Round Gobies Lead to Increases in Endangered Snake - Richard King
(rbking@niu.edu).

- *Lake Erie Watersnake (LEWS) natural history:* Midwestern endemic restricted to western basin of Lake Erie. Federally threatened sp, Canada, Ontario, and Ohio
- endangered status. –restricted distribution, history of population decline due to:
 - habitat loss
 - human persecution
 - prey availability?
- *Great lakes Invasives:* 150+ aquatic invasives
- *Round Goby:* recent invader from Black/Caspian Sea from ballast water discharge. First documented in Lake Erie in 1993. Population in western basin of Lake Erie alone is ~9.9 billion. Feeds on zebra, quagga mussels (both invasive), native macroinvertebrates, eggs and larvae of native fishes. Competes with native fish for food and for space.
- *Changing LEWS Diet Composition:* prey item samples from 1948, 1989-92 → (pre-goby): 70% native fish and 15% mudpuppies
- 1996-98 → goby invasion → diet shift
- 2003-04 → 90% goby prey
- *Impacts of Round Gobies*
 - evidence of LEWS functional response

- increased growth rate, increased body size
- mean LEWS svl has increased since goby invasion
- increase in # of offspring produced per female LEWS with round goby invasion
- reproduction more strongly influenced by female LEWS body size since round goby invasion:
 - pre-goby 16% of variation in offspring number was explained by female LEWS body size. Post goby, 54% of variation in offspring # explained by female LEWS body size.
 - average # offspring/female LEWS increased from 21→26 with goby invasion
 - = 20% increase on LEWS offspring production with goby invasion
 - evidence of LEWS numerical response
- *Population Trends*
 - LEWS individually marked w/scale clips,PIT tags since 1980
 - Nerodio: intensive spring survey, annually since 2001
 - Pop size estimates:
 - -within year: Lincoln-Peterson/Schumachers
 - -among year: Jolly-Seber/Bailey's triple catch
 - →Positive trends in pop size over time in 10 out of 10 study sites
 - -positive effect of year and year by site interaction
- *Summary*
 - round gobies =super abundant food source
 - increased prey consumption →functional response, results in:
 - -more rapid growth (earlier sexual maturity)
 - -larger body size (reduced predation)
 - -stronger relation b/t female body size and offspring #
 - goby has helped LEWS population recovery (numerical response) through increased reproductive potential and positive pop. growth
 - Outreach and population recovery plan also greatly contribute to LEWS recovery

Hibernation Ecology of the Eastern Massasauga - Chad Smith (smitcs02@ipfw.edu)

- Eastern Massasauga (E.M.) is a candidate for listing under Endangered Species Act
- Successful management depends on knowing habitat needs during all seasons
- *Objectives:*
 - characterize hibernacula of 3 Michigan populations
 - determine physical and biotic characteristics of hibernacula
 - study behavior in hibernacula
 - 2 sites in SE Michigan (Indian Springs Metropark and 7 Lakes State Park) and
 - 1 site in northern lower peninsula (Camp Grayling Natnl Guard Base)
- *Methods:*
 - Snake observations with fiber optic boroscope, body temp from radio transmitters



- groundwater observations: water chemistry (pH, dissolved oxygen, temp), depth with PVC wells
- soil structure and composition: %Organic Matter, soil texture
- ground temperature-with temp loggers
- *Grayling*: 16 study animals (7 males, 9 females) tracked to hibernacula and monitored through winter → 1 mortality.
 - Grayling site hibernacula had sandy soil—no crayfish burrows
 - stump and root holes, cavities in *Sphagnum* hummocks, mammal burrows, jack pine barrens, spruce forest, wet forest
- *Southern Sites*: study animals exclusively hibernating in crayfish burrows, transitional and upland habitats adjacent to wetlands and streams
- *Winter Cohabitants*: garter snakes in and around E.M. hibernacula
 - E.M. will share hibernacula with conspecifics, *Nerodia*, and *Rana pipiens*
- *E.M. and Groundwater*: -require access to groundwater to survive freezing temperatures
 - Spend time submerged from late October/early November through the winter
 - significantly choose hibernacula with greater water table depth
- *Soil*: soil organic matter is low at Grayling but E.M. select the higher organic matter areas to hibernate in overall.
- *Snake body temperature and water table temp*: -E.M. body temp strongly reflects water table temp.
 - EM drop deeper in water table as temperatures decrease
- *Home ranges and Hibernacula*:
 - hibernacula tend to lie on edges of home ranges
 - E.M. travel long distances from their summer activity centers to hibernacula
 - Fidelity to hibernacula: 86% return to <50 meters from previous hibernacula
- *Behavior during winter*:
 - E.M. occasionally seen breathing at water surface
 - movements: 3 snakes moved to new (shared) hibernacula during a warm period in the winter
- *Winter mortality*: -predators occasionally excavate hibernacula (higher incidence at Indian Springs site)
- *Conservation Implications*: E.M. reported to hibernate in wetland habitats—not the case for all populations
- Michigan law does not offer same protection to wetland and edge/upland habitat
- *Conclusions*
 - very specific structures allow groundwater access to E.M.
 - variety of abiotic and biotic structures important in hibernacula selection
 - winter habitats outside of typical summer activity areas/edge of home ranges

Impacts of Box Turtle Races in Midwest - Alex Heeb (lonerockalex@yahoo.com)

- Mark-recapture and telemetry studies of box turtles



- *Turtle Race Background*
 - turtle races common at fairs throughout country and esp. in Midwest
 - in 1930s gave away cash prizes to encourage participation
- *Turtle Race Problems*
 - currently: several turtles in same containers/pens, poor conditions, injured turtles, disease exchange is possible
 - each turtle is supposed to have 4 square feet of space (Missouri regulation) but this is not the case: more like 10-20 turtles/4 sq feet
 - paint markings on carapace → constricts growth and can increase predation
 - sometimes 50% of the race turtles are discarded in surrounding thickets or other areas—not returned to original locations of collection
 - box turtles use 5-15 acre home range typically
 - disease spread possible from race turtles to native populations (Upper Respiratory Tract Disease)
 - random releases increases box turtle road crossing frequency
 - children learning inappropriate treatment of turtles
 - races should be done earlier in the day
 - turtles should be released at source locations (people releasing turtles in streets/trash cans)
- *Conservation Implications*
 - Over 520 races in the Midwest (4/5 of all turtle races are in Midwest)
 - ~65 turtles/race → 33,800 turtles annually (26,500 are box turtles)
 - in 5 years project that 169,000 turtles raced
 - 2 most frequently used are ornate and eastern box turtles—others used include Blanding's turtles
 - box turtle life history → recruitment is slow
 - in 1987 Florida prohibited races due to gopher tortoise decline
 - existing regulations in Missouri not being enforced (such as # turtle/container)
 - Currently it is illegal to exchange \$ for races.

Session 2: Agriculture and Pesticides

Effects of Insecticide Combinations on Amphibian Metamorphosis - Michelle Boone (boonemd@muohio.edu)

- Agricultural Practices: ~20% land in U.S. is in cropland and in areas like the Midwest it is \leq 58% in cropland
 - 900 million pounds of pesticide used annually
 - agricultural lands account for ~60% total pesticide use in U.S.
 - Amphibians readily use agricultural ponds: sublethal effects are possible with mixes of chemicals
- *In situ Studies*: allow evaluation of environmental impacts

- *Artificial pond studies*: allow more replication and complexity
- Both are useful methods for evaluating chemicals in foodwebs
- insecticides may have direct negative impacts on anurans but may have indirect effects too (through reduced predation, reduced prey, or increased food abundance)
- *Indirect effects study*:
 - examined the single and combined effects of insecticides, fertilizer, and herbicide
 - contaminant effects are additive (not necessarily interactive)
 - food web changes—periphyton fluctuations explain some effects
 - control ponds did not significantly differ from fertilizer and herbicide treatments
 - fertilizer alone and herbicide alone don't do as well
 - indirect effects provide some predictive power for effects on metamorphosis
- *Do direct effects become more important when pesticide has the same mode of actions? (Do multiple insecticides amplify effects?)*
 - Impact = Direct + Indirect
 - used two acetyl-cholinesterase inhibitors (Malathion and Carbaryl) and used a sodium channel disruptor (Permethrin) –different functions
 - Same indirect effects but different direct effects at half of the reported LC50s tested with *Bufo americanus* and *Rana clamitans*
 - insecticides with the same mode of action are more likely to interact
 - potential costs with chemicals with the same mode of action: gosner development stage increases with both carbaryl and malathion (*Rana clamitans* - positive indirect, non-additive effects)
- *Comparing to real world scenario → Golf Courses (with many chemicals)*
 - enclosure experiments with *Ambystoma maculatum*, *Bufo americanus*, and *Rana pipiens*, with and without overwintering *Rana catesbiana* tadpoles present
 - species in golf course enclosures had highest survival when *Rana catesbiana* tadpoles were absent. These species did not do as well when *Rana catesbiana* tadpoles were present in enclosures
- *Conclusions*:
 - indirect effects may be positive or negative depending on mode of action of the chemical, there may be unexpected effects
 - endpoints: what is the best, most sensitive endpoint to examine?

Ecological Effects on an Aquatic Herbicide on Amphibians - Sarah Osterfeld
(french.horn.05@yahoo.com)

- Herbicides may be used as a conservation tool for controlling invasive plants such as reed canary grass
- *Purpose*: Atraxine, glyphosate-based round-up → harm amphibians but now there are glyphosate-based herbicides using alternative surfactants or reduced concentrations approved for wetland use. Study tests Accord and Cidekick II effects on amphibians.



- *Field sites:* constructed wetlands—6 control and 6 treatment ponds (where Accord and Cidekick II are applied to reed canary grass)
- 3 tiger salamander densities used: 15, 30, and 47
- Herbicide treatment: amphibians sampled once a week for 7 weeks with minnow traps, dip nets, and seines. Measured svl for tiger salamanders. Aquatic invertebrate sampling with containers and zooplankton nets→identified and counted.
- There was a significant effect of herbicide treatment with tiger salamander density in the medium and high density treatments
- Herbicide had a significant effect on tiger salamander mortality in all density treatments
- SVLs of leopard frogs significantly differed in herbicide vs. control ponds
- Herbicide treatment had significant effect on prey items: more damselflies present as prey items in herbicide ponds.
- *Behavioral Study:* microhabitat—movement and feeding
 - collected material/substrate from treatment and control ponds along with respective invertebrates and placed tiger salamander larvae in either treatment
 - more movement in herbicide substrate treatment than in control
 - more foraging behavior observed in control than in herbicide treatment
- *Summary:*
 - herbicide treatment: complex density-dependent interactions decreased
 - Accord and CideKickII not as detrimental as with Round-up
 - Spotted salamander study: other herbicides→more asymmetry in treatment ponds
 - more herbicide interactive effects (including prey base) than direct effects

Session 3: Partnering for Conservation

Wetland Reserve Program in Indiana - Gerald Roach (jerry.roach@in.usda.gov)

- *Background:*
 - Wetland Reserve Program (WRP) administered by Natural Resources Conservation Service (NRCS)
 - voluntary program for landowners to protect, restore, and enhance habitat (wetlands)
 - includes marginal croplands, easements
 - WRP emphasizes: migratory birds and wetland dependent threatened and endangered species (e.g. whooping crane, crawfish frog)
- *WRP in Indiana:* in place since 1994, includes 47 counties, 51,306 acres, 494 landowners, primarily permanent easements, \$90 million spent for all years
 - in 2007: \$9.1 million in funding and 41 applications
 - on average annually: \$9-12 million in funding, 40-75 applications, 3500-6500 acres, 85-acre projects on average.
- *Restoration:*



- low level dikes, plug removal, disablement of tile as long as no impact to neighboring property, tree planting, grass planting, -woody debris placement-particularly done to attract invertebrates and to benefit herps (e.g. basking logs in a swale).
- Vegetative Response:-planted woody vegetation
- Wildlife response: T and E species (state and federal) herps, birds, and mammals
- *2 large sites: Kankakee Sands* (TNC property)- 4,393 acres: restored grasses and forbs. Shallow saturated soils. *Goose Pond Restoration*- 7,200 acres- was largest single landowner project in U.S. –diverse habitat upland and wetland
- *Fish Creek Watershed Project*: allowing up to 10 acres of other type land to 1 acre eligible land (special consideration)—Currently, 150 acres being worked on -critical habitat for copperbelly watersnake
- improving water quality
- *Goose Pond*: crawfish basin development
 - work completed in 2007. 9 wetland areas developed, < 1 acre each. Average depth 9-15” for crawfish frog (state endangered). –Shallow, fish-free waters. Water available from early March-mid-July, emergent herbaceous wetland vegetation, crayfish burrows, upland grasslands and savannahs.
- *Copperbelly Watersnake Habitat Guidelines*:
 - complex of habitat (permanent and semi-permanent)
 - shallow waters
 - woody debris
 - Planning now involves more herps: Basins should keep water available till late July/early August
- *WRP is popular with landowners*: backlogged with applicants. Wildlife and vegetative response to restored sites is tremendous
- IN WRP-sites monitored since 2001. IN DNR fish and wildlife biologists monitor sites currently. Monitoring personnel previously hired on temporary basis.
- -There is a 3 year monitoring provision for WRP sites nationwide.

Iowa NRCS Helping People Help the Land through Conservation Partnerships - Jennifer Anderson-Cruz (jennifer.anderson@ia.usda.gov)

- *NRCS Programs*:
 - Conservation Security Program (CSP)
 - Environmental Quality Incentives Program (EQUIP)
 - Wildlife Habitat Incentives Program (WHIP)
 - Grassland Reserve Program (GRP)
 - Farmland Protection Program (FPP)
 - Wetlands Reserve Program and Emergency Wetlands Reserve Program (WRP & EWP)



- WRP and EWP *most money and time spent with these programs. EWP deals with flood damage funding to buy out farmland from federal govt.
- WRP/EWP currently: 1,094 easements, 128,733 acres, 40% of easements are open to the public. –Fairly consistent funding (\$11-17.5 million annually) from 2002-2007.
- 500 NRCS employees in Iowa and 300 associated staff
- really encouraging training staff to identify species at risk
- work out plans with landowners
- educate landowners re: conservation and restoration
- University collaboration (U of Iowa, U of Nebraska, SE Community College)
- Unique sites can be automatically accepted into program out of order (take out of application queue) esp. if T/E species are present
- Partnering with Iowa DNR land owner incentive program to set more land aside - collaborating on restoration plans: Iowa NRCS has no funding for monitoring so partnering with Iowa DOT and Iowa DNR, university personnel, and USGS/ARMI on WRP lands.

Natural Resources Monitoring Partnership - Karen Kinkead (karen.kinkead@dnr.state.ia.us)

- U.S. F.W.S., U.S.F.S., and U.S.G.S. initiated partnership—now many other agencies and organizations have joined
- The need for a new approach is monitoring for:
 - State Wildlife Action Plans
 - Provincial/territorial plans
 - Bird conservation areas, etc.
- Issues in monitoring:
 - driven by short term needs
 - difficult to determine what others are doing for same species
 - inconsistent data collection/storage
 - No communication until after project is complete
- Practical tools: what do we know re: existing monitoring and protocol
- Website houses library of protocols and monitoring locations (not data from past projects)
- Free website—open to any user: enter your project information (title, lead organization, major objectives, methods used, geographic area, link to website if data are available online)
- protocol, goals, and objectives need to be included
- can search monitoring protocols (NMRP does not review or edit protocols)
- quality and appropriateness of protocols vary
- provides easy access to protocols
- saves time and money—find people using the same techniques
- <http://nrmp.nbio.gov>



Session 4: Habitat Management and Restoration Session

Effects of prescribed fire on the eastern box turtle, *Terrapene c. carolina* - Joanna Gibson
(gibsonj@ipfw.edu)

- Eastern box turtle population decline from all states in range—IUCN red list species
- Prescribed fire :
 - used for control of non-native vegetation
 - control encroachment
 - limited literature on effects of prescribed fire on herps
- Purpose: Investigate effect of prescribed fire on movements, spatial ecology, and habitat use in eastern box turtle
- observe direct effects
- management issues
- Site: Army training center—eastern and western pops in Michigan site
- Turtles tracked 3 times/week (May-Mid August)
- Army training center uses fire to maintain sites
 - One turtle in west block burn area: carapace color changed and bubbled after burn, some skin loss, maggots, scute loss → eventual mortality
 - second turtle: exposed bone
 - third turtle: more carapace damage than other two, skin loss, forelimb discoloration, exposed bone
- In east block area, 5 escaped burn damage and 1 mortality
- Observed changes in area and habitat use for burn turtles
 - Kernel density analyses
 - One turtle spent prolonged time in wetlands following burn
 - another restricted activities to wetter areas
 - same pattern observed with additional burn turtle
- Unburned turtles: more overlap in core activity areas
- Conservation implications:
 - ½ turtles emerged by late March and rest are out by April
 - Strategy in a fire: move out, dig down, stay put
 - Fires conducted after emergence will injure/kill turtles
 - ~7% annual loss from population
 - observed scute and toe loss, skin damage
 - shift in habitat selection to moister areas
 - scutes important for water regulation—eventually succumb to water loss?
 - Is overwintering survival reduced?
 - Decrease in activity → decrease in reproduction?
 - Impact on small populations:
 - added pressures (increased road crossing/predation)
- Recommendations:



- burn as early as possible
- only burn target areas –all injuries were from upland habitat
- avoid burning open canopy areas during nesting season
- consider a mosaic approach in burning

Compositional changes in a pond-breeding amphibian community after fish removal: The saga continues – Lee Gross (fleabz4@aol.com)

- Examined impact of fish removal on amphibian community in Coles County, Illinois
- Looked at changes in species abundance, diversity (H'), and *A. texanum* larval recruitment at four ponds
- Of the four ponds, two contained fish, two did not.
- Baseline data collection started 2000 using drift fences and pit-falls
- Rotenone applied to fish ponds in 2001 and 2002
- Bullfrogs/American Toads more abundant prior rotenone application; salamanders (*A. texanum*) more abundant post application
- Found no difference in abundance before/after fish removal in control & treatment ponds; except for *A. texanum* YOY abundance (increased in all treatments)
- H' increased in ponds where fish were removed, but no statistical significance
- *A. texanum* recruitment increased after fish removal
- Rotenone effective for fish removal, apply after active season.
- Exotic fish removal may be effective management tool for increasing amphibian species diversity.
- Study also highlighted importance/need for long-term data collection due to stochasticity

Habitat restoration and amphibian reintroduction in flatwoods wetlands – Allison Sacerdote (asacerdo@niu.edu)

- Study conducted at preserve in Lake County, Illinois
- Site History: Drainage tile and Buckthorn at site negatively impacted amphibians. Surveys in 80's and 90's noted declines and loss of Spotted Salamanders, Wood Frogs, and Spring Peepers. Started habitat restoration in 1999, but surveys conducted post-restoration showed no recolonization.
- Reintroduction Feasibility Assessment: multiple components: Locate source populations; Compare Spotted Salamander hatching success & larval survival in source/restored sites (additionally compare these to Blue-spotted Salamanders); Determine tadpole survival rates for Wood Frogs; Monitor environmental variables; Generate PVA.
- No difference between source and restored sites for Spotted Salamander hatching success or larval survival
- No difference between success of Spotted and Blue-spotted Salamanders
- Did find significant among pond differences for Spotted Salamander hatching success – related to DO: as DO decreased, hatching success decreased. Ran lab experiment with



gradient of DO levels: 0, 2, 4, 5, 6, 7, 8mg/L. No hatching at 0, 2, 4mg/L. Hatching at 5, 6, 7, 8mg/L, greatest proportion hatched at 6mg/L.

- Considered restoration efforts that may affect decrease DO levels: decomposition, tree encroachment, canopy closure. Possible management solutions to increase DO levels: selective thinning of above pond canopies; conduct prescribed burns in pond basins in late fall/winter to reduce amount leaf litter.
- PVA – used to estimate number individuals needed to reestablish population (calculated 100 adults); highlight which life stages are most important for persistence (highlighted adults and late juvenile stages); highlighted % that could be removed without adverse effects (estimated 10%).
- Released 55 successful spotted salamander metamorphs.
- Conducting post-reintroduction monitoring, and additional releases planned over next five years to reach target numbers (from PVA)
- Conclusions: Multiple land use changes may cause extirpations; Study highlighted need to monitor several environmental variables; PVA useful for reintroduction efforts.
- Future efforts will focus on wood frogs and spring peepers, buckthorn 2⁰ compound.

Recovery of amphibians following large-scale habitat restoration – Bob Brodman
(BobB@SaintJoe.edu)

- Study conducted at Kankakee Sands (TNC property), Newton County, Indiana.
- Acquisition of land by TNC provided for connection of three nature preserves: one to north, one in middle, one to south. Habitat includes mesic wet prairie, savanna. Soil is very sandy, originally shallow lake, had been farmed for years (but marginal crop land).
- TNC: “If we build it they will come”
- Baseline data was collected in 1998. In 1999 TNC did habitat restoration. Project from 2000-2003.
- Data: Frog call surveys, visual searches and dip-nets conducted in 1998, 2000-2003. Added drift fences, funnel traps 2001-2002.
- Results: exponential increases in #populations, #breeding sites from 1998 through 2003 (data based on call surveys, visual searches and dip-nets).
- Total species richness has increased from six in 1998 to ten in 2003 (data also based on call surveys, visual searches and dip-nets). All species were originally found on state properties – have migrated in. Still missing four species that are found on state properties (Small-mouth Salamander, Plains Leopard Frog, Cricket Frog, Crawfish Frog).
- Remnant ditches found to retain water longer than new wetlands, provide important sites as deep water refuges.
- St. Joseph College Habitat Restoration: 2002-2007. Restoration efforts focused on meadow south of campus that had been drained years ago. Restored 30 acres. Observations: native sedge has replaced canary grass as dominant species, 11 new species of birds, amphibians have increased.



Impacts of clear-cutting on the spatial ecology and habitat use of the Eastern Massasauga – Brett DeGregorio (talk was given by Bruce Kingsbury, kingsbur@ipfw.edu)

- Candidate for federal listing as threatened. Multiple reasons for declines including habitat loss and fragmentation.
- Although affiliated with wetlands, may also make use of uplands in summer months
- Objective: evaluate impacts of forest clear-cuts on resident massasaugas. How do clear cuts affect spatial ecology? Do clear-cuts create favorable habitat, or is practice detrimental?
- Study conducted north Michigan. Created six large clearings (three in pine, three in mixed deciduous), spread slash, left and spread stumps, left some standing trees.
- Three years of pre-cut data on telemetered snakes (2002-2004). Logged in February 2006. Post-cut data on telemetered snakes for 2006 and 2007.
- Snakes did use pre-cut areas between 2002 and 2004.
- Clearings comprise 4% of study area. <1% of relocations for 2006 were in clearings. Six of 20 telemetered snakes used them, most never encountered them. Used by all snake classes.
- For 2007: Nine snakes used clearings, 10% of relocations in clearings. Not all clearings were used (4 of 6). Also used by all classes.
- Compositional analysis placed clearings last in rank order in 2006, has moved up in 2007.
- Data preliminary at this point, more analysis needed. Also need for further post-cut monitoring.

Long-term intraguild predator-prey dynamics among salamanders – Spencer Cortwright (scortwr@iun.edu)

- Long-term study in Brown County State Park, southern Indiana, on Jefferson's and Spotted Salamanders in wetland ponds created in 1960s. Study started in 1980s.
- Jefferson's and Spotted's have similar life histories, similar size, but can be predators and competitors at same time. As Jefferson's hatch earlier than Spotted, there is a brief period where Jefferson's predate on Spotted's. Within a given year predation by Jefferson's on Spotted's can have a significant impact on the Spotted Salamander Population.
- Conducted long-term sampling, following larval and adult salamanders over time. 24 years of larval samples.
- Over the 24 yr period found that:
 - Spotted Salamanders decline when Jefferson's increase.
 - 52% of ponds fit Pattern 1: if colonization by Spotted Salamanders is early (i.e., earlier than Jefferson's), population growth of Spotted Salamanders is rapid
 - 26% of ponds fit Pattern 2: if colonization by Spotted Salamanders is late, population growth is slow (due to predation by Jefferson's)



- 21% of ponds are not explained by either (show erratic relationship)

Turtles and urbanization in the Midwest – Travis Ryan (tryan@butler.edu)

- Urban sprawl is increasing in Midwest. Agricultural land is being converted into residential areas. Many areas, including Indianapolis have a rural to urban gradient.
- Studies conducted to date on urban turtle populations have been classical studies, none have looked along urban-rural gradient to see how urbanization affects turtle populations.
- Study site: Central Canal in Indianapolis. Canal is 50' wide, 5' deep. Little variation in dynamics, but upland habitat surrounding canal is variable along length. There are 6 species of turtles in canal.
- Study looked at how variation in uplands along canal varies behavior of turtles in canal. Used radio-telemetry.
- Turtles were found to use areas disproportionately to availability. Woodlots, commercial, and river were used more than available, residential and road were used less. No change for open. “Modal” use areas included woodlots. Commercial areas provided important basking sites.
- During winter there was an even greater modal shift in selection towards woodlot associated areas for hibernation.
- Nesting females preferentially selected residential areas for nesting
- Urban habitat is influencing behavior of turtles – key to understanding their persistence.
- We need to move forward and understand what is driving patterns of behavior – move towards process, need hypothesis development
- Important to keep common species common. To achieve this we need to understand why they are staying common.

National PARC Update – Priya Nanjappa-Mitchell (priya@parcplace.org)

- Overview of mission, purpose, structure
- Highlighted importance of Regional Working Groups (RWG): The current funding environment is a “zero sum game,” and there is a need to shift towards larger integrative projects. PARC (JNSC) can assist with identifying projects.
 - Emphasis is on “Now What.” We know species are declining, what can we do now and in the future? Including solutions, mitigation, and non-traditional partnerships.
- PARC has identified six major challenges in reptile and amphibian conservation: Habitat alteration or loss; Disease and parasites; Environmental pollutants; Global climate change; Unsustainable use; Invasive species.
- In addition, a seventh major challenge includes:
 - Lack of data



- Lack of training – particularly identified lack of training in State agencies (non-game biologists, there is not always a herpetologist in every state). PARC wants to help with training.
- Lack of education: public, importance of herps in ecosystem, difference between venomous/non-venomous.
- To address challenges PARC has created range of conservation tools and products (in the form of publications). These include:
 - Model State Herp Regulations – addresses unsustainable use
 - “Don’t turn in loose” – addresses invasives/disease
 - HMGs – addresses habitat loss. Benefits more than herps.
 - Inventory and Monitoring Handbook – addresses lack of data and expertise. Provides guidance for biologists/land managers in inventory, monitoring techniques. Guidance provided for both rapid as well as comprehensive techniques. Currently in review – refer to http://www.parcplace.org/inventory_monitoring
- Current national task teams include:
 - Roads Task Force – Jackie Grant has agreed to lead for MW
 - Important Herp Areas
 - Backyard Education
 - Herp Education Guidelines
- Other PARC conservation tools, products, activities:
 - Trainings – trainings for HMGs, I&M. May lead to PARC certification... 1st HMG training session, based on SE guide, is on October 16-18 in TN.
 - Infrastructural Development:
 - Continue to produce regional tools and products;
 - Strategic plan and Operations document - alignment workshop held in August 2006. Strategic plan draft completed, currently in review. Companion Operations document is in progress.
 - Friends of PARC - separate non-profit entity to PARC. Purpose is to support PARC’s mission. Provides way to solicit, hold, distribute funds. Hopefully accepting donations by October 2007. People needed for Board of Director’s – will be responsible for creation of fund raising strategy.
- Current PARC funding:
 - Mostly federal and state based
 - Ernie paid through federal; Priya through state.
 - Also receive discretionary funding: donations, product proceeds, royalties
- PARC Meeting Calendar (visit: http://www.parcplace.org/meeting_calendar.html for updates):
 - HMG SE Training (TN): Oct 16-18
 - Amphibian declines and Chytridiomycosis (AZ): Nov 5-7
 - PARC JNSC (AZ): Nov 8



Discussions and Breakout Sessions

Greg Lipps (GregLipps@aol.com)

Website

Midwest PARC owns the domain mwparc.org, but does not currently have an active website. Bruce Kingsbury (kingsbur@ipfw.edu) agreed to help develop a MW PARC website, and the co-chairs will work on raising money to help support a student to work on the site.

Research Working Group

The Research Working Group of MW PARC produced two documents that were identified as priorities during the 2006 annual meeting. These documents will be posted to the MW PARC website:

- 1) *Research needed to assess management strategies for amphibians and reptiles in the Midwest.* Compiled by Mark A. Jordan (jordanma@ipfw.edu) and Richard B. King (rbking@niu.edu).
- 2) *Literature pertinent to conservation objectives for amphibians and reptiles.* Compiled by Stephen J. Mullin (sjmullin@eiu.edu).

Brochure Revision Task Team

The Bureau of Land Management has agreed to pay for the reprinting of several PARC brochures. Allison Sarcedote (asacerdo@niu.edu) agreed to take the lead on the review and update the "Amphibian Eye's View of a Wetland" brochure.

Midwest Habitat Management Guidelines Task Team

Bruce Kingsbury (kingsbur@ipfw.edu) gave an update on the second edition of the MW HMG. The new format used by the SE and NE will require the addition of new habitat types and their relationship to MW species. The following tasks were identified:

1. Finalize habitat types by end of September – Bruce/Joanna Gibson (gibsonj@ipfw.edu) to coordinate
2. Solicit authors for each habitat type by end of September – Bruce/Joanna
3. Finalize optimal, marginal, suitable in table by end of October – Bruce/Joanna to coordinate.

Roads Task Team

Jacqueline Grant (jbgrant@mtu.edu) is leading the MW PARC Roads task team and will be our liaison to the national PARC working group. The following tasks were identified at the meeting:

1. Develop contact list of interested parties (completed).
2. Contact national PARC roads working group and request link to webpage (completed).
3. Develop web presence -- J. Grant by spring 2008.
4. Develop a database of Midwest herp/road activities and research to include: mitigation locations; important target species; links to important herp areas; links to education and outreach; future research priorities; borrow pits -- J. Grant to compile and post on website.



5. Host web page -- coordinate with B. Kingsbury.

Guidelines for Using Amphibians & Reptiles in Education & Outreach Programs Task Team

This task team has produced an outline for this proposed new PARC product. A conference call of individuals interested in pursuing this project has been scheduled for September 24, 2007.

The following tasks were identified at the meeting:

1. Revise outline. -- Bill Flanagan (BFlang@aol.com) and Kent Bekker (kbekker@gmail.com) by 30 Sept. 2007.
2. Send outline to reviewers and incorporate comments. -- Bill and Kent by 31 Oct. 2007.
3. Present idea to JNSC at Nov. meeting. -- Greg Lipps (GregLipps@aol.com)
4. Identify contributors and potential funding sources. -- Bill, Kent, and others by 31 Jan. 2008.

State Wildlife Action Plans Task Team

This task team is led by Carol Hall (carol.hall@dnr.state.mn.us) and is working on a comparison of amphibians and reptiles in the current State Wildlife Action Plans. Tasks identified at the meeting include:

1. Send a table to selected state representatives to collect the following information: species of greatest conservation need; habitats; and, conservation actions.
2. To encourage uniformity across the states, include the list of species and habitats developed by Joanna Gibson for the MW HMG.
3. Create a regional summary document by November 30, 2007.

Turtle Races Task Team

This task team was formed in response to the presentation by Alex Heeb (lonerockalex@yahoo.com). Midwest PARC's approach to this issue will focus on helping our partners provide alternatives to organizers of turtle races. A particularly large turtle race in northern Michigan was identified as a possible model for PARC's efforts. Tasks identified at the meeting include:

1. Investigate alternative ideas to replace turtle racing (i.e., hand powered toy turtles). -- Alex Heeb by 1 October 2007.
2. Identify partners that can work with local turtle race organizers (i.e., local herpetological societies). -- Joanna Gibson and Bill Flanagan will work on for large turtle race in northern Michigan.
3. Produce informational materials for race organizers about laws concerning turtles, proper husbandry, and the release of turtles after races.

Agriculture's Effects on Amphibians and Reptiles Task Team

It is impossible to discuss amphibian and reptile conservation in the Midwest without discussing agriculture. There was a lively discussion about biofuels and other technological advances that



may be perceived by policy makers and the public to be environmentally-friendly, when in fact they may actually do more to harm populations of amphibians and reptiles. The effects of the expanding footprint of agriculture on Midwestern amphibian and reptile populations became the topic of this task team led by Allison Sacerdote (asacerdo@niu.edu). The team came up with a goal of examining the Farm Bill for language regarding changes in policy with respect to biofuels, habitat protection, and research moneys. Tasks identified by the team included:

1. Determine current status of the Farm Bill in congress and when it will be voted upon -- Allison 9/12/2007.
2. Determine if other conservation organizations already have campaigns in place re: biofuel production and environmental impacts. See if PARC can join in on existing campaign or set-up similar model campaign. Madeleine, Jennifer, Allison 10/7/2007.
3. Contact David Pimentel, Tyrone Hayes, David Pulaski, Jen Mock, and Chuck Bullard to synthesize known information on environmental, health, and economic ramifications of various biofuels and petroleum. Allison 10/7/2007.
4. Generate fact sheet/information table comparing the environmental and economic costs and benefits of various fuels for brochure and weblink. (TBD).
5. Make brochures available at NRCS offices. (TBD).
6. Letter to the Editor Campaign- create form letter to the editor for dissemination to various papers simply pointing out that some biofuels may not be as 'green' as advertising states.-Encourage people to read up on fuel environmental ramifications and include weblink to comparison table. (TBD)
7. Contact county commissioners for soil and water conservation districts to distribute brochures/set up meetings? (TBD)

Increasing Partnerships Task Team

One of the most productive and interesting discussions during the MW PARC meeting revolved around increasing our partnerships, both to strengthen the regional working group and to be more effective in implementing conservation strategies. This included discussions of the Indiana NRCS 10:1 upland:wetland exemption for the Fish Creek watershed, specifically to benefit the Copperbelly Water Snake

(http://www.in.nrcs.usda.gov/intranet/TechnicalNotes/Copperbelly_Water_Snake_Habitat_Guidelines_TechNote.pdf), and the incentives for including snake hibernacula in Iowa NRCS projects (<http://www.ia.nrcs.usda.gov/news/brochures/ReptilesAmphibians.html>) as examples of the types of on-the-ground conservation we want to motivate.

Participants agreed that in order to be successful we must reach out to other groups and individuals not traditionally associated with amphibian and reptile conservation. Discussions also touched on our need to acquire outside funding to support such things as a MW PARC website and low student registration/lodging fees at the annual meeting.



Rachel Osborn (rosborn@ch2m.com) agreed to take the lead on this task team with the goals of: increasing partnerships, identifying and pursuing fundraising opportunities and sponsors; and, educating partners. The tasks identified at the meeting included:

1. Establishing a network of current and potential partners and sponsors.
2. Creating “canned” presentations for educational use.
3. Exploring the possibility of certification programs.

Future Meetings

In 2008, MW PARC is planning to meet in Iowa, where the nation’s first amphibian and reptile conservation area was recently dedicated (<http://www.inhf.org/mag07summer/arca.htm>). Thanks to Karen Kinkead (karen.kinkead@dnr.state.ia.us) and Jennifer Anderson-Cruz (jennifer.anderson@ia.usda.gov) for volunteering to help with meeting planning and logistics. We have also tentatively planned to meet in Michigan in 2009. Thanks to David Mifsud (dmifsud@herpman.com) and Edyth Sontag (sonntage@msu.edu) for volunteering to help with the 2009 meeting planning. In the future, MW PARC will attempt to alternate annual meeting locations east and west of the Mississippi River.

Acknowledgements

The co-chairs would like to thank all of the people who made the MW Annual meeting a success, especially: Joanna Gibson, Rich King, Bruce Kingsbury, Rich King, Steve Mullin, and Allison Sarcedote. Thanks to everyone who brought items for the silent auction which raised over \$350 for MW PARC!