This field course will take place in Glacier National Park (GNP), West Glacier, MT, and the surrounding Greater Glacier Ecosystem (GGE), to occur intensively from June 16- June 23, 2019. There will be online work to be completed before the field component starts, including a written chapter assignment from one of your texts due NLT May 31, and a timed quiz due NLT June 7. There will be an assignment due on June 23 while in GNP, as well as one after the field portion of the class ends, due NLT July 12. The field portion of the course will be home-based at the Glacier Institute’s Glacier Park Field Camp (GPFC; glacierinstitute.org), one mile north of West Glacier inside GNP on the Middle Fork of the Flathead River, GNP, c/o P.O. Box 1444, Columbia Falls, MT 59912, (o) phone 406/755-1211.

**PRELIMINARY SYLLABUS & SCHEDULE for FIELD CLASS, June 16-23, on site (travel additional)**

**Course:** A field course in Environmental Sciences and Policy (ESP), this class will consist in part of day trips to various venues in Glacier National Park, several surrounding National Forests, and a wetlands floodplain. Access will be dependent on snow load, avalanche danger, possible wildfires (which with our earlier course start this year we hope to avoid), availability of specialist field instructors, and other variables.

**Lead Instructor:** Dr. Albert (Al) M. Manville, II

While my JHU email account is primary, please use both addresses **** Phone (h) ___, (c) ____. For appointments, questions, or emergencies, you may call me at home on my landline (preferred; leave a message on voice mail if you are unable to reach me), cell phone, or by email (also preferred). However you try reaching me, please identify yourself as a JHU June 2019 GNP conservation biology student. I will respond to your email inquiry within 24-48 hours of receipt.

**Office hours:** By appointment at GPFC

**Instructor’s Asst:** Ms. Whitney Beer-Kerr

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1 Dr. Manville has been an Adjunct Professor for JHU since 2000, and has instructed numerous ecology, conservation biology and wildlife management field classes for JHU, the USDA Graduate School, Michigan State Unv., the Smithsonian Institute, and other foundations. He lived and worked in GNP and studied grizzly bear behavior for 7 summers beginning shortly after the “night of the grizzly” incidents (highlighted in the book of the same name by Jack Olsen, 1969 and 1996); conducted 6 summers of brown bear-human interaction studies at Katmai National Park, AK; immobilized, handled, marked and/or radio-tagged more than 100 black bears, and assisted in handling several immobilized grizzlies; and assessed impacts to wolves in Alaska for 12 years. Based on extensive field research conducted from Maine to Alaska, including 6-summers in the Aleutian Islands and 5 years post-Exxon Valdez oil spill in AK, he has published more than 175 scientific papers, chapters, and popular articles, many in refereed, peer-reviewed scientific journals. Recently, he retired from the Division of Migratory Bird Management, U.S. Fish & Wildlife Service, as his agency’s national avian-structural-impact lead on all things human-related affecting migratory birds. Manville also worked as a seasonal Park Ranger Naturalist for the National Park Service in several positions. He is a “Certified Wildlife Biologist” by The Wildlife Society.

2 Ms. Beer-Kerr graduated in May 2018 from JHU’s AAP with an M.S. in Environmental Sciences and Policy, completing a number of conservation biology and related courses at Hopkins. She currently is the Development
2 3/2/2019 Preliminary Syllabus: Subject to Change

Please use both email addresses **** Phone (c) _____

Course Director: Dr. Jerry Burgess
**** Phone (o, DC) _____, (c) _____. While Dr. Burgess will not be able to join us in Montana, in terms of logistics, he will serve as the primary Point of Contact (POC).

Course Meeting: At GPFC: June 16- June 23. Travel to/from Kalispell (FCA) additional. Students will dorm, dine at (except trail lunches), make daily excursions from GPFC with field experts and hand-write daily evening Journal assignments at the GPFC. GI is a 501(c)(3) NGO which acquired the property in 1983. Conditions are rustic but comfortable, with hot/cold running water, electricity in each cabin, a bathhouse, small library and a classroom, internet access, cell phone reception, phones, dorms (5 single beds/cabin), a kitchen and picnic area. The campus is located on the beautiful Middle Fork of the Flathead River, inside GNP, with immediate access to Lake McDonald, Going-to-the-Sun Highway, the North Fork, National Park Service Headquarters, and the Great Bear Wilderness. See tentative meeting schedule summary below.

Course Description: This graduate level field course — taught as part of Johns Hopkins’ Krieger School of Arts and Sciences (KSAS), Advanced Academic Programs (AAP), Environmental Sciences and Policy (ESP) program — will use the living “laboratory” of Glacier National Park (GNP) and surrounding landscapes to learn about and explore key concepts and timely issues in conservation biology and wildlife management. GNP was created as a National Park in 1910, and is unique for many reasons. It is a World Heritage Site and Biosphere Reserve, linking Canada and the U.S. since 1932 as the world’s first International Peace Park, Waterton-Glacier, managed respectively by Parks Canada and the National Park Service (NPS). George Bird Grinnell, co-founder of the Audubon Society and the Boone and Crockett Club3 appropriately named this Park the “Crown of the Continent.” The Park exhibits many unique features. E.g., based on a hand’s width, the ultimate destiny of a raindrop or a snowflake at Triple Divide Peak, southeast of Logan Pass, may end up in the Columbia, Mississippi, or Saskatchewan River system, flowing respectively to the Pacific Ocean, Gulf of Mexico, or Hudson Bay.

Once home in the 1850’s to an estimated 150 glaciers, the Park now supports less than 254 — and current rates of ice melt may see all of them gone in less than 10 years. Studying these glaciers and the Park’s environments provide a cutting-edge opportunity to investigate the effects of climate change on ice-dependent species (e.g., wolverines, bull trout, Dippers and Ptarmigan); on effects of changing environmental conditions (e.g., more wildfires, greater droughts, effects of pine bark beetle infestations, impacts on pika migration, and debris flows from late-season wet snowstorms); and assess the status and survival of rare, Federally listed, imperiled, and sensitive species (e.g., grizzly bears, wolverines, Canada lynx, mountain goats, bull trout, and long-toed salamanders). Gray wolves have naturally recolonized the Park and mountain lions are widespread. Some 250 species of birds (from Golden Eagles to Rufous Hummingbirds), 70 species of mammals, and over 1,200 species of vascular plants persist, ranging from lush and colorful alpine meadows, to fescue grasslands, to old-growth cedar and Douglas fir forests.

Manager and a member of the Board of Directors for the Hawaii Marine Animal Response, a nonprofit partnering with NOAA, USFWS, and others to manage and help recover Hawaii’s protected and federally listed endangered marine wildlife — including marine mammals, sea turtles, and seabirds. Previously, she spent 10 years as a science and natural history producer/writer for National Geographic, Discovery, and PBS. Whitney currently is working with Drs. Burgess and Manville to develop a new field course in SE Alaska for 2020. She brings a passion and dedication to conservation and wildlife management.

3 Your instructor previously served as Big Game Records Coordinator and as an Official Measurer for the BCC.
Blackfeet Indians lived in and around the Park for millennia, now situated on the Blackfeet Indian Reservation just east of the Park. The Confederated Salish and Kootenai Tribes of the Flathead Nation, also long-established Native American Tribes, are located on the Flathead Indian Reservation to the west of the Park. Using the Park, surrounding National Forests, the river systems, and the Reservations as a living “laboratories,” we will examine first-hand in the field the various disciplines associated with field research focused in conservation biology and wildlife management. These include, but are by no means just limited to:

- taxonomy, genetics, small population biology, chemical ecology, and wildlife ecology and management (e.g., in the latter, providing corridors for wolverines in the Great Bear Wilderness, wolves from Alberta and British Columbia into GNP, and pathways for grizzlies into the Selway-Bitterroot Wilderness Area in ID and MT).

- We will explore how conservation biology differs from other natural sciences both in theory and in application. Students will be introduced to some of the key research “tools” and techniques used in wildlife management which are of primary importance to the conservation biologist. These, for example, include:

  - research techniques involving experimental design (e.g., using radio tagging and telemetry to monitor and assess movements, status and trends of wolverines, mountain goats, and wolves in the Greater Glacier Ecosystem, and to assess impacts from hunting on wolves outside GNP providing future information for population status and possible re-listing under the Endangered Species Act);

  - immobilization and handling of wild animals (e.g., black bears, grizzlies, cougars, Canada lynx, mountain goats, hoary marmots, and bighorn sheep to monitor their health, reproductive status, weight, and response to immobilizing drugs);

  - investigating wildlife diseases (e.g., parvo virus in wolves, sylvatic plague in black-footed ferrets and black-tailed prairie dogs, brucellosis in bison, and avian flu in birds to assess survivorship, resistance, and susceptibility);

  - tagging and marking animals (e.g., bears, elk, sheep, goats and moose) for purposes of estimating populations, assessing individual movements, and identifying individual animals within their respective metapopulations;

  - using radio telemetry and remote sensing technologies (e.g, on mountain goats, Golden Eagles, Bald Eagles, Ptarmigan, and cut-throat and bull trout) to better assess their challenges, environmental impacts, and population status and trends;

  - using camera imagery (e.g., camera trapping for wolverines) to assess species presence, and in the case of wolverines, uniquely identify individual mustelids, and to assess impacts from bears on individual cameras;

  - conducting vegetation sampling (e.g., to determine the chronology of cow parsnip growth, effects of climate on white bark pine, use of pine nuts by Clark’s Nutcracker and grizzly bears and effects of wildfires, eruption of glacier lilies, and drought impacts on vegetation);

  - assessing changes in animal behavior (e.g., behavioral changes in mountain lions and grizzly bears leading to human-puma and human-grizzly bear conflicts, respectively [the latter a continuing focus of your lead instructor]);
and investigating the roles of molecular ecology (e.g., evaluating the genetics of bull trout), among others.

**Management techniques** also important to conservation biology will be explored, including:

- those related to human dimensions, the importance of communication and outreach, adaptive management, managing species and habitats, harvest and animal damage control, and habitat conservation planning, among others.

- Students will witness up-close and personal and learn about the major threats to biodiversity — focusing on the wildlife and plant species mentioned above — and what natural and social science methods and alternatives are being used to avoid, minimize, reverse, or mitigate for these threats.

- We’ll take advantage of your lead instructor’s previous research on grizzly bear behavior (7 summers in Glacier NP and 6 summers at Katmai NP, Alaska) and wolf status and impacts (12 years in Alaska) to better understand these apex predators and their fascinating behaviors.

Experts provided by the Glacier Institute will lead day hikes and excursions into the Park and surrounding National Forest and private land habitats using GI-provided vans. We will be hiking in 1 or 2 groups (the latter in GNP backcountry per our Park permit of individual groups no greater than 15 people per group), each lead by an expert, members of each group all staying together, in some cases covering several miles per day, with some elevational gain.

NPS is also quick to respond to any problems with grizzly bears or other wildlife, generally closing trails and alerting visitors. A full briefing will be provided by GI and your lead instructor upon arrival at the GPFC, probably on the morning of our first full day of class on June 17. If you wish to purchase bear spray in Montana for your personal use in the backcountry, be advised that it is **not** allowed on board aircraft in either checked or carryon luggage, but can be shipped by the USPS via ground delivery.

However, per the Glacier Institute’s policy, all GI Staff and expert field instructors will carry bear spray for the group each day we are in the field. Everyone in the group does not need their own bear spray, and in fact, GI prefers that only their Staff and field experts carry it — all having been trained to use and handle the spray should a situation arise.

Base elevation of the field camp is ~ 3,100 ft.

Once the field portion of the class is completed, you will prepare a final research memorandum, topic approved by your instructors, with details provided below. **Brief Overview**: You will select one plant or animal species we investigate or discuss during our stay at GNP and the GGE that relates specifically to conservation biology and wildlife management. You will then develop, design and briefly outline the framework and protocol for a research project investigating an aspect(s) of the organism you select. You will summarize and substantiate your study design and protocol in your research memo. Nova Silvy’s 2012 *Wildlife Techniques Manual* (see below) is to be used as one of your sources for specific “tools” and techniques you intend to use in your study design. Other sources are also to be included. The final report/memo will be due NLT Friday, July 12. While it is unlikely that you will actually be able to initiate your study while in GNP due to very tight time constraints — including gathering data — we

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5 For those who purchase bear spray in Montana and wish to return home with it, it can be mailed by the USPS, provided the package is boxed, the spray is in a sealed zip-lock bag, taped with duct tape, and the package is marked “ORM-D” (Other Regulated Material). Since it is going by ground delivery, it may take several weeks to get it from GNP to your home address.
hope you will use your protocol to conduct a research project for a future Capstone or Independent Research Study while at JHU, or possibly for a future research project for another M.S. thesis, a Ph.D. dissertation project or even a post-doc study.

**Reading Materials:**

**Primary Textbook – Required:** please acquire, read through, familiarize yourself for a quiz before the class, and use as source material for your daily Journal assignments and your final course research memo. Please bring Volume 1 (*Research*; there is an e-book version also available) with you to GNP (no need for Vol. 2). There is also required reading (item 2, below) regarding online background and preparatory material about GNP, its fish, wildlife and plants, ongoing science and research and other important ongoing efforts dealing with, e.g., wildfires, ice, science, research and management, and laws and policies. This also is testable material so we want you to read it.

1. **Silvy**, Nova J. (editor). 2012. *The Wildlife Techniques Manual, 7th edition*, *Research* (Volume 1), 686 pp, and *Management* (Volume 2), 414 pp, The Wildlife Society and Johns Hopkins Univ. Press. ISBN-10: 1-4214-0159-2 (hardcover). This 2-volume text provides some of the most timely and pertinent “tools” and techniques used by most wildlife and conservation biologists — including by the National Park Service, U.S. Forest Service, USDA Wildlife Services, U.S. Geological Survey, U.S. Fish & Wildlife Service, Bureau of Land Management, and academics studying wildlife in and around GNP. The 2 volumes integrate techniques commonly used for conducting scientific field research and discuss how findings are used to influence management and policy decisions. The techniques manuals are probably considered by most wildlife and conservation biologists as the primary “tool chest” of available techniques. I acknowledge there is a tremendous amount of information in both volumes as well as new information published since 2012; we will focus on what I feel is the most important.

2. Please access the following sites online and familiarize yourself with each of the issues before departing for GNP. This background material includes:


   [https://www.nps.gov/glac/learn/nature/animals.htm](https://www.nps.gov/glac/learn/nature/animals.htm) — information about the variety of animals found in GNP.

   [https://glacierwr.com/wildlife-watching](https://glacierwr.com/wildlife-watching) — wildlife viewing opportunities in and around GNP.

   [https://www.nps.gov/glac/learn/nature/fish.htm](https://www.nps.gov/glac/learn/nature/fish.htm) — the variety of fish (including the federally listed Bull Trout) found in and around GNP.

   [https://www.nps.gov/glac/learn/nature/plants.htm](https://www.nps.gov/glac/learn/nature/plants.htm) — plants found in and around GNP.

   [https://www.nps.gov/glac/learn/nature/treesandshrubs.htm](https://www.nps.gov/glac/learn/nature/treesandshrubs.htm) — trees and shrubs found in and around GNP.

Please briefly familiarize yourself with these sites and the issues. The concepts are testable so we want you to access, read and assess them, improving your understanding of GNP, the GGE and its flora and fauna.

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6 Unfortunately, the 8th edition of the Techniques Manual won’t be published until late this fall at the earliest.
Related Reading Material in Class Notes:

The availability of refereed, peer-reviewed scientific literature, peer-reviewed text books, scientific information on State and Federal government websites, as well as “gray” literature on conservation biology grows almost daily — certainly in addition to the information found in Silvy (2012). We will use both volumes of the *Techniques Manual* to better illustrate the variety of current “tools,” techniques and case studies used in conservation biology, specifically those in the GGE. The class notes and visuals which I will provide are intended to focus on the issues I plan to stress in this course.

While conservation biology is a relatively new discipline, with its “official” North American genesis in 1978 at a conference in San Diego, CA, wildlife conservation and wildlife management in the U.S. date back to at least the 1930s with the work and teachings of Aldo Leopold (of *Sand County Almanac* fame) at the University of Wisconsin, Madison — and even further back into the early 1800s if you consider anti-poaching laws, hunter bag limits, and other wildlife and habitat regulations. Dr. Leopold is often referred to as the “father of wildlife management.” There are thus many references, and much new material, that are available. I will borrow from a number of these sources — several of whom I have worked with closely in the recent past — in the class notes I will provide you. The concepts in this material are all testable, so please read and attempt to absorb them.

Course and Learning Objectives:

While part of the ESP curriculum, this class may be your first introduction to conservation biology and wildlife management, and it may represent your first class held in the field. My intent is to introduce you to this important discipline — building on background acquired from possible courses or professional training you have had in ecology, field methods, and others which you may have taken. We will focus on some of the key concepts, principles, and practices used in conservation biology and wildlife management, primarily focusing on cutting-edge wildlife and habitat issues facing flora and fauna in and around GNP, MT.

By course completion, you should have a far better understanding of biodiversity at the species, genetic and ecosystem levels, the roles species play in the ecosystem, threats to biodiversity, managing populations (including small populations) and their habitats, the dynamics of human dimensions, and specific “tools” and techniques used by wildlife managers. You will learn how this information can parlay into wildlife management and conservation biology decisions and policy at the local, State, Federal and international levels — with a focus on addressing issues in GNP, surrounding National Forests, private and State lands, and the Blackfeet and Flathead Indian Reservations. By course completion, you should also better understand the roles involved in human dimensions, effective communication and outreach, and adaptive management.

Acknowledging that there are many environmental challenges currently facing the Planet and its ecosystems, my intent is to:

- Teach you to recognize the issues/problems first-hand;
- Focus on what needs to be done to reduce or ideally reverse them; and
- Determine what are the best approaches (scientific efficacy, cost and practicality) to take to resolve or mitigate them. For some of you, this course may provide a stepping stone to further work in conservation biology and wildlife management or perhaps get you impassioned about a particular environmental initiative to which you can connect.

Source Materials and Accountability:
While Silvy (2012; 2 volumes) provides a detailed overview and discusses various, specific case studies, I recognize that there is a tremendous amount of information available from this source, not to mention more recent published scientific literature which may help you investigate specific flora and fauna in Montana. I will focus on the key “take-homes” presented in this 2-volume text, plus other source information from other texts and journals (e.g., Hunter and Gibbs 2007, Fundamentals of Conservation Biology, 3rd edition; Journal of Wildlife Management; The Wildlife Professional; Wildlife Monographs; Journal of Mammalogy; The Auk; The Wilson Society of Ornithology; The Journal of Raptor Research; among others). I will highlight what I consider to be the key, most important issues and concepts which I will submit both in class and through electronic chapters notes before we convene in Montana. FYI, these have yet to be prepared. These notes will be sent to each of you via email and will be posted on Blackboard once this site becomes available.

Many other sources are also available that review the disciplines of conservation biology and wildlife management; I will point some of them out as the topics are discussed in Montana. My goal: provide each of you a strong grounding and good understanding of the concepts, theories, issues and approaches in order to better understand conservation biology and wildlife management, using the “living laboratory” of the GGE as our learning platform. Specifically, I intend to help you understand (1) what “tools” and techniques are available for conducting field research; (2) how to use and apply them in conducting field research; and (3) which approaches are most important in helping you tease out, understand, and ideally solve environmental problems and challenges. Since much of the field research conducted today is about collecting and assessing data, and testing research hypotheses (remember back to your statistics experiences in disproving null hypotheses!), we’ll focus on the many ways to collect data and assess what it means, using the scientific method for conducting a study. Your goal will be to develop and design the outline for a framework and research protocol for your final research project memorandum for the study of a plant or animal of special interest in the GGE, details provided below. Silvy’s (2012) Chapter 1, “Research and Experimental Design” by Gordon et al. might be a good place to start investigating.

Climate change — an incredibly timely issue — certainly impacts many of the strategies and techniques we must use in conservation biology and wildlife management. GNP provides a marvelous learning laboratory for seeing these issues first-hand, up-close, and personal. We will investigate the problems, assess how to solve them, and discuss what next needs to be done to reverse current trends. Examples we will specifically witness or see their impacts include the effects of rapid ice melt, drought, increasing heat, wildfires, debris flows, insect infestations, ice-dependent species declines, behavioral changes, impacts to imperiled species, the introduction of invasive species, “loving our parks to death,” and other related challenges. You will be trained in how to identify, assess, and hopefully reverse current trends. Problem solving will be important.

If, however, you are unsure of, unclear about, or confused regarding any issue for which you are being held accountable (e.g., pre-class assignments, in-field discussions, field journal exercises, evening dinner discussions, and your final research memo) please ask us. That’s one of our roles.

How You Are Graded, Including Specific Details:

1. There is a written assignment due NLT May 31, from one of the chapters in Silvy 2012 (worth a possible 10 points). You are to select the chapter of most interest to you, explain/justify why is is most compelling/interesting, and briefly relate the issues from this chapter of most interest specifically to conservation biology and wildlife management. It can be research oriented or management driven. You are to word-process this assignment in complete and clear sentences, single-spaced, preferably 11 point font, and attempt to keep it to no more than 1-page single-spaced in length (if it goes slightly longer, no worries). If you use any additional source material from sources other than this
specific chapter in Silvy (e.g., *Journal of Wildlife Management, The Wildlife Professional, Wildlife Monographs*, source references in my notes, websites you may access, or other scientific publications you review), you must include a brief literature citation section after your write-up which will not be counted as part of your 1-page write up. Within the text of your write-up, please reference the author(s) last name(s) and date of the scientific article, and include any websites you used. Use the instructions for writing your research memo — referenced below — to help you cite sources within your text and in your Literature Cited section. Please submit your chapter write-ups to me via email **** and to Whitney ******, as well as on Blackboard. Thanks.

2. A 1-hour, timed quiz (possible 20 points) will be submitted on and taken via Blackboard, due NLT Friday, June 7. We will post the quiz on Blackboard during the week of June 1, and once it is electronically graded, provide each student with correct choices, and explanations for each correct answer. The quiz will include true/false, multiple choice, and fill in the blank. The quiz is intended to reinforce the reading materials in Silvy (2012), GNP general information, and from my class notes. It will be open-book, open-note, and open laptop, but will be timed (maximum 1 hour), so preparation is important. Plan to take the quiz as if you were without source material.

3. A daily assignment at the GPFC to be inputted into what we call your Academic Journal. These are daily responses to prompts, including opportunities regarding field research and data collection that present themselves during each day’s excursion into the field, and specialties provided by each of our field instructors. These items/observations are to be initially recorded in the field in your “Rite-in-the-Rain” field notebooks, then the key take-home notes handwritten in your spiral Academic Journal Notebooks. We will provide both the “Rite-in-the-Rain” notebooks and spiral Journal Notebooks during our first full day of class, June 17. Some examples of the prompts are highlighted below, as well as the format we request you use (see Daily Journal Assignments and Format, below) subject to change if for whatever reason we are unable to participate in a specific, planned activity/event (60 points possible). We’ll provide sufficient time each evening while at GPFC to write these Journal entries. The first daily assignment from your Journals will be preliminarily graded (check+, check, check-) one evening early in the week that we are in Montana, tentatively on the evening of Tuesday, June 18. Your final, daily responses to prompts in your Academic Journal are all due during our final class meeting on Saturday, June 22. We will grade your tear-out sheet responses once we return home.

4. A final research briefing memo (60 points possible) on a topic approved by your instructors, preferably using a plant or animal you saw and/or discussed of conservation biology and wildlife management significance in the GGE, is due via Blackboard and email to Dr. Manville by NLT Friday, July 12 (details below).

5. Class participation, interaction, discussion and Q&A (worth up to 50 points). You will be answering questions I, Whitney Beer-Kerr, the field experts, and GI staff pose while in the field, from class notes, chapter readings, guest presenters, and class discussions, and you will be discussing recommended options in addressing ongoing environmental and wildlife issues. Your participation should demonstrate that you have done the course readings and that you are actively integrating and synthesizing newly encountered information, illustrating your understanding of the issues and concepts in conservation biology and wildlife management introduced before we meet in GNP/GGE and while there in the field.

**Grading Policy and Assessing Students:**

Requirements, Grading, and Expectations: Total possible point values (out of a possible 200 points)

Pre-class exercises 30  timed quiz: 20 points; chapter write-up: 10 points.
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Final assigned paper/memo 60 See memo format and specifics below.
Academic journal 60 See write up format, specifics below.
Class participation, Q&A 50 Please participate.

No view or opinion is unimportant. Make your voice heard. Please be prepared to discuss issues, answer questions, and provide feedback. I expect each of you to actively participate in class discussions. There is much going on in Glacier that relates to conservation biology and wildlife management—a world-class “laboratory” from which we will learn. Part of my job is to open your eyes to the issues we witness and to teach you the most important aspects of conservation biology and wildlife management used to address them.

Tentative Schedule, Logistics and Preliminary Subject Matter:

BEFORE meeting in the field, via Blackboard and email:

• Distribute (this document) the preliminary syllabus, specific pre-class assignments, daily academic journal format and details, and specifics for final organism research protocol memo.
• Assign specific text books and reading assignments from Silvy (2012), National Park Service, National Science Foundation, and State of Montana online briefing reference materials.
• Electronically distribute class Notes.
• Administer and grade pre-class quiz and Silvy (2012) reading assignment before class
• Fill out and return student contact and emergency information (required).

In GNP: DAILY ACADEMIC JOURNAL DETAILS AND ASSIGNMENTS

Once we begin the field component of our class on Monday, June 17, we will (1) provide and distribute 4.5 x 7” Rite-in-the-Rain all weather notebooks for taking notes each day in the field, and (2) spiral-wired, tear-out-sheet 8.5 x 11” Academic Journal notebooks. You will need additional writing implements, specifically several #2 pencils and pens to be used for taking notes in your field journals, and for transcribing daily field notes from your journals to your spiral Academic Journals for responses to daily prompts. We will briefly collect, preliminarily review and grade responses to the prompts, tentatively on Tuesday, June 18. Tentative journal prompts are provided below, which Whitney and I may elaborate or adjust depending on the actual days’ excursion and the key issues we reviewed.

Overview: Field notebooks such as “Rite-in-the-Rain” provide an important tool for collecting data, making field observations, hand-drawing maps, noting GPS coordinates and VHF triangulations, logging drug type and dosages for immobilizing animals, keeping personal notes, recording wildlife interactions/signs/presence, denoting perturbations to habitats, referencing key concepts, summarizing speaker presentations, and for many other purposes. Laptops, smart phones, iPads, and related electronic devices may appear to be more expeditious and convenient for recording data, but they can have significant downsides when used in the field. Please do not bring these into the field. You, however, are welcome to bring cameras (including cell phones) and binoculars. You will use small 4.5 x 7 inch Rite-in-the-Rain field notebooks on our daily excursions—they do indeed work in the rain either with pencil or pen (be sure to bring both). The 8.5 x 11 inch lined spiral Academic Journal notebooks are intended for more detailed write ups, summaries, and journal responses to prompts for each day’s field experience. Internet searches on your laptops/Smart phones can be conducted back at the GPFC.

Journal Entries:
(1) Please make a concerted effort to keep detailed, daily notes and a daily log of activities conducted in your small field notebooks (the ‘Rite-in-the-Rain’ ones). This information and these notes are best
transferred to your larger 8.5” x 11” lined spiral Academic Journal notebooks as daily entries, and will help you to jog your memories and answer questions for your daily responses to prompts.

(2) We recommend that you transcribe these field notes into your larger Academic Journal notebook, including key take-homes from each day’s exercise in the field, each evening. For the notes you keep in your larger Academic Journal and for the individual daily assignments, please write in compete sentences and in the responses to prompts please make every effort to make your handwriting legible so we can assess and grade your daily responses. They do need to be clear and concise — both in the transcription from your small journal details and in responding to daily prompts. It is important to thoroughly address each of the issues and questions, showing us that you are grasping the concepts and understanding the materials. There is therefore no page limit either for your Academic Journal notes or for your daily response to the prompts. Please note, however that more verbiage does not necessarily equate to a better grade or a more thorough understanding of a subject.

(3) To clarify, your daily response to the prompt is not about simply noting that you visited, e.g., Hidden Lake at Logan Pass, saw some mountains goats, caught some “rays,” and that you had a really marvelous time on this field excursion. We are asking you to relate what we saw, investigated, interpreted and discussed, and how the trip specifically pertains and connects to specific field research studies, to particular principles, practices, theories, concepts, and related issues presented in Silvy (2012), my class Notes, from our field instructor experts, and from other sources germane to each field experience. We want you to show us you are grasping and understanding some of the many “tools,” principles and practices used in conservation biology and wildlife management. In other words, you need to convince us that you are connecting and grasping the concepts, principles, practices and materials. Where there are questions, please ask.

(4) Daily Journal Assignments, Subject to Change: Please use the following format and attempt to respond to the following prompts for each day’s exercise. Make certain this “tear out” assignment (your notebook pages are perforated so they should tear out easily) is separate from your note transcription and other Journal entries. We will collect ALL your responses to prompts for grading on June 22, although we will review them earlier in the week to be sure you are on the correct track.

(5) Format for Each Daily Academic Journal Assignment: please use this format.
Name:
Date and Time of Field Exercise:
Location of Site Visited:
General Weather Conditions:
Questions: [by day, assuming we are able to complete each of these field excursions on the day specified]

(6) Examples of daily trips and JOURNAL PROMPTS, subject to change.

• Mon, 6/17. Dave Shea (resource conservationist, wildlife biologist, GNP Supervisory Backcountry Ranger, former USFS wildlife biologist and botanist, and author) will take us to the North Fork where we will visit Polebridge, Hidden Meadow, Wenowna Lake, the Red Branch fire burn site, and possibly the Logging Ranger Station subject to time and accessibility. Evening Journal prompt: Specifically, what are the take-homes and lessons learned about wolf recovery, how do predators like grizzly bears, timber wolves and mountain lions interact (predator-prey strategies), and what is currently being done to maintain and manage native prairie species and habitats? Overall, why are these issues important to CB&WM, briefly? NOTE: for this and all the following written responses to Journal prompts, please provide a very short but complete literature citation referencing all sources you have accessed — including citations within your written text — much like what we are requesting for your final written
research memo topic (details below). I’ll go over this *Journal of Wildlife Management* literature citation format during our first class on 6/17.

- **Tue, 6/18. Evening Journal prompt:** From what we learn from Rick Yates (Wildlife Biologist, U.S. Forest Service, Swan Lake Ranger District) on our discussion during “predator day” on the High-line Trail, Logan Pass — or at Many Glacier, Swiftcurrent Valley if we go here — what are some of the **key predator-prey conservation issues** facing the NPS and USFS? What “tools” do Rick and other biologists use on the predators and their prey to count, track, and monitor them, and what are some of the costs and benefits of these technologies? Relate how these issues **specifically pertain** to CB&WM.

- **Wed, 6/19.** During botany day today, we’ll likely hike the Firebrand Pass trail assuming the plants are blooming and the trail is accessible. Ellen Horowitz (freelance writer, instructor at Flathead Valley Community College, botanist, and a former Road Scholar) will be our expert instructor. **Evening Journal prompt:** From a **plant perspective,** why is GNP so important? Pick one **aspect** of conservation biology Ellen discusses, and elaborate on it from the perspective of CB&WM — be that terrestrial invaders, the plight of the white bark pine, trophic cascades, or another important conservation issue. What field research techniques might apply?

- **Thur, 6/20. Evening Journal prompt:** From what we learn in the classroom and in the field from Tom Bansak (Aquatic Ecologist, Univ. Montana’s Flathead Lake Biological Station, and board member, Wild Rockies Field Inst.), what are some of the **key take-homes** from the long-running Nyack floodplain studies? Specifically, relate your responses briefly to how wildfire and climate change impact wetland ecology. What roles have **partnerships** like funding from the National Science Foundation played in working on Nyack issues, including endangered bull trout v. lake trout, threatened stone flies, and aquatic invasive species (AISs), among others? Briefly, what field research efforts apply per Tom’s presentation?

- **Fri, 6/21.** Your **evening Journal prompt:** From what we witness at Logan Pass and Hidden Lake, and hear from Jeff Kuhn (hydrogeologist, MT Dept. Environmental Quality), summarize the **key** conservation biology issues pertaining to climate change that we discuss and the evidence we see during our field trip. Reference appropriate field research efforts. From the perspectives of CB&WM, **why** are these issues so important? Directly relate your response to specific issues presented in your texts, Notes, comments made in the field by your instructors and guest experts (i.e., Jeff Kuhn), or from other sources.

**TENTATIVE COURSE MEETING SCHEDULE** at the Glacier Institute’s GPFC, GNP, 6/16- 6/23 — field excursions subject to change including field expert availability and access:

- **Sun, 6/16.** Unless driving separately, arrive Glacier Park International Airport, Kalispell (FCA) for pickup by 2 Johns Hopkins rental vans that afternoon, Sandy Scholar holding JHU Sign to locate students and head them to vans, transportation to GPFC that afternoon. Check into GPFC cabins that afternoon/evening. BBQ dinner ~6:00 pm at field camp picnic tables for those who have arrived. Later evening p/u by JHU van at FCA will be available if needed. For those who have arrived by the late afternoon, meet and greet early that evening, but no formal meeting.

- **Mon, 6/17.** Breakfast at picnic tables at ~7:30 am, prepare trail lunches, dress for hiking (keeping in mind we may encounter snow on the trail), meet in classroom at 8:15 am, welcome and orientation in classroom (including backcountry etiquette and GPFC rules). Meet your field instructor, Dave Shea (resource conservationist, wildlife biologist, GNP Supervisory Backcountry Ranger, former USFS wildlife biologist and botanist, and author), introducing timber wolf, mountain lion and grizzly bear issues, load up in GI vans, off to investigate the North Fork (NW side of the Park) and adjoining
National Forest lands, stopping to investigate and interpret. Dinner. Evening Journal assignment (see above).

- **Tue, 6/18.** Breakfast at 7:00 am at picnic tables, prepare trail lunches, meet with Rick Yates (Wildlife Biologist, U.S. Forest Service, Swan Lake Ranger District), 7:30 am classroom to very briefly introduce issues, then into field. **Option 1:** Vans to Going-to-the-Sun Highway, the Loop Trail, Logan Pass, visit Logan Pass Visitor Center, and hike toward Hidden Lake (dependent on road access, snow load, avalanche danger, and permission from NPS) to look for wolverines and mountain goats. Drive over Logan Pass to Siyeh Bend trailhead for brief hike toward Piegan Pass looking for wolverines, grizzly bears, hoary marmots, ground squirrels, Golden Eagles, mountain goats, Dippers, other wildlife and plants. **Option 2:** If unable to get to across Logan Pass, we’ll drive Rt. 2 around the Park to Swiftcurrent Valley and Many Glacier on the East side of the Park. Short hike to Josephine Lake, past Grinnell Point, looking for wolverine, grizzlies, deer, mountain goats, and other wildlife. Or short hike to Redrock Lake at the foot of Mt. Wilber. Dinner at picnic tables. Evening Journal assignment (see above). Hand in tear-out responses to Journal prompts from Monday’s trip during dinner for brief assessment.

- **Wed, 6/19.** Breakfast, prepare trail lunch, short briefing, then all day in the field with Ellen Horowitz (freelance writer, instructor at Flathead Valley Community College, botanist, and a former Road Scholar) to the Firebrand Pass trail or another venue depending on flowering chronology and access. Dinner at picnic tables. Evening Journal assignment (see above). Journal prompts turned in on **Tuesday returned** by breakfast today to students.

- **Thur, 6/20.** Breakfast, trail lunch, brief classroom introduction to freshwater ecology with Tom Bansak (Aquatic Ecologist, Univ. Montana’s Flathead Lake Biological Station, and board member, Wild Rockies Field Inst.), then drive to Nyack floodplain on the Middle Fork of the Flathead River to discuss ecological issues, impacts to the Flathead River watershed, and visit other adjoining wetland habitats. Dinner. Evening Journal assignment (see above). Each student to provide JHU instructors with 3 proposed topics for student final Research Memos (submit on a tear-out Academic Journal sheet with your name).

- **Fri, 6/21.** Breakfast at 7:00 am, trail lunch, introductory briefing with Jeff Kuhn (hydrogeologist, MT Dept. Environmental Quality), 7:45 am in classroom to very briefly introduce issues, then into field. **Option 1:** vans to Going-to-the-Sun Highway, the Loop, Logan Pass, visit Logan Pass Visitor Center, and hike to Hidden Lake (dependent on road access, snow load, avalanche danger, and NPS approval). **Option 2:** Vans to Avalanche Lake trailhead, hike to Avalanche Lake. Dinner at picnic tables. Evening Journal assignment (see above). Instructors advise each student of approved Research Memo topic today.

- **Sat, 6/22.** Breakfast 8:00 am. Turn in all responses to Journal prompts. Conduct summary/overview including details and concerns about final student research memos in the morning. Raft trip down Middle Fork of the Flathead River for those interested in afternoon, $87/person adult fee to be paid in cash by each participant (not covered by JHU; 10% discount for ≥ 10 in group). Details later. Or decompress, pack and relax that afternoon.

- **Sun, 6/23.** Light breakfast provided ~ 7:30 am, depart campus. Pick up students in 2 JHU rental vans ~ 8:00 am for transport to FCA for return home/back to work, or other plans for some. Check out from GPFC for those driving by NLT noon.
Final AFTER-CLASS Assignment, due NLT Friday, July 12, 2019, unless other arrangements have been made. The assignment needs to be submitted via the appropriate link on the course Blackboard site as well as by email to Dr. Manville (both addresses).

Using a plant or animal seen, studied or simply discussed during the week's course — reviewed and approved by your 2 instructors — write up a briefing memo that ties in key issues reviewed and learned during this class.

This research memo assignment needs to be submitted via the appropriate link in the course Blackboard site, with a copy of your memorandum to Dr. Manville’s 2 email addresses ******. Late submissions will be downgraded 2 points per day, so please submit this assignment on time, or make other arrangements where necessary should you need an extension. This assignment is worth 60 points. Please follow instructions carefully as you are given a tight time line for this assignment.

Based on a plant or animal seen, discussed and/or studied during our week-long course in GNP/GGE, submit your 3 proposed topics in writing to Dr. Manville and Ms. Beer-Kerr for their review and approval by NLT than Thursday evening, 6/20. Try to select an organism you know little to nothing about but which you find intriguing. He and Ms. Beer-Kerr will advise each student of their final topic selection by Fri, 6/21.

Recapping, your memo is due NLT Friday, July 12, 2019.

Ground rules:

1) You are going to write an abbreviated scientific briefing memorandum that outlines a brief proposed research protocol and a brief proposed study framework and design — including opportunities for collecting field data — based on the study of the organism (plant or animal) which will be approved by your instructors. Your memo should tie in the pertinent, key issues reviewed and ideally learned during this course (e.g., from the notes, chapter readings, field excursions, field experts, and other sources). You are to select an organism you know little to nothing about but for whatever reason intrigues you. We intend for you to use this research memo as the framework for later conducting an actual field study on your selected organism. This may equate to conducting a Capstone or Independent Research Study at JHU, a M.S. thesis at another institution, or possibly Ph.D. dissertation research, or a post-doc study elsewhere. So, select an organism you really would like to study. There will probably not be sufficient time to actually begin collecting much if any field data while at GNP. However, you will need to discuss what data need to be collected, interpreted and assessed in your memo.

2) We want you to delve into the current literature (including Silvy 2012), learning about your particular organism, and learn to use the “tools” and techniques, and principles and practices of conservation biology and wildlife management you have learned that relate to your organism. You will then prepare a very short, succinct, clear, yet sufficiently-detailed briefing memorandum. This memo is to include the brief outline for a preliminary proposed research protocol and the brief summary for a proposed study framework for your organism. Your memo, its framework, the study protocol, and ideally results from your future study could be put to later use by the National Park Service, the U.S. Fish & Wildlife Service, the U.S. Forest Service, Bureau of Land Management, the U.S. Geological Survey, Parks Canada, Montana Fish Wildlife and Parks, Idaho Fish and Game, the Blackfeet Tribe, the Flathead Nation, and other entities in helping to address specific conservation needs, concerns and challenges with your organism. These might include, but are not limited to, possible State or Federal listing, minimizing species extirpations or extinctions, species recovery efforts, delisting, inbreeding and genetic bottlenecks, invasive species impacts, travel corridor needs, changes in conditions and resources for your species, addressing impacts from climate change, and related issues.
3) Your memorandum should focus on the field aspects for studying, assessing, monitoring and evaluating your organism — based on data collection in the field — summarized through your proposed field research protocol and field research study design. Use your text, class notes, and field presentations as a guide. Your memorandum should not exceed 2¼ pages, single-spaced (no smaller than 11-point font) written text. The page limit does not include the footnotes, literature citations, illustrations, charts, graphs, appendices, etc. which must be included in your Appendix and Literature Cited sections. These latter inclusions are not considered part of the written text of the memorandum. We will be looking for clear, crisp explanations regarding the development of the outline for your proposed research framework and protocol, which should include how you plan to collect field data.

4) In your required Appendix, include any figures, charts, tables, maps, data, photos, and whatever other supporting materials that you feel justify the current status, conditions, trends, and needs of your organism — which you will reinforce through data collection and analysis in your study. Please credit all sources that you use (author[s], date, source, including any websites) for any figures, charts, tables, etc., in addition to sources consulted and cited in the body of your memo.

5) Memo Format. For consistency, please use the following format for your memo.

SUBJ: BRIEFING MEMORANDUM ON THE STUDY OF … Specific Organism

Your Name

ISSUE: This should include a brief and succinct explanation of the (1) key issues facing your organism, (2) what and why you intend to study the organism, (3) what data you hope to collect and how you intend to use those data, and (4) a brief summary of the research study protocol and framework you intend to use to accomplish your research on your organism. Please use your Appendix to help substantiate and provide further details regarding your proposed study and supporting details.

BACKGROUND: Include a very brief statement regarding the history, ecology, biology, general information regarding your organism — use the conservation biology issues from your texts and notes as reinforcing points.

CHALLENGES FACING YOUR ORGANISM OR CHALLENGES IT IS CREATING: What do you hope your study will accomplish to address the challenges facing your organism, or other flora and fauna your organism impacts?

ANY FINAL RECOMMENDATIONS/NEEDS/COSTS INVOLVED/NEXT STEPS IN DEALING WITH YOUR ORGANISM: Include why your study is important, what it may roughly cost to complete (ballpark), and anticipated outcomes (recognizing that until you actually collect and analyze your data, you may be unable to disprove your null hypothesis(es) or you may need to develop a wholly new null hypothesis).

APPENDIX: This is not part of your 2¼-page memo — all your graphs, photos, charts, diagrams, maps, etc., go here. Be sure to reference these attachments within the text of your paper. For example, within the text of your memo, you state that, “Grizzly bears, while members of the Order Carnivora, and have large teeth and long claws, they spend significant portions of their non-hibernating lives eating grasses, sedges and other vegetation” (see Figures x and y in the Appendix).” The reference to Figures x and y in your Appendix draws the reader’s attention to these photographic and anatomical details about grizzly bear feeding behavior not included in the text of your memo. Reference Silvy (2012) for many
examples.

ENDNOTES: Use these only for a reference for a product name, specific immobilizing drug, chemical formula, etc. Do not use them for referencing literature.

LITERATURE CITED: Please use the Journal of Wildlife Management (The Wildlife Society) format. I’ll provide some examples via email before class begins. It’s actually an easy format to use.

6). Follow-up. Carefully proof-read your memorandum, including proper spelling and use of grammar. Please write in complete sentences. Another pair or two of eyes never hurts in reviewing your document. Assume your memo will be used to initiate further research on your organism by a Federal, State, academic, NGO, consulting or other entity. Your message needs to be crystal clear. Yes, I will be reading each of your memos very carefully (e.g., as part of my recent full-time day job I was and continue to be a professional peer-reviewer and referee, and I continue to do this kind of work as a consultant).

7). Literature Citations. You must consult and use at least 8 credible scientific reference sources that pertain to your organism, research studies specifically related to it, and additional research needs surrounding it. You may use any and all of the following references: books, scientific journals, refereed e-journals (e.g. PLOS One), scientific bulletins, monographs, government publications, and appropriate scientific Internet sources. We probably all use Wikipedia, but let’s use that only as an introductory source. You will need to dig much deeper into the literature by actually reading scientific publications that pertain to scientific studies, monitoring and assessing your organism. Newspapers and magazines are not to be used as primary sources although you may include them as attachments in your Appendix (depending on your topic). Whatever source you use, please cite each source in your Literature Cited section. I am requesting that you use The Wildlife Society’s Journal of Wildlife Management literature citation format. You can always Google on “The Wildlife Society, Journal of Wildlife Management format.” It is a very easy format to follow. Please, however, give credit where credit is due. Otherwise this is plagiarism — a definite ‘no-no.’

We’ll review this assignment in more detail at GNP and discuss final refinements, needs and research objectives and anticipated outcomes for each of your organisms on Saturday, June 22.

Grading Scale: The following is the scale I will use for this class.

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Extra credit will NOT be available.

Additional information:

My goal in class and in the field is to be as interactive as possible, and my expectation is that you will each come prepared to Glacier. That means reading all the assigned chapters in Silvy (2012), the chapter/class notes, and the online information on the NPS, NSF and related websites provided above.
before the field class convenes. You will demonstrate to us via the class quiz and chapter assignment that you have read the materials and understand the issues and concepts. These assignments will both be graded.

My role, in addition to helping teach you about conservation biology and wildlife management, is to provide you with a good understanding and sound grounding of the principles and practices used in conservation biology, including its management — highlighting these outcomes by learning how field research is conducted, and understanding how data are collected and analyzed. Whitney and I will try to keep everyone focused, motivated, and let no one slip behind for lack of understanding. To accomplish this, we all need to work together. My expectation here: please be prepared, ask questions, interact, and be part of your class “team.”

JHU Code of Conduct:

Johns Hopkins University has a well-established Code of Conduct (http://advanced.jhu.edu/wp-content/uploads/2013/01/AAP1101_CodeofConduct.pdf) that addresses issues pertaining to cheating, plagiarism and other violations of the Code. To borrow from JHU’s ethics statement, “the strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. Read and adhere to JHU’s policy on plagiarism: http://advanced.jhu.edu/students/plagiarism/.” If you have not done so already, please review this Code.

While being a professional means following the “spirit and the letter of the Code,” I especially draw your attention to JHU’s (and mine) zero tolerance policy for plagiarism. As an author of more than 175 technical, professional, popular and related scientific publications, chapters and book reviews, I would expect that were you to use a source where I was either sole, senior or a junior author, that you would cite me (and any other authors) as a reference where that material was used and cited. Otherwise, you may be plagiarizing. You will be writing a final research memorandum on proposed research regarding an organism of conservation interest pertinent to your experiences in GNP; please keep this in mind. As professionals, “giving credit where credit is due” is not only your responsibility, but it is the law and a cornerstone of the JHU code of conduct. Please follow it. Thank you.

JHU Disability Services:

“The Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students in Advanced Academic Programs (AAP) who are in need of accommodations should visit http://advanced.jhu.edu/current-students/current-students-resources/disability-accommodations/ for the appropriate steps and documentation needed. Requesting accommodations before the semester is preferable, but not required. The student should submit the Request for Accommodation Form prior to the beginning of each semester (s)he is registered to ensure that accommodations continue for that semester. Depending on the accommodation, there may be a time delay before accommodations can be implemented.” More about this is available at this weblink. For any AAP disability matters please use this email alias: aapdisability@jhu.edu.

Dropping the Course:
“You are responsible for understanding the university’s policies and procedures regarding withdrawing from courses. And you should be aware of the current deadlines and penalties for dropping classes.”

NOTE: This course does NOT follow the usual schedule for dropping or withdrawing. Please consult the course website for dates.