The Martes Working Group, founded in 1993, facilitates communication among scientists with a common interest in research, conservation, and management. The Martes complex includes 7 marten species (Martes sp.), fisher (Pekannia pennanti), wolverine (Gulo gulo), and tayra (Eira barbara).

New site under development: www.martesworkinggroup.org

Fall 2017 Newsletter - Volume 24.

2018 Symposium Update
Michael Joyce, Arrangements Chair

We are delighted to invite you to the 7th International Martes symposium which will held in Ashland, Wisconsin, USA from July 30-August 2. This meeting will bring together researchers, practitioners, and educators from around the world engaged in research and conservation within the Martes complex (martens, fisher, wolverine, tayra).

Ashland is a small city of about 8,000 people located in the Western Great Lakes Region. Ashland sits near the head of the Chequamegon Bay (pronounced shuh-WAH-mah-gen), on the south shore of Lake Superior in close proximity to the Apostle Islands National Lakeshore, the Chequamegon National Forest, and many other highly prized natural areas providing incredible opportunities for outdoor recreation.

We are still working to finalize details about the conference, but preliminary information on venue, lodging, travel, and field trips is given within. Be on the lookout for emails providing additional information over the next several months, including a link to the conference website and details about registration, lodging, transportation, and field trip options. If you have any questions, please contact Jon Gilbert (jgilbert@glifwc.org) or Michael Joyce (joyc0073@d.umn.edu).

Conference Venue
The 2018 Martes Symposium will be held at Northland College in Ashland, Wisconsin. Northland College is a small liberal arts college with an emphasis on environmental stewardship and sustainability. For more information and pictures of Northland College, please visit their website: www.northland.edu.

Lodging
Several lodging options will be available to symposium attendees including dorm rooms at Northland College and rooms at one of several area hotels. Dorm rooms will be available for either single or double occupancy. Prices and reservation information will be available this winter.
2018 Symposium update (continued)

Transportation and Travel Logistics

The nearest airport is the Duluth International Airport (DLH) in Duluth, Minnesota approximately 75 miles from Ashland. There are several daily connecting flights to Duluth from Chicago O’Hare International Airport (ORD) and Minneapolis-St. Paul International Airport (MSP).

Rental cars are available from the Duluth airport. The planning committee is also working to organize easy, low-cost or no-cost ground transportation between the Duluth airport and Ashland. Look for additional details and reservation information in the next several months.

Field Trips

Symposium participants will have the opportunity to take part in a number of exciting field trips to explore the Western Great Lakes region. Potential field trip options include trips to the Apostle Islands National Lakeshore, Porcupine Mountains, and other local natural areas.

The Apostle Islands National Lakeshore contains 21 islands surrounded by Lake Superior. The islands have more lighthouses than any other National Park. Visitors can hike, kayak from one island to another, scuba dive, camp, and swim. July and August are the warmest times of the year with 24-25°C temperatures and occasional rain showers.
Field trip option: the Porcupine Mountains are one of the most extensive old growth northern hardwood forests. The park was established in 1945, protecting sugar maple, American basswood, eastern hemlock, and yellow birch. Hiking, wildlife viewing, backpacking, camping, swimming, and boating are some of the recreational opportunities.

2018 Symposium update (continued)
Similar to our last meeting in Krakow, Poland - this symposium will be a great opportunity to establish collaborations, deepen friendships, and further international understanding of the issues with these taxa. The social events and field trips will provide opportunities to network with colleagues from around the world in a pleasant environment, surrounded by the shoreline and deciduous forests. We hope you will enjoy the Great Lakes Region!

Please see our call for abstracts within this issue. Also notice we’re developing a new website and we need your photographs (see the request by Scott Yaeger within). The website should be online this winter, providing plenty of updates and opportunities for our membership.

We’ll send out a call for volunteers and details regarding our travel assistance programs for students and under-represented regions/taxa soon.

2018 Symposium Theme
The theme of the 7th International Martes symposium is: The Martes Complex: Does the ecology match the phylogeny?

The Martes Complex (martens, fisher, tayra, and wolverine) includes members of Mustelidae with similar physiological characteristics (body shape, metabolism), but species are distributed globally in diverse and dynamic conditions – from tropical forests to boreal mountains. Thus, the phylogeny suggests the Martes Complex should have physiological similarities due to body morphology, ecological similarities in behavior, or a combination of physiological and behavioral adaptations. Because of the diverse environments in which these species inhabit, understanding fundamental characteristics between and among taxa can identify strategic opportunities for prioritizing research and continued conservation.
Submit your abstract

We welcome either original contributions or comprehensive reviews.

In an effort to capture a wider variety of topics, we would like to encourage the submission of presentations including:
• Original research
• Comprehensive reviews/synthesis
• Field updates (poster or 5-minute presentations)
• Field techniques (poster or 5-minute presentations suggested)
• Thoughtful discussions (posters or 5-minute presentations suggested)

Invited presentations will be up to 30 minutes; contributed research will be up to 20 minutes. We are also including several sessions for which talks will include 5-slides for 5 minutes. The goals of these accelerated sessions are to provide simple concepts or updates to the entire group so discussions can continue during breaks, meals, and field trips.

Current potential session themes:
• Phylogeny (e.g., evolutionary relationships and traits)
• Physiological/behavioral ecology (e.g., reproductive ecology)
• Foraging/movement ecology (e.g., energetics, dispersal)
• Population demography (e.g., survival, population viability)
• Conservation genetics
• Epidemiology/parasitology
• Community ecology (e.g., interspecific competition/predation)
• Conservation and management
• Traditional Ecological Knowledge
• Techniques
• Field updates (limited to 5-minute presentation or posters)
• Review/synthesis (include subject area)
• Other (describe)

Please submit abstracts to martes.symposium.2018@gmail.com and include “Martes Symposium Abstract and your last name” in the subject line (e.g., Martes Symposium Abstract, Moriarty). Abstracts must be submitted electronically via Microsoft Word by 26 February 2018. There will also be a link on our website soon.

Abstract Guidelines

Please limit abstracts to 400 words. Use Times New Roman, 12-point font.

• Line 1: Preferred presentation:
  “Oral presentation, invited” (if you are invited to summarize a topic regarding the theme)
  “Oral presentation, contributed” (original research or review)
  “Oral presentation, 5 minute” (field updates, techniques, or discussions)
  “Poster presentation”
• Line 2: Presentation theme (see list of session themes above)
Abstract Guidelines (continued)

• **Title.** Upper and lower case in bold.
• **Author name(s).** Type in upper and lower case, include superscript and number for each address
• **Author address(es).** If there are several authors with different addresses, start with the subscript and include the organization, department, street addresses, and country with commas between and followed by corresponding email addresses. Separate address and email address of the corresponding author with a period.
• **Abstract.** Single space and type in upper and lower case. The abstract should summarize the paper with an emphasis on results and their meaning. Leave only 1 space between a period and the start of the next sentence. Scientific names should be *italicized* in parentheses, and should accompany the 1st use of the common name. Common names should be capitalized.
• **Keywords.** Include <6 keywords.

Example from the 6th International Conference:

**Poster presentation**
**Techniques**

**Maximizing information from technology: recommendations for GPS units with motion sensors for forest associated mustelids (>800g)**

Katie M. Moriarty¹, William J. Zielinski², Mark A. Linnell¹, Patrick J. Tweedy³, Clinton W. Epps¹

¹ Oregon State University, Department of Fisheries and Wildlife, 104 Nash Hall, Corvallis, Oregon, 97331, USA. ktmoriarty22@gmail.com
² U.S. Forest Service, Pacific Southwest Research Station, 1700 Bayview Drive, Arcata, California, 95521, USA.
³ Green Diamond Resource Company, P.O. Box 68, Korbel, California, 95550, USA.

Miniaturization of Geographical Positioning Systems (GPS, >40 grams) provides innovative opportunities to learn from small mammals >800g, including elusive members of the weasel family. GPS units allow locations to be collected at short intervals with high precision in remote locations. Nonetheless, all GPS units suffer from non-random data loss and error due to topographical and vegetative obstruction as well as animal behavior, such as resting in cavities or burrows. Further, battery life in miniature GPS units limits the number of possible locations and unit malfunctions are common. Fisher (*Pekania pennanti*) and wolverine (*Gulo gulo*) have the lowest reported fix success rate, or the number of successful locations divided by number of attempts (25-35%, 46% respectively). We collected movement and activity data on Pacific martens, *Martes caurina*, using GPS collars with a motion sensor, or accelerometer (Quantum 4000 MicroMini, Telemetry Solutions, Concord, CA, USA). Our fix success rate was 66% and our expected accuracy for locations with >4 satellites (3-D) was <50m. Here we showcase three applications from our research to create broad discussions about mustelid ecology and to increase collaborations locally and globally. First, we provide results from two series of GPS testing to understand the effects of satellite information, or the fix interval, on fix success and accuracy. Our results suggest that traditional fix intervals for cavity resting animals near dense vegetation may critically bias data. Second, we evaluate marten activity patterns using accelerometer data. We reveal individual variation during and between seasons, suggesting our knowledge of species activity is more variable than previously described. We recommend activating motion data collection during future projects to better understand fundamental aspects of marten ecology. Lastly, we evaluate home range creation for territorial adult martens. Our data suggests that short-term (<7 days) fine scale movement data may be sufficient for estimating annual home ranges. It is unknown whether this phenomena applies to juveniles or other populations with loose territoriality, expected with increased resources. The combination of information on individual marten activity and movement can powerfully provide information on fundamental ecology, energetics, behavior, and habitat use. Although this body of research has been largely explored, we reveal considerable gaps in our knowledge. GPS technology is expensive and wrought with frustrating malfunctions. However, we feel unified suggested protocols at this early phase of GPS opportunities could rapidly increase our understanding of mustelids at a global scale.

Keywords: accelerometer, activity patterns, home range, *Martes caurina*, movement
We are getting a NEW website

Scott Yaeger
Our group website is getting an update and we would like to prominently display your fabulous photos of the Martes complex, their habitats, or past and ongoing field work. Showcase your favorite images and let your colleagues see your species of interest, a field memory, or some great new finding that presents well in a photo.

Of course a picture is worth 1000 words, but please include a short caption, photo credit, and a short note with your permission to post on our group’s site. At a minimum, please save the filename with the species, photo location including country, and photo credit (e.g., M.caurina_Lassen_National_Forest_CA_USA_K.Moriarty). Please send photos and captions to jscottyaeager@gmail.com.

We are moving the old website to a new platform to improve functionality and updating a number of items including a means to make it easier to check and maintain your membership status. Site development is already underway, so please send membership updates soon to get full updates and benefits!! It’s under development – but here’s the address:

martesworkinggroup.org

Call for Newsletter Submissions!

Katie Moriarty
Soon the newsletter will be integrated with our new website, providing more resources to our membership.

When you feel inspired, please send Katie Moriarty (ktmoriarty22@gmail.com) any or all:
• Short project updates with photographs (<1 page)
• Your favorite field photographs with a caption
• Citations and summaries for new articles, books, or other media
• Dates (and links) to upcoming meetings or workshops that may be of interest
• Links to field videos or technique videos

Pictures are needed for the new website! Here, a fisher (Pekania pennanti) is captured sticking out his tongue, captured during distribution surveys in Oregon. Photo from Brent Barry, Oregon State University.
Newly released and available!

Andrzej Zalewski

Our latest *Martes* book became available in print September 2017. When will you get your copy?

“The *Martes* Complex in the 21st century: ecology and conservation”

Edited by: Andrzej Zalewski, Izabela A. Wierzbowska, Keith B. Aubry, Johnny D.S. Birks, Declan T. O’Mahony, Gilbert Proulx

Published by: Mammal Research Institute, Polish Academy of Sciences, Białowieża, Poland

14 chapters on the ecology and conservation of *Martes* Complex species (385 pages) organized into 4 sections:

Part I - NATURAL HISTORY
Part II - CONSERVATION AND MANAGEMENT
Part III - HABITAT USE AND SELECTION
Part IV - RESEARCH TECHNIQUES AND KNOWLEDGE GAPS

The price of the book – 40 EUR.

**Order NOW from:** the library of the Mammal Research Institute PAS
(http://www.zbs.bialowieza.pl/artykul/233.html) or by email: library@ibs.bialowieza.pl.

---

Snow tracks of a Pacific marten (*Martes caurina*) along a log, Lassen National Forest, California, USA.
The Republic of Sakha (Yakutia) is the part of the Russian Federation located in the northeast of Asia, where it occupies over 3.2 million km² (Fig. 1). The distances between the outmost northern and southern points, as well as between the eastern and western points are >2000 km. Over 40% of the territory lies beyond the Arctic Circle. The climate there is sharply continental, the amplitude of air temperature fluctuation is 100 °C in average (from 40 °C in summer to -60 °C in winter). In the territory of Yakutia, the Northern hemisphere’s Pole of Cold is situated, where the lowest temperature record was -71.2°C. The average temperatures in July and January are +16,6°C -37,1°C on average.

The vast region of Yakutia is located in the area covered with permafrost, 80% of which is continuous. Yakutia is also remarkable for numerous lakes and rivers. There are more than 723 thousand lakes and more than 700 thousand rivers of various sizes, including the large rivers of the Eurasian continent, such as the Lena, Indigirka, Yana, Kolyma and Olenek. Yakutia is located within three natural zones: zone of Arctic deserts and semi-deserts, tundra zone and taiga zone. The forests cover more than 80% of the territory with larch as the main forest forming species. The rest are birch, pine, spruce and Siberian pine.

The modern fauna of Mustelidae family in Yakutia includes seven species: weasel (Mustela nivalis L., 1766), stoat (Mustela erminea L., 1758), steppe polecat (Mustela eversmanii Lesson, 1827), Siberian weasel (Mustela sibirica Pallas, 1773), American mink (Neovison vison Schreber, 1777), sable (Martes zibellina L., 1758), wolverine (Gulo gulo L., 1758) and river otter (Lutra lutra L., 1758). In Southern Yakutia, occasional invasions of badger (Meles leucurus Hodgson, 1847) are recorded.

In 1961-1986, 1006 specimens of American mink were introduced in Yakutia. Acclimatization of 532 steppe polecats in 1980-1981 was not successful and the stable population was not established. Now, due to extremely small numbers, the steppe polecat is considered to be a rare species and is listed in the Red Data Book of the Republic of Sakha (Yakutia) along with the river otter living in Yakutia in the northern limits of its distribution range. The rest of the mustelids are the game species and are hunted during winter hunting seasons. Sable is of greatest commodity value due to high skin price.

Yakutia is a region of developed branches of tradition-bound management of natural resources including great hunting traditions. Owing to this, we are generally delivered from the necessity of killing animals for scientific purposes and have an opportunity to work with plenty of material. Our study involves the work with carcasses of game.
Field Reports and Commentary

Fig 2. Students participating in morphometric, genetic and parasitological studies of predatory mammals.

Cunis Family Fauna in Yakutia (continued)

species of carnivorous mammals. As a rule, these animals are hunted for their fur, not for meat. So, hunters take the skins and provide us with animal’s carcasses. Due to extremely low winter temperatures, carcasses can be kept in excellent, deeply frozen condition for a long period of time.

Carcasses of hunted carnivorous mammals are examined at the laboratories of the Institute for Biological Problems of Cryolithozone of Siberian Branch of the Russian Academy of Sciences and the Yakut State Agricultural Academy (Fig. 2). Thus, game species bring both economic benefits to hunters and to research activity.

Collection and study of carcasses of game predator species have been carried out annually since 2002. All major ecological and geographical regions of Yakutia are covered by monitoring. In addition to the network of monitoring sites which provide us with samples every year, we also collect carcasses from other regions of Yakutia. The most numerous and common species in our studies is sable. In certain years we managed to study more than 1000 specimens. Our current craniological collection comprises over 8000 sable skulls, over 200 skulls of American mink, 100 skulls of Siberian weasel, about 90 skulls of wolverine.

Each animal carcass undergoes complete morphological and anatomical examination. Each specimen is assigned a number under which all the data are entered into the database. They include the catching area, morphometric body and skull measurements, internal organs measurements, participation in reproduction and fertility, fatness estimation, presence and species diversity of helminths, food type and its amount in gastro-intestinal tract, etc. The age of all animals is estimated by counting annual layers in teeth. Tissues are sampled for genetic studies as well (Fig. 3).

Over the past winter period of 2016-2017, more than 700 carcasses of sables, over 50 American minks, 30 stoats, 10 Siberian weasels, 6 wolverines, and about 50 foxes were collected and studied. We work on expanding the range of research activity and are always open for cooperation and joint projects. Some of the latest results of our research activity are in the following publications (see literature section):


Fig 3. Helminths and histological sections of mustelids’ organs: a) wolverine nematodes; b) Scolex cestodes; c) Histological stained section of canine tooth; d) histological section of the sable ovary.
After much time and effort, I am happy to share with the Martes working group that I have finished my dissertation focused on the reproductive ecology of the fisher in the southern Sierra Nevada. This dissertation focused on assessing reproductive parameters and forest habitat used by denning female fishers.

I have really appreciated encouragement and advice provided by members of this group over the course of completing my dissertation. This research was conducted in conjunction with Kathryn Purcell and Craig Thompson of the USDA Forest Service, Pacific Southwest Research Station and Douglas Kelt at the University of California, Davis. I provide some highlights on the three chapters here; if these pique your interest, you can read the full dissertation or keep an eye out for publications that we hope to have available soon.

In my first chapter I reviewed literature on fisher reproduction over the species’ range for comparison with 7 years of data from the southern Sierra Nevada. On average across its range, 71% of adult females reproduced (range, 40 – 100%; \( n = 16 \)), parturition occurred on 25 March (range, 3 March – 17 April; \( n = 16 \)), and litter size was 2.5 (range, 1 – 4; \( n = 16 \)). In our study area, we tracked 35 of 42 adult female fishers to 257 reproductive dens; 86% (range across years, 79 – 100%) of females attempted denning and 75% (range across years, 64 – 100%) were successful; mean parturition date was 30 March (range 17 March – 12 April; \( n = 69 \)), and mean litter size was 1.57 (range, 1 – 3; \( n = 75 \)). In this region, females reproduced at a rate comparable to or higher than elsewhere, gave birth at similar or later dates, but had the smallest reported litters; I discuss conservation implications of these findings and hypotheses for small litter size.

In my second chapter, I compared fisher use of microsites and structures for resting and denning and assessed habitat selection by denning females at 3 spatial scales. At the microsite scale, both sexes rested in tree cavities (42.1%), branch platforms (29.7%), broken top platforms (11.1%), burrows (8.4%), and log cavities (7.5%); in contrast, females used tree cavities almost exclusively as both natal (100.0%) and maternal den (99.0%) microsites.
Rebecca Green (Continued)

At the structure scale, both sexes rested in live conifers (35.4%), live hardwoods (26.3%), and conifer snags (20.1%), while denning females used live hardwoods (51.3%), live conifers (22.5%), and conifer snags (21.3%). Both sexes rested most frequently in white fir (Abies concolor), California black oak (Quercus kelloggii), and ponderosa pine (Pinus ponderosa); denning females used California black oak most often (55.4%), followed by white fir and incense cedar (Calocedrus decurrens). Habitat selection analysis suggest that large California black oaks, large snags, dense tree canopy, high stand density indices, decay, slope, and elevation may predict den habitat at different spatial scales.

In chapter 3, I assessed physical and thermal attributes of tree cavities used for denning and season by a female (i.e., den cluster). We measured physical traits of cavities used as den microsites (30 natal, 35 maternal); attributes were similar for natal and maternal dens, except that natal den entrances were smaller (mean vertical x horizontal diameter 11.1 x 7.6 cm compared with 19.2 x 9.3 cm). Data from loggers deployed inside and outside previously used den cavities (20 natal, 21 maternal) from late March – June indicate that cavities provided good insulation from cold temperatures. Mean daily minimum temperatures were lower outside than inside cavities for all dens; natal den cavity interiors had a smaller proportion of days with temperatures below 5° C than maternal dens. Within a den cluster, mean distance between trees was 364 m ± 314 SD (range 0 – 1,894 m) and among all trees was 930 m ± 650 SD (range 0 – 2,718 m). Spatial attributes of den clusters may reflect a patch size relevant to denning female fishers of use in forest planning.

**TIMELINE of ACTIVITIES for REPRODUCTIVE FEMALES**

**EARLY SPRING**
- Natal Den Initiation (Parturition)
- Male Visitation to Dens and Mating
- Move to Maternal Dens
- Rearing of Mobile Kits

**SPRING**
- Range of Dates
  - 23 March – 11 April
- Dates across years
  - 29 March – 6 May
- *Peak ~ 6 April
- Documented moves
  - 6 April – 10 June

**SUMMER to EARLY FALL**
- Approximately
  - Mid- to late June to early October

1 Not including dens located “late”

**Update from Northeast North America**

Paul Hapeman

The 1st meeting of the Northeast Forest Carnivore Working Group was a success. The meeting focused on marten and fisher and was organized by Paul Jensen at New York Department of Environmental Conservation. The meeting was intended to bring researchers from across the Northeast together to share project updates, exchange ideas, and develop collaborations for larger regional efforts. Some of the topics included occupancy models, genetics, data management, and field protocols. The meeting was well-attended and included members of state agencies, faculty from universities, and graduate students.
Resources: New literature


Deksne, G., Segliņa, Z., Ligere, B., Kirjušina, M., 2017. The Pine marten (Martes martes) and the Stone marten (Martes foina) as possible wild reservoirs of Toxoplasma gondii in the Baltic States. Veterinary Parasitology: Regional Studies and Reports.


Short Photographic Narratives Submitted by: Evgeny Zakharov zevsable@gmail.com

The stoat inhabits all of Yakutia, including the tundra zone. Its modern population size is much lower compared to the first half of the last century. As many specialists believe, this is due to recovery of the sable population. The stoat feels no fear of a man and often settles in close vicinity with him. Taking advantage of stoat’s credulity, hunters easily domesticate it. Stoats reduce the harmful activity of rodents and other small mammals at hunters’ logs. Besides, they often act as pets or companions bringing joy to hunters living a sheltered life during hunting seasons.

"The mistress of the hunter’s log" (the Anabar River basin, North-east Siberia)

The stoat has a special place in Yakutian folk art. An ancient Yakutian fairy-tail explains the presence of a black mark on stoat’s tail. One hunter wanted to kill the stoat for thieving. He tried to hit the animal with a poker but missed, only a tip of its tail was grazed. People believed the stoat to be a smart and brave hunter who was able to kill an elk. The stoat waited until the elk fell asleep and then got into its ear and killed it. Hunters tell the legends on how stoat hunts wood-grouses. It finds those magnificent birds sleeping on the ground in the snow. When attacking, the stoat often fails to overcome such a big bird at one stroke. The wood-grouse flies away taking the small predator along with. If the stoat succeeds to bite the bird’s neck through, they fall down together. In case the predator is less successful, it falls into the snow alone, while the bird escapes.

"The fluffy spirit of rocks" (rocky slopes of the Indigirka River bank, North-east Siberia)
Successful hunting (the Indigirka River bank, North-east Siberia)

Sure enough, the stoat’s diet is based on small mammals, particularly, mouse-like rodents. Stoats also willingly keep close to pika colonies. This food item is, probably, very attractive for stoats due to its big size as compared to voles.

International *Martes* Working Group Contact Information

**President:** Jonathan Gilbert ([jgilbert@glifwc.org](mailto:jgilbert@glifwc.org)) * Contact Jonathan regarding the 2018 Symposium *

**Treasurer and Membership:** Sean Matthews ([Sean.Matthews@oregonstate.edu](mailto:Sean.Matthews@oregonstate.edu)) and J. Scott Yaeger ([jscotyaeger@gmail.com](mailto:jscotyaeger@gmail.com))

**Newsletter Editor:** Katie Moriarty ([ktmoriarty22@gmail.com](mailto:ktmoriarty22@gmail.com))

**Representatives:** Kerry Nicholson (Alaska, Yukon, Northwest Territories); Aaron Facka (Western North America); Marianne Cheveau (Central and Eastern Canada); Paul Hapeman (Eastern North America); Vacant (Canadian Maritimes); Claire Poirson (France); Andrzej Zalewski (Poland and Eastern Europe); Shibing Jhu (Asia).

If you’re interested in helping represent your region, please write the board! Not all regions are included here...

A kit (Martes caurina) lounges on a log as the mother “F20” stands guard. Photos were part of a den and rest structure re-use project. Write Katie Moriarty for details. Submitted by Alyssa Roddy.