

# **THE DIAMONDBACK TERRAPIN PROJECT FIELD MANUAL**

**VERSION 2022.1**

**BY WILLEM M. ROOSENBURG**

**DEPARTMENT OF BIOLOGICAL SCIENCES OHIO UNIVERSITY  
ATHENS, OHIO 45701**

**EMAIL: ROOSENBU@OHIO.EDU**

**OFFICE: 740.593.9669 MOBILE 740.503.4983**

**FIELD ADDRESS: 8716 BOZMAN- NEAVITT ROAD  
ST. MICHAEL'S MARYLAND 21663**



## INTRODUCTION

My research has two foci, the first is to understand how environmental variation affects population level process; the second is the conservation and sustainable management of long-lived species with delayed maturity. Reptiles in general and turtles, in particular, are excellent model organisms to explore these questions. Examples of questions that pique my interest include understanding how variation in temperature might affect sex and survivorship in developing embryos and how that in turn may affect population structure and sex ratio, or understanding how climate change may affect growth and survival patterns in long-term data sets. Conservation questions include exploring how crab pot mortality affects terrapin populations and evaluating methods to reduce terrapin mortality, or manipulating nearshore habitat to create and enhance turtle nesting in areas affected by shoreline hardening. My primary study organism is the diamondback terrapin, *Malaclemys terrapin*. Currently, my primary research site is the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island in Talbot County Maryland. This manual is intended for students interested in working with me to gain an idea of what is expected, but also can serve as an excellent resource for anyone wanting to learn what is involved and how to do terrapin or turtle demographic work. The most important criteria for doing intensive terrapin field research are 1) a positive attitude, 2) a willingness to work hard and get dirty and 3) the ability to complete mindless repetitive tasks in challenging environmental conditions (high heat and humidity, bugs, belligerent crabs, dead rotten fish, and scratchy turtles). If you do not possess these capabilities and do not like spending most of the day outside when most people would prefer to be inside, then you might want to reconsider whether this is the job / internship / research experience is suitable for you.

Herein, I hope to describe my project so you may know what to anticipate as you begin working. Realize, however, that once you start working things will seem very different and likely overwhelming, but over time you will master a variety of new skills that will be useful in future jobs as wildlife and fisheries biologists. You may feel a little out of place initially, but it is important that you learn to step in and effectively help whenever and wherever there is a need for extra hands. Either I, or other experienced field crew members will teach you all of the basic skills, but it is through actually doing the tasks yourself that you will master them. How well you complete the tasks will determine your success in addition to the success of other field crew members, and the entire field season. Success is accomplished by carefully paying attention to detail and taking the time to work precisely and carefully. Time to completion is not a measure of success and using it as such can result in errors, harm to others, and often require more time and money to fix the mistakes. For example, noticing the way the current is moving relative to a net may affect how easy it is to deploy or how well it catches turtles. So, concentrate on your work and pay attention to details, point them out to others who may oversee them, and use them to make informed decisions. All aspects of this project require attention to detail including rowing a boat, recording data, setting traps and nets, finding nests, running motorboats, and driving vehicles. The goal is to make sure the tasks get done carefully, accurately, and safely. Take your time, enjoy what you are doing, and do your job carefully and correctly.

The research experience has been a career defining for most field assistants that have worked with me. Their summer's experience has cemented the desire to become field biologists. For fewer, the experience has revealed that ecological field research is not to their liking. It is better to realize this in a brief summer internship rather than when landing a job that you intend to hold for the rest of life. Whatever you decide by the end of the summer, I only ask that you give me your best effort, focus on your work, and learn from your experience.

## **POPLAR ISLAND STUDY SITE AND SAFETY PROTOCOLS**

The Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island (PIERP) is a large-scale environmental construction site that is run by Maryland Environmental Services (MES), the Maryland Port Administration (MPA), and the US Army Corps of Engineers (ACE). They are using dredged material to rebuild an island that has eroded and subsided into Chesapeake Bay on a footprint similar to the size of the Island circa 1850, approximately 1750 acres. The project is located approximately 1.5 miles east of Sherwood, Maryland in Talbot County on Maryland's Eastern Shore. The PIERP offers a unique opportunity to study aspects of terrapin biology that are otherwise virtually impossible to study elsewhere. There are no nest predators on the PIERP and as a consequence nest survivorship is amongst the highest of any freshwater turtle population that has ever been studied. The terrapin population on the island is increasing and is one of the few turtle populations in the world that is increasing in size. This provides an opportunity to experimentally aspects of the terrapin biology that might otherwise be impossible.

Because Poplar Island is a construction site, there are safety procedures and dress codes that need to be adhered to while working on the island. Furthermore, you will constantly need to be on the lookout and aware of construction activity and vehicles and always stay well clear of them. One member of the field crew and I will be responsible for communication with MES and ACE personnel on the island. Please do not bother or disrupt island personnel unless you asked by them or there is an emergency and always remain polite, respectful, and courteous. Here are some basic safety rules and regulations about working on Poplar Island.

### **Safety concerns on Poplar Island**

Working on Poplar Island requires a number of safety and accident prevention protocols. Prior to the initiation of field work we will have a safety meeting with personnel from MES and USACE to orient you with the safety procedures and protocols used on the island.

- 1) Each field team should have a two-way radio set to the island frequency (provided). This allows for communication among field crew teams, island personnel and equipment operators, and provides a mechanism to call for help when there is a safety concern. Radio use should be kept to a minimum and only when necessary.**
- 2) Stay a minimum of 100 feet from all equipment and if you encounter equipment on the road make sure that the operator can see you and stay well clear of the equipment when on foot and stop if you are in our vehicle.**
- 3) Speed limit on the island is 15 mph.**
- 4) Always carry a minimum of 1 quart of water with you. It is hot, dry, and humid and very easy to get sunstroke or heat poisoning. This can be prevented by staying hydrated. If you feel as though you are experiencing the symptoms of over-heating call on the radio immediately to get transport to shade and air-conditioning.**
- 5) Weather conditions on the island can change quickly, keep an eye on weather radar via your phone and weather apps so you do not get caught in adverse weather conditions in unsheltered locations.**
- 6) Do not pick up any unexploded ordinance e.g. hand grenades (we found one once).**
- 7) Alcoholic beverages or drugs are not permitted on the island.**

### **Attire on the Island**

- 1) Closed-toed shoes must be worn at all times. Hiking boots are preferred, sneakers and tennis shoes are okay. Sandals, flip flops, or open shoes are not permitted. You also may want rubber boots for checking the nets because the boat is leaky, and you will want to keep your feet dry.**
- 2) Long pants and sleeved shirts are required on the island. Shorts and tank tops are not permitted. Pants with zip away legs are okay and can be removed for the trip home.**
- 3) A yellow safety vest is required at all times on the island, except when walking to and from the boat when an orange life jacket can be substituted.**
- 4) A hard hat is required when you are within 100 ft of construction equipment.**

### **Special Safety Concerns with Equipment**

#### **Boats**

The terrapin project has two boats, one is a 22-foot center console C-Hawk with a 115 hp motor (photo right) that is used primarily for transportation back and forth to the island. The second is a 14-foot aluminum rowboat that is used to check nets and traps on the island. Finally, occasionally we will burrow a canoe on the island and use it to get to some of the habitat islands. Here are the rules and safety precautions concerning boat use on the project.



- 1) A PFD (personal flotation device) must be worn at all times. The PFD must be “zipped and clipped” meaning securely attached and must fit you properly before stepping in any boat.**
- 2) The operator is in charge of the boat and assumes responsibility for safety for all the persons onboard including themselves. In the case of rough seas or thunderstorms, it is the operator’s decision whether to proceed or not. The operator can receive input from crew members, but no one should take the boat out unless they are fully comfortable with the sea state. The trip to the island will not be made when small craft warnings are posted.**
- 3) All boat operators must have taken a US Coast Guard approved boating safety course and have their card in possession while operating the boat. They also must be familiar with the use and location of all safety equipment onboard the boat.**
- 4) Make sure the hand-held VHF radio is on board when operating the boat.**
- 5) Passengers on the boat must be either sitting on the gunwale or standing holding onto railings while the boat is underway and on plane.**
- 6) Man-overboard drills (MOB) will be conducted at regular intervals and all persons onboard are required to participate.**
- 7) Docking the boat is a multi-person job, especially in rough weather. All persons on board are expected to participate in the docking process. It is an important time to be**



**attentive and ready to secure the boat**

- 8) **While docking always use a fender to protect the boat from hitting the dock, never place any limbs or other parts of your body between the boat and the dock.**
- 9) **Horse play, consuming alcohol, or clowning around, or any other unsafe behavior is strictly forbidden while operating the boat.**
- 10) **The boat should be fully cleaned, and gear stowed at the end of everyday**



### **UTV – Utility Terrain Vehicle**

We transport ourselves on the island using a UTV (picture above) aka the “turtle buggy”. Once again there are specific safety rules associated with both the operation and riding in the vehicle.

- 1) **All operators and passengers must take an online ATV safety course prior to using the turtle buggy.**
- 2) **Seat belts must be worn at all times.**
- 3) **The speed limit on the island is 15 mph, do not exceed the speed limit.**
- 4) **Stay well clear of equipment and pull off the road and stop when the big dump trucks are met on the road.**
- 5) **When passing working excavators and bulldozers on the roads, make sure that the operators is aware of your presences and has stopped before passing it. If an operator is not aware of your presence hail them on your radio to make sure they are aware, do not proceed without their acknowledgement.**
- 6) **No more than 4 people should be in the buggy at one time.**
- 7) **Passengers riding in the back must sit inside the compartment, not up on the edges or rails.**

Whenever you violate a safety regulation or use poor judgement you reflect poorly on the turtle project, its personnel, and me and therefore repeated violations of safety regulations will result in termination. Finally, the personnel on the island are friendly, courteous, and helpful; it is your responsibility to interact with them in a friendly and courteous manner. Always be respectful that they have a job to complete, and we do not want to interfere with their work. If there is something that you need on the island then MES for assistance. For example, the rare instance that we might ask for a ride to make sure we get to the boat on time or asking to have supplies delivered in the field.

## Supplemental Training Required before Starting Work

There are three online courses that you are required to take before beginning the field season. All of these courses are free and can be taken online. They also are good training in general for all who are interested in careers in field and wildlife research.

- 1) Everyone participating in the field work is required to take an online “Working with IACUC” course. This is an online course designed to help you understand the use of animal subjects in research. It is required by Ohio University for all individuals that handle live animals. To take the course, go to <https://about.citiprogram.org/> and register and then complete the training. This is a free course once you affiliate with Ohio University. If you have any problems, let me know and I will help.
- 2) All field crew members should complete an US Coast Guard approved online small boating safety course. This course will provide basic safety training and “rules of the road” for operating boats. It is required for all individuals operating a boat in Maryland. You can take the course for free through Boat US at the following link. <https://www.boatus.org/maryland/> . After you have completed the course, please print out your certificate and then get your card and have it with you in Maryland whenever you are driving the boat. The course will not teach you how to drive a boat, we will do that. The boat teaches the rules of navigation and basic boating safety. We will do additional training in MD to teach you how to drive a boat. Finally, this is excellent training and experience to add to your resume when you enter the job market.
- 3) All field crew members are required to take a basic ATV safety course. We have a John Deere Gator at the field site and all passengers and drivers are required to take the training course. Again, this can be accomplished for free at <https://atvsafety.org/atv-ecourse/> and you should take the state certification course for Ohio. You can take and complete the course for free but if you want to register your certification you can pay an additional \$25 but this is not required. Just print or email me the document when you complete the training that identifies to me that you have completed the course. This will be required before you arrive in MD.

All students are required register their travel with the office of global studies that they will be going to Maryland under a university sanctioned event. Goto this link to register [https://ohiouniversityglobal.force.com/ogo/ogo\\_customcommunityloginpage](https://ohiouniversityglobal.force.com/ogo/ogo_customcommunityloginpage) and login with your Ohio ID and then click on Travel Registration.

Finally, one of the things that will be an important part of the data collection is knowing where you are on the Poplar Island. The island is divided into cells, and we identify the area where we are working with by number of the cell. There are a few exceptions with some areas that have specific names which you will be taught during the summer. The map of PI on the following page identifies all the cells. Please take some time to make yourself familiar with these sites as it will make learning them much easier once you arrive, in particular those areas identified in yellow which are areas that will be surveyed for terrapin nests.

# Poplar 2018 Study Area

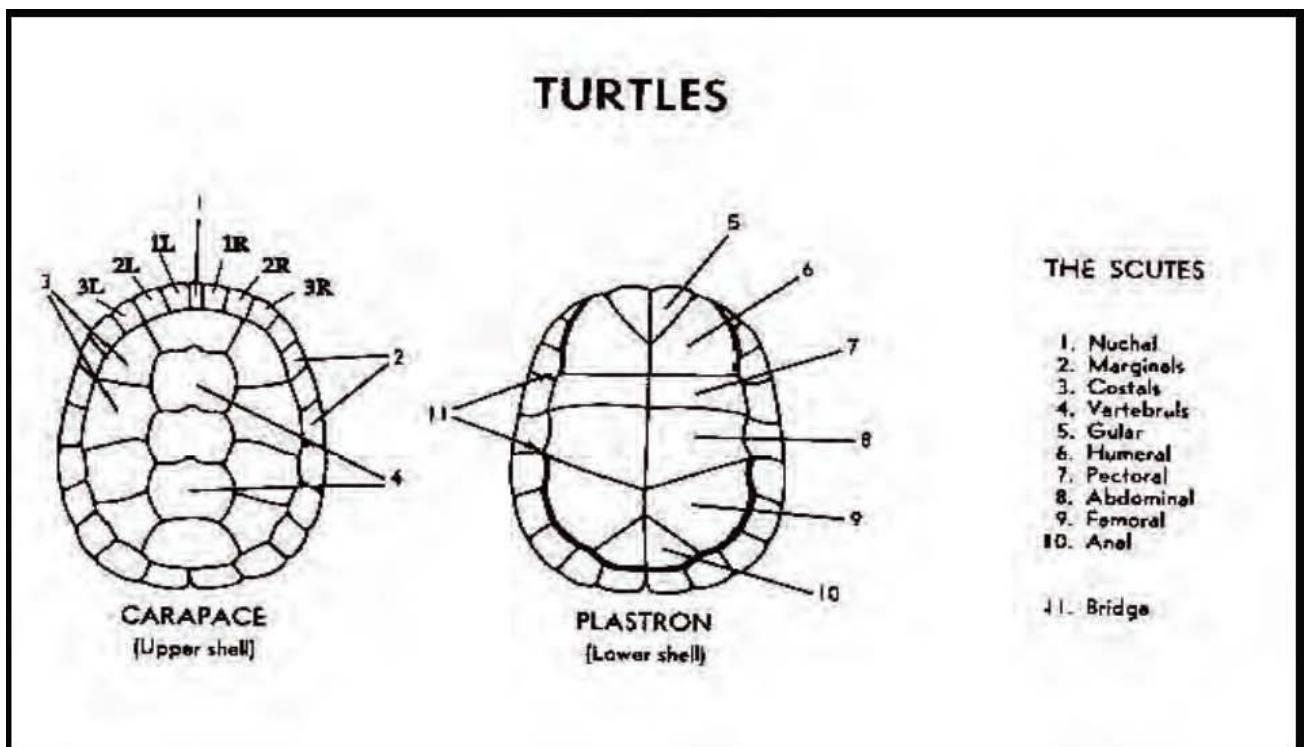


*Map of Poplar Island with yellow lines indicating areas surveyed for nesting activity daily by the research team.*

## TURTLES

Turtles are a unique order of reptiles whose skeleton has evolved to completely encase the animal except for their head, tail, and appendages. They are tough animals, in part, because their shell affords a protection from predators and other things that would normally kill mammals and birds. Because of their shell, their basic anatomy is different from the normal vertebrate. The figure below describes the anatomy of the turtle shell, both carapace (dorsal half) and plastron (ventral half). Take the time to become familiar with the turtle's shell, including the names of the scutes because you will be taking notes of anomalies of shell scute patterns. Scutes are the keratinized plates that lie over the bone on the turtle's shell. The scutes have specific names: twenty-four marginal scutes form the periphery of the carapace and in many, but not all, there is a 25<sup>th</sup> Nuchal scute that separates the right and left side at the anterior end of the shell. The vertebrals comprise 5 scutes following the midline of the carapace and 8 costals (4 on each side) lay between the marginal scutes and the vertebral scutes. 6 pairs of scutes make up the plastron. These include the gular, humeral, pectoral, abdominal, femoral, and anal scutes (Figure below).

Anatomy of a turtle





In the 1930's, Fred Cagle developed the technique of scute marking to ID turtles. Scute notching marks the marginal scutes of turtles with a nick or hole combinations that create unique IDs. It is cheap, reliable, and marks remain recognizable throughout the lifetime of the individual; even dead turtles can still be positively identified. Scute notch IDs are read by holding the turtle carapace up, the first scute near the head on the right is 1R. The second scute is 2R, the third is 3R, etc. It is the same for the left side (1L, 2L, etc.). The 5<sup>th</sup> and 6<sup>th</sup> marginal scutes are not marked because this would interfere with the bridge (the union of the plastron and carapace). IDs are read always using the right side first and then the left side. Therefore, envision a turtle with marks in the 1<sup>st</sup> and 10<sup>th</sup> scute on the right side and the 9<sup>th</sup> scute on the left side its ID would be 1R10R9L.



The main focus of the projects is the diamondback terrapin (*Malaclemys terrapin*). The diamondback terrapin is a wide ranging emydid turtle found from Cape Cod, MA to Galveston Bay of TX. They are good natured turtles, not aggressive, but also not fearful of humans when handled. They are very active when held and their long nails can scratch painfully. The best way to minimize scratches is to hold the turtle by the back of its shell (Figure above). It is good practice to have a second hand underneath the turtle because they can squirm out of your hand. Additionally, keep your hand and other parts of your body away from their mouth because occasionally they will bite. Take the time to admire each animal that you handle because every individual is different and some are stunningly beautiful. Our study of them comprises two fundamental components of the population biology. The first is a demographic study that employs mark-recapture technology attempting to repeatedly capture individuals within the population throughout their life. The goal is to monitor the populations and understand how it is affected by the environmental changes that are occurring. The second part of the project is to monitor the terrapin nesting activity on Poplar Island and determine the success rates of the nests. Both parts of the study have very specific protocols and mechanism of data collection that are described in the following sections.

Other species of turtles are occasionally caught on Poplar Island and all turtles need to be processed, including snapping turtles and eastern mud turtles. They will bite and therefore need to be handled with care. You will be taught how handle snapping turtles properly and safely. If you have not been taught, then let someone show you before you attempt to handle them on your own. There are proper ways to handle them that minimizes harm to the turtle and the risk to you. Do not pick up snapping turtles by just the tail. Furthermore, turtles, and all reptiles, potentially are carriers of *Salmonella*. Although these bacteria are rare, the risk of getting it warrants taking the proper precautions. **This means that you should wash your hands when you come out of the field, after handling any turtles, including hatchlings, and definitely before eating.**

## CATCHING AND PROCESSING TURTLES

We process all turtles in this project whether they are alive, dead, or just shell fragments. Our goal is to document each individual but also its fate. Dead turtles can be very smelly, but we still take whatever measurement we can from each individual and check it carefully for tags and marks. If parts of the shell are damaged then we may skip a measurement, but we try to collect whatever data we can from every animal even if it is just that it was dead and a location, and if possible, determine how it died. You could encounter a turtle at any time and any place so always carry a turtle bag with you so that you may have a way to secure the animal and get it back to the turtle shed for processing. Also, we need a location for all animals which we collect using GIS. If you have a smart phone I recommend getting the app Nav Clock which has a GPS feature that can provide a latitude and longitude wherever you are. Make sure that you set your location coordinate system to WGS84 in settings.

### Trapping

We use primarily fyke nets and turtle traps at Poplar Island to catch turtles. Our traps are deployed on the first day of the week and taken in on Fridays. Setting the nets require close attention to the level of the tide and where the high tide line is relative to the holding part of the trap. Terrapins need to breath air and therefore if a trap becomes fully submerged the animals will drown and die. Always make sur that the net maintains a permanent air space, this is particularly important for traps that do not have a float to help maintain the air space. We also catch many animals besides turtles and when checking the nets, it is always important to consider the welfare of the animals. Therefore, the first job after a net has been emptied is to return the fish to the water and secure the turtles in turtle bags. We also catch invasive species that we are required to remove from the water (see Invasive species below)

Turtles are placed into laundry bags when transported from the trapping site to the turtle shed for processing. Place turtles into the bag until it is about ½ way full, then grab the top of the bag and spin so that the turtles are tight in the bag. Then put the bag closure tightly around the bag as close to the turtles as possible. Terrapins are very active and squirmy and can easily crawl their way out of the bag if the closure is not tight. Then place the bag in a bin or bucket so the turtles cannot crawl off. Finally, try as best to keep the bags either shade or damp so that the trutles do not overheat. Finally, please remember that the animals in the traps and nets are probably stressed, therefore please handle them carefully.

Here is a general list of do's and don'ts for turtles in the bag.

- 1) Always make sure that the bagged turtles are in a bin—they will crawl away in the bag
- 2) Make sure the bag is properly closed—they can get out
- 3) Never leave turtles in the sun—they will die if they overheat
- 4) Do not drop turtles in bags onto hard surfaces—boat bottoms and hard floors
- 5) Typically, we put several turtles in a single bag, but if you have an injured turtles, put it in its own bag

### DEMOGRAPHIC DATA

We take a standard series of data that is characteristic of most turtle studies. Our methods are modeled after the techniques used at the ES George Reserve turtle project started by Don Tinkle and continued by Justin Congdon. There have been some minor modifications incorporating the

newer technologies that we have adopted and methods specific to my research.

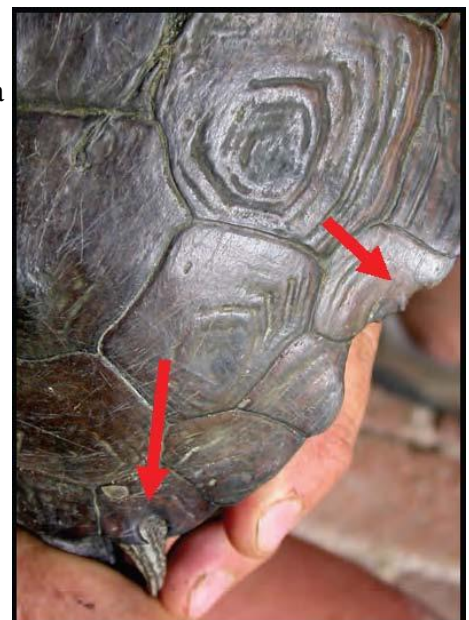
### The PIERP Mark-Recapture Data Sheet

Below is a copy of the demographic data sheets. You will learn how take all these measurements and collect all these data. But let's go over what is recorded for on this sheet. First, at the top of the data sheet is the date and the initials of the person/s processing the turtles and the second is the person recording the data. Also in the right-hand corner is the sequential page number of that data sheet for the year. These are important information that help us trouble shoot problems in the data set. Now lets go through by column, each line is the data from an individual turtle.

44

PIERP Mark Recapture																	Date		Measurer		Recorder			
Type	N/R	CWT PI#	PIT Tag ID				Sex	PL	CL	Width	Ht	Mass	RP	HW	DOB	RC	MOC	Cell	Latitude	Longitude	DNA	Comments		
W	R	4257	9182	0101	0407	477	97	55	F	188	204	161	90	1598	34	38.7	2013	Y	Trap 3	3D	38.76656	-76.38258	20-26	ADFRP, becnacles, AND juv
HS	K	5747	0411	0811	0622	041			F	170	186	149	81	1136	20	33.8	2015	N	Trap 3	3D	38.76656	-76.38258	21-324	AND VS, ADFRC, Hamilton ESIMS, South America
25 JUN 2021																								
W	R	5711	01A11	0911	0811	07E			F	183	203	160	96	1269	30	32.6	2013	N	Long	1A/B			17-184	AND FI 2921 ADFRP AND VS
W	N	5715	9182	1260	0578	0411	0823		F	92	109	88	46	221	15	20.4	2017	-	Trap 2	1A	38.767256	-76.379142	21-395	AND VS
W	R	3083	9182	1000	0407	477	7857		F	150	165	127	67	715	25	29.8	2014	-	Trap 2	1A	"	"	19-7	AND U4-US, ADFRC
W	R	5669	9182	1260	0577	0823	0411		F	96	112	88	48	224	15	20.5	2016	-	TRAP 2	1A	"	"	21-78	ADFRP
W	N	5724	9182	1260	0577	0823	0411		F	108	126	98	52	326	17	22.1	2016	-	TRAP 2	1A	"	"	21-336	ADFRP
W	R	5745	9182	1260	0577	0823	0411		M	97	113	92	46	241	15	19.5	2016	-	Trap 2	1A	"	"	21-213	ADFRP
W	N	5800	9182	1260	0577	0823	0411		M	98	114	89	46	216	14	19.1	2016	-	Trap 2	1A	"	"	21-347	ADFRP
W	R	5673	9182	1260	0577	0823	0411		M	91	109	86	47	213	12	18.4	2017	-	TRAP 2	1A	"	"	21-57	ADFRP, scar tissue on claw
W	N	5749	9182	1260	0577	0823	0411		F	94	114	88	46	221	14	20.2	2017	-	Trap 2	1A	"	"	21-338	ADFRP
W	N	5717	9182	1260	0577	0823	0411		F	89	101	82	46	182	13	19.6	2016	-	Trap 2	1A	38.767256	-76.379142	21-539	ADFRP
W	R	5792	9182	1260	0577	0823	0411		F	95	110	92	50	242	13	20.0	2017	-	Trap 1	3D	38.76727	-76.38343	21-300	ADFRP
Poplar Island Data sheet																								
W	R	4212	9182	0101	0407	477	7857		F	131	142	117	62	496	22	28.4	2015	-	Trap 1	3D	"	"	20-4	ADFRP
W	R	5712	01A11	0306	0474	066			F	177	199	150	84	1276	26	34.7	2012	Y	Trap 1	3D	"	"	16-149	ADFRP, 1051 PI
W	R	4234	01A11	0306	0474	066			F	185	203	152	86	1357	28	34.8	2012	Y	Trap 1	3D	38.76582	-76.38197	16-40	ADFRP

- 1) **Type** – There are 3 categories of turtles on Poplar Island,
  - a. **W** – Wild terrapin that was marked originally as a juvenile or adult at PI.
  - b. **HS** – Head-Started turtle that originated as a hatchling form PI, reared to a larger size, and was released on the island
  - c. **MH** – Marked Hatchling that originated as hatchling on PI and was released immediately after processing.
  
- 2) **N/R** – New, Recapture, or Dead. A recaptured turtle, previously marked, gets an **R** in this column, a new turtle without a mark gets a **N**. A dead turtle get a **D**. All turtles must be scanned with both the Coded Wire Tag Reader and





the PIT tagger reader to determine if it is a new turtle. Also look at the turtle carefully for possible notches in the marginal scutes. The photo on the previous page illustrates examples of old healed notches in an adult turtle.

- 3) **PI Tag** – All marked turtles have a metal tag in their 9<sup>th</sup> marginal scute on the right side. There is a number on the tag that starts with PI and then 4 digits. In this space record the PI####. If there is a hole but the tag is missing carefully scan it for a PIT tag – there should be one there. If there is a hole, no PIT tag, then bring the animal to me so I can inspect it. If it is a new turtle a monel tag will need to be placed in the turtle. This is done by drilling a small hole in the 9<sup>th</sup> marginal scute. You will be instructed on how to install these tags.



- 4) **PIT Tag ID** - PIT is a passive integrated transponder, or microchip that is injected into the turtle. The PIT tag can only be detected by a reader and consists of either a 10 digit alphanumeric or a 15 digit number. Always double check the data that you have either exactly 10 or 15 digits for the PIT ID. PIT tags are injected into the inguinal region of the turtle and are read with a scanner. It is important that all PIT tag IDs are double checked. Usually there is one person tagging and scanning and another recording data. Typically, the person scanning reads the number to the data recorder and then the data recorder reads the number back to the person scanning. It is imperative to pay careful attention while conducting this part of the turtle work up. An error can cost many hours of time attempting to figure which turtle it truly is.



- 5) **Sex** - Three sexes are recorded. You will be taught how to sex turtles, but it is done by judging the size of the tail with the size of the turtle. Males have notably larger tails.
- M** - Male – large tail with cloaca beyond the posterior edge of the carapace
  - F** - Female – short tail with tail at the posterior edge of the carapace
  - J** - Juvenile – no dimorphism in the tail
- 6) **PL** - Plastron length. The straight-line length of the plastron (bottom shell of the turtle) on the mid-sagittal plane measured with calipers in millimeters (mm). Although this may not always be the longest length of the plastron, it is the one we use. (See top photo)
- 7) **CL** - Carapace Length. The straight-line length of the carapace (top shell of the turtle) on the mid-sagittal plane measured with calipers in millimeters (mm). Because of the medial indentations of the shell, this may not be the longest length of the carapace. (See bottom photo)



8) **Width** - width measured in mm as the widest point of the carapace. (See photo)

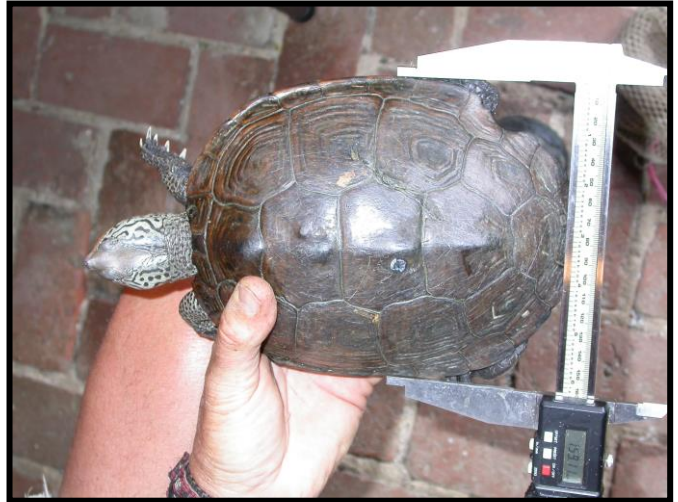
9) **Height** - height measured in mm at the deepest part of the turtle. This is usually at the third vertebral scute. (see photo)

10) **Mass**- Mass or Weight. Measured with a Top Loading Balance and recorded in grams.

11) **RP** - Right Pectoral. The straight line length of the **left** pectoral scute of the plastron measured in mm. (See Photo)

12) **Head Width** – The widest point on the head measured as the widest point of the jaw bone measured to the nearest 0.1 mm. Head width may be difficult to achieve on some individuals and is therefore only measured on cooperative turtles. One technique that works on occasion is to hold the turtle with its head facing down and sometimes it will extend its head. Also, be careful not pinch the head of the turtle with the calipers.

13) **DOB – Date of Birth - All ages must be confirmed by me or the senior person on the project.** Annuli counting is the method that is used to determine the age of turtles. However, what is recorded in the database is the year that the turtle hatched. So count the annuli and then calculate the year of birth. For example, a 5-year-old in 2022 will have a DOB 2017. Occasionally, we will be uncertain of the age. In these cases, a margin of error will be noted, e.g. 1983  $\pm$ 1. Frequently we will be able to determine a turtles age because it was caught previously when it was younger but currently it cannot be aged. Here we use the database to determine age and write year of birth on the data sheet along with **ADFPC** - age determined from previous capture – in the comments. In addition, turtles older than approximately 9 years cannot be aged accurately, because the annuli become too worn. A turtle too old to age the DOB is left blank. You should practice aging turtles and develop confidence in this skill. Whenever you think there is an error in the database you should report it to me. It is better to be overly cautious and potentially resolve and error then to let it slide and perpetuate.



Finally, as the season progresses and we go into the summer, turtles begin to show growth from that year— therefore you will need to learn to distinguish growth from the current year from the previous years annuli. For example the turtle in the figure on the right is either 5 (spring) or 4 years old (summer). You will be trained how to make this assessment. **However, when in doubt, please ask!!** Making a mistake here will incorrect age a turtle. New growth is characteristically lighter in color and is softer (feels flexible when pushed with a fingernail).



14) **RC** - Reproductive Condition. RC applies only to females and indicates whether they are gravid (carrying shelled eggs) or not. Inguinal palpitation is used to determine if the turtle is carrying eggs. All female turtles of reproductive size must be palpated for the presence of eggs. If she is gravid, one writes **YES**; if not, one writes **NO**. For males and juvenile turtles this column is left blank. Learn to feel for eggs by practicing and if you are unsure, bring the turtle to me.



15) **MOC** - Method of Capture. This is the technique by which the turtle was captured. Presently, the methods of capture are .

- GILL** - Gill Net
- HAND** - Captured with a dip net or by hand from the water.
- FYKE** - Fyke net of larger size, without bait
- LAND** - Any turtle that is caught on land. This does not include females which were caught after completing a nest or hatchlings which originated from a nest.
- NEST** - Females caught after completing a nest or hatchlings originating from a nest. Include the nest number with this method of capture.
- CRAB POT** - Captured in a crab pot.
- TURTLE TRAP** – One of our round turtle traps



16) **Cell** – Record the Cell where the turtle was captured

17) **Latitude – Longitude** – We record where the turtle as latitude and longitude in decimal: degree minutes on a GPS. We have GPS units but for \$0.99 you get can get an App call Nav Clock on your phone and it will provide a GPS coordinate. Go into the settings and make sure that your location data is set to WGS 84 (GPS) to get the correct format for lat /longs. When and wherever you find a turtle, load Nav Clock, wait for it to update the lat-long and take a screen shot.



18) **DNA** - We take tissue samples of turtles for molecular analyses to study the movement of terrapins and potentially identify distinct populations that may warrant specific conservation consideration. Tissue samples are labeled with the last two numbers of the year and the sequential number beginning with 22-01. Because tissue samples only need to be taken once, if the turtle is a recapture, we use the old DNA number which is obtained when the turtle is looked up and reviewed in the database (see below). Tissues samples are stored in 95% ethanol and in a freezer minimum -20 C. We collect tissue in two forms. The preferred tissue samples are the drill shavings from newly marked individuals and from previously marked animals we take a snippet of the tail. Thus, when drilling a turtle, carefully collect the drill shavings which typically cling to the drill bit. It also is important that between each turtle we clean and rinse the drill bit in ethanol to prevent contamination of the DNA.

19) **Comments** - This space is provided for you to write any interesting observations or distinctions for that turtle. E.g., shell anomalies, damage to shell or limbs, or distinct features that would help identify that turtle. If you run out of space, the space because there are so many comments then write in the next line. Comments, particularly those that pertain to shell damage or anomalies are particularly important because they frequently are used to help resolve problem turtles. So please carefully examine each turtle for unique identifying marks. Also, please remember that these data sheets are public record. They are scanned and loaded to a website and are reviewed by the people that pay for the project. Please be careful about the unusual features that you write about the turtle.

Typically, we use three people to process turtles, particularly when there are a large number of animals. Often, we add a fourth person to assist with the tissue collection. One person is the measurer, one person records the data, and the third person is the “Data check person”. The data person looks up all recaptures in our database and checks and reviews their history to look for inconsistencies – e.g. mismatched ages, sex, or other data that simply seems incongruent. This is the most important job while working up turtles; **WHY?? This is how errors are removed from the database.** By checking the data, you are making sure that the age, sex, and size matches with the turtle in hand. Then you read over the entire capture history and look to see if there are any inconsistencies in the data—particularly with sex, age, and measurements (this is how misidentifications are discovered). Make sure that the turtle is a sound match and if you have even the slightest suspicion that there is a problem then try to figure it out by first making sure that the ID is correct and then trying to resolve what the problem may be. This also can help us resolve problems with turtles where there are mismatches with the ID which believe it or not happens more frequently than you might imagine because people are not careful. This carelessness results in many wasted man hours trying to figure out which turtle is which.

### **WHEN A TURTLE IS DONE.**

#### **1) DOUBLCHECK THE ID**

#### **2) IF IT IS A RECAPTURE, MAKE SURE THAT THAT ITS SEX, AGE, AND MEASUREMENTS ARE CONSISTENT**

#### **3) IF YOU SUSPECT A PROBLEM, THEN SAVE THE TURTLE FOR ME OR THE SENIOR PERSON ON SITE.**

## NESTING DATA

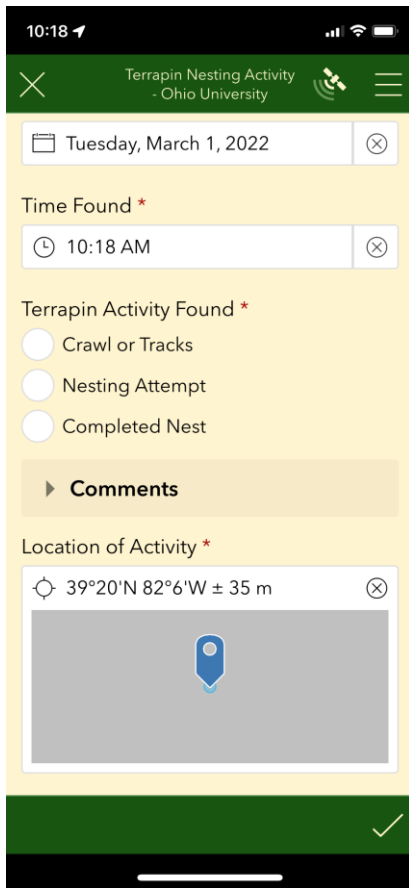
The greatest challenge that you will face this summer is learning to find turtle nests. Some are easy to find, while others are extremely cryptic. This part of the study is where keen attention to detail is the most important. Looking for the subtle signs that a turtle has nested requires patience and concentration. Finding turtle nests is difficult because many of the nests are laid in vegetation where the telltale signs are difficult to see; wind, sun, and rain obscure most nest signs within 24 hrs; and turtles are the masters of disguise. Turtles lay their nests on any of the open, elevated, sandy sites on PI that they can get to. We try to walk as many of these sites daily to locate nests and unfortunately it is often, hot, humid, and the deer flies and mosquitos are swarming. These conditions make it challenging to maintain focus and concentrate while looking at the ground for the signs of terrapin activity. You will learn how to identify signs nesting activity and we record as much of this activity as possible. We use a smart phone app

custom made for us to collect these data. We identify and document tracks (upper photos), with the hope of following them to a nest; nesting attempts where a female tried to nest (lower right photo), but did not complete the nest; and then completed nests (lower left photo). The data recorded depends on what you find, if you find a nest then that is the highest and only activity that needs to be recorded and of course there will be tracks too, but we do not record these tracks associated with the nest. Second is nesting attempts

without a completed nest, again, there will be tracks but we would only record the nesting attempt. Lastly, if we only find tracks and no attempts or nest we record the just the tracks. The photo above illustrates turtles tracks. One cool thing is that you can determine the direction the turtle is going based on the track, the curvature of







the claw marks and the J-like swirl in loose sand provide directional information. In the upper photo on the previous page the track on the left is coming out of the water and the track on the right is the return track.

### Nesting Activity

We use the app Survey 123 to record nesting activity and our nest data, a GIS app that you will load onto your cell phone. We also record a hardcopy of our nest data. The app is wonderful because it automatically records much of the data that we used to collect the old-fashioned way. To use the app, stand directly over the site, when cued for nesting activity, pick Crawl or Tracks, Nesting Attempt, or Nest. The app will automatically collect the latitude and longitude and the date and time. However, use the image of the map to verify the location of the nest, if it is inaccurate then you can manually move the pin to the correct location on the map. If it is a completed nest, then the app will automatically trip into collecting the Nest Data which you will record on both the app and on an actual data sheet.

### Nest Data

A scan of a Nest Data sheet is provided below. First note that there are two nests recorded on each sheet. If you select nest in the Survey 123 app you will automatically trip into a similar data collection mode on the app see appendix for more details of the app. We use a Nest Data Sheet to record all nests on Poplar Island. We record all nests whether they are intact, destroyed by predators, or found by the tracks or evidence of emerged hatchlings. Confirmation of a destroyed or emerged nests requires either finding eggshells so that we can be certain that it was a nest or a high level of confidence that it was a completed nest based on

**NEST DATA SHEET**

Nest #: <u>1</u>	Date: <u>29 May 18</u>	Cell#: <u>watch</u>
Lat: <u>38.75256</u>	Long: <u>76.27450</u>	Way pt: <u>001</u>
Logger: _____	Start: _____	Depth Top: <u>10.0 cm</u>
Exposure: <u>Sun</u>	Area: <u>Open</u>	Depth Bottom: <u>17.0 cm</u>
Predation: _____	Clutch Size: _____	<b>Comments</b> <u>Recheck July 17</u> <u>7 HATCHLINGS AUG 8</u> <u>1 hatch 8/8/18</u>
<u>11.3</u> 1	12 <u>11.2</u>	
<u>12.1</u> 2	13 _____	
<u>11.6</u> 3	14 _____	
<u>11.4</u> 4	15 _____	
<u>11.0</u> 5	16 _____	
<u>11.0</u> 6	17 _____	
<u>11.4</u> 7	18 _____	
<u>11.5</u> 8	19 _____	
<u>11.1</u> 9	20 _____	
<u>11.2</u> 10	21 _____	
<u>11.3</u> 11	22 _____	

Nest #: <u>2</u>	Date: <u>29 May 18</u>	Cell #: <u>5</u>
Lat: <u>38.75045</u>	Long: <u>76.37062</u>	Way pt: <u>002</u>
Logger: _____	Start: _____	Depth Top: _____
Exposure: <u>Semi shade</u>	Area: <u>Veget</u>	Depth Bottom: _____
Predation: <u>Full Snake</u>	Clutch Size: _____	<b>Comments</b>
_____ 1	12 _____	
_____ 2	13 _____	
_____ 3	14 _____	
_____ 4	15 _____	
_____ 5	16 _____	
_____ 6	17 _____	
_____ 7	18 _____	
_____ 8	19 _____	
_____ 9	20 _____	
_____ 10	21 _____	
_____ 11	22 _____	

tracks left by a snake or a well-formed nest chamber (see photo on next page of nest depredated by snake). If you are uncertain at all, then do not record it as a nest. The information recorded on the app and the Nest Data Sheet includes the following information.

- 1) **Nest Number** - Each nest is assigned a sequential number in the order that they are found. Find the next nest number by checking the most recent nest sheet. When there are multiple teams searching for nests, the team with the nesting backpack assigns numbers so call on a radio for a nest number. The number starts with the year and then the sequential number of the nest.  
e.g. 2008-5 (note the scanned example data sheet is incorrect)
- 2) **Date** - The date the nest was **found**. Written Day Month Year, the month should always be written out.
- 3) **Cell** – this identifies the Cell where the nest was found and can be obtained using the pull down menu from the Nest App and then written on the data sheet.
- 4) **Latitude and Longitude** - We determine the latitude and longitude of the nest using global positioning system (GPS). These data can now be obtained from the Nest App. It is important that you hold your phone directly over the nests to minimize error.
- 5) **Cell Number** - The cell number also is recorded. This provides the ability to provide a quick summary data of nest locations throughout the island when requested.
- 6) **Logger** - In some nest we will be placing iButton temperature loggers. These loggers record temperatures of nest so that we may make estimates of sex ratios of nests on Poplar Island. Temperature loggers are wrapped in a pink finger cot and then placed in the middle of the nest. We do this by returning ½ of the eggs to the nest, placing the logger within the eggs and then placing the rest of the eggs back in the nest. Before the logger is placed within the nest, we write the number of the nest on the logger and the finger cot.
- 7) **Start** - Here we record the date that the temperature logger was started which is usually written directly on the logger after it is launched (prepared to record).
- 8) **Depth Top** -To measure the nest depth top carefully dig to the top egg of the nest and locate the first egg. Then lay a flag across the hole and use the ruler to measure from the top egg to the flag laying across the hole. It is important that the position of the flag is not affected by the sand that was dug out of the nest. The depth is measure to an accuracy of 0.5 cm.
- 9) **Exposure and Area** - This is biophysical data that we record for each nest and is very important because it correlates with the incubation temperatures the nests experience during incubation.



**Exposure** categorizes the amount of direct sunlight and there are three categories

SUN - more than 8 hours of direct sunlight per day

SEMI-SHADE - 4-8 hours of direct sunlight per day

SHADE - less than 4 hours of direct sunlight per day

**Area** categories describe the amount of low lying vegetation in the immediate vicinity of the nests. I typically envision a 25 cm square area and estimates the number of stems with the following criteria

OPEN - no vegetation in the immediate vicinity of the nest

EDGE - a limited amount of vegetation in the immediate vicinity of the nest, usually less than 50 stems in the 25 cm<sup>2</sup> area

VEG - dense vegetation greater than 50 stems in the 25 cm<sup>2</sup> area

It is possible to have combinations of microhabitat such as SHADE - OPEN, for example open beach under a tree and SUN - VEG for nest in the full sun but in a dense mat of very short vegetation such as redhat or *Spartina patens*.

**10) Depth Bottom** - After the last egg is removed, measure the depth to the bottom of the nest in the same manner as 8 above.

**11) Clutch Size** - The number of eggs in the clutch.

**12) Predation** – When a nest is depredated, we record the date and the type of predator. Many nests are discovered after they have been depredated in which case the predation date should be the same as the date at the top of the sheet. For most nests it is difficult to determine what the predator was but at the top of the list are birds, snakes, and small mammals, but leading all of these is unknown. Why? Because the telltale signs of a particular predator are obscured or missing. The picture to the right shows a nest depredated by a kingsnake, note the serpentine tracks in the sand. You will learn the signs of different predators over the course of the summer. Additionally, when you find a depredated nest, always look to see if eggs remain in the nest in which case we would refer to this as partial predation as opposed to full predation. These details should be noted on the data sheet and in the app.



**13) Excavating the nest and weighing the eggs.** One of the skills that you will learn this summer is identifying fresh vs older (>24hrs.) nests. This is done by excavating the nest and looking at the first few eggs. After you measure the depth to the top egg, look carefully at the eggs. If they have a translucent pinkish color (see photo on previous page) then it is a fresh nest. If the eggs are white and chalky or have a chalky patch at the top, then they are too old to excavate. Go no further and finish processing the nest. But if the eggs are fresh we can



excavate the nest, count the total number of eggs, and weigh them. There are several blank lines on the data sheet to record the weights of the eggs. If you break an egg while excavating, then note that in the comments and add it to the clutch size but do not weigh a broken egg. Do not rebury the broken egg with the nest.

- 14) Egg Mass** - After the nest is excavated, the eggs are individually weighted on a small micro balance. Each egg is carefully cleaned of sand and then weighed. During this process it is important to keep the eggs out of direct sunlight and on moist sand. Dry sand and sunlight rapidly dehydrate eggs and evening the brief period that it takes to process the eggs they can be significantly dehydrated if not handled properly.



- 15) Comments** - This section is reserved for any additional comments which you noted for this particular nest, such as egg deformities, if any eggs were destroyed while digging the nests, if so how many eggs were weighed etc. Anything which seems important to you as a scientist should be recorded in this section. We also record here if the nest has been washed out by a high tide. We record the date of these events and any additional information that is potentially important. If you are unsure write it down. It is better than not having the information and someone else has to figure it out later. **When in doubt add it to the comments.**

**Finish up the Nest** - Nests at Poplar Island are protected and marked. Marking the nests involves placing four survey flags at the corner of the nest in about a 25 cm square area. Make an X in the sand directly over the nest to avoid putting flags into the eggs. **On the flags should be written the nest number and the date that it was found.** If you find a destroyed nest it is simply marked with a single flag directly in the nest chamber. For intact nests we place a small piece of ½ inch mesh hardware cloth over the nest, held in place by the flags to prevent the nests from being eaten by crows. The job is complete - now go find the next nest!!!



### **Catching and Processing Hatchlings**

After 50 days of incubation the nests are encircled with aluminum flashing fencing. Over the ringed nest, we place hardware cloth that prevents predators from eating our hatchlings. Because the rings trap the hatchlings and potentially exposes them to lethal temperatures during the day, the ringed nests must be checked at least



twice a day; once in the morning when you arrive and again in the late morning and on very hot days a third time before you leave. On cooler overcast days checking once per day is adequate but more frequent checks are definitely preferred. When the nests emerge, the hatchlings are put into small laundry bags using a separate bag for each nest. One of the important statistics we calculate is within nest survivorship, which is the number of hatchlings that emerge from each nest divided by number of eggs in that nest. The hatchlings are then transported back to the lab and placed in small containers with water until they are processed.



All of the animals are measured in the same way as adults except that we measure to the nearest

0.1 mm. Furthermore, we use a much simpler data sheet for hatchlings (see below) because there is less data collected from the hatchlings. The marking system for hatchlings is different from

PIERP Hatchlings  
Processors \_\_\_\_\_

Date 26 Oct 2021

Num	ID1	ID2	Notch ID	Nest Number	Plastron Length	Carapace Length	Width	Height	Mass	DNA	Comments
1	03193		1R11R	110	25.9	28.1	25.3	15.4	5.7	110-11	5 L cost
2	03194	03195		110	26.4	29.1	26.4	16.2	6.4	110-12	ANO US
3	03196	03197		110	24.5	27.4	24.5	14.5	5.2	110-13	ANO US
4	03198			201	26.5	29.6	27.1	16.2	6.6	201-1	
5	03199	03200		201	27.1	31.2	28.0	16.4	7.8	201-2	ANO vert, 13 R cost
6	03201	03202		201	26.5	29.4	26.5	15.8	6.4	201-3	ANO vert
7	03203			201	29.1	32.7	29.6	16.5	8.4	201-4	ANO vert, 26 Marg
8	03204	03205		201	29.7	32.0	27.7	16.2	7.8	201-5	ANO vert, 26 Marg, 26 Marg
9	03206			201	21.9	26.3	22.0	13.6	4.1	201-6	ANO US, 26 Marg
10	03207	03208		206	29.7	32.8	29.5	17.6	8.7	206-1	
11	03209	03210		206	30.1	33.5	30.1	17.0	8.7	206-2	
12	03211			206	29.7	32.9	29.5	17.4	8.5	206-3	
13	03212	03213		206	30.5	33.2	30.4	17.5	8.7	206-4	
14	03214			206	26.6	30.7	24.6	16.6	7.5	206-5	
15	03215	03216		206	29.0	33.7	30.4	16.8	8.5	206-6	
16	03217	03218		206	29.3	32.8	29.6	17.5	8.4	206-7	ANO vert, 26 Marg
17	03219			206	28.1	33.5	29.7	17.1	8.7	206-8	
18	03220	03221		206	28.6	32.3	29.6	17.4	8.8	206-9	ANO R cost
19	03222			206	27.4	31.3	29.6	16.5	7.9	206-10	
20	03223	03224		206	27.8	31.9	28.5	16.1	7.4	206-11	
21	03225	03226		206	29.1	32.5	30.3	17.3	8.6	206-12	
22	03227	03227		206	30.3	33.7	30.0	17.3	8.9	206-13	
23	03228	03229		224	26.7	29.6	26.2	15.2	6.2	224-1	
24	03230	03231		224	25.5	29.0	26.7	15.6	5.9	224-2	
25	03232			224	25.7	29.1	26.7	15.7	6.0	224-3	
26	03233	03234		224	26.8	28.9	25.9	16.0	6.2	224-4	
27	03235			224	26.3	29.0	26.6	15.9	6.5	224-5	
28	03236	03237		224	26.1	28.4	25.8	15.4	5.8	224-6	
29	03238	03239		224	25.5	28.6	27.1	15.2	5.9	224-7	
30	03240			224	27.1	30.6	27.8	15.7	6.6	224-8	

what we do for adults. First, we do marginal notch coding with a cohort mark specific for the year and the season of emergence (Fall or Spring). The notch mark that is cut out with a scalpel that is unique for its cohort e.g. 2007 = 9R12L. The notches that we cut out of the shell are saved as the DNA sample of that individual and therefore must be carefully saved and stored in 95% ethanol. We also have a



specific labeling system for the DNA sample that is as follows, the year – nest number – hatchling number for that nest e.g. 2021 – 51 – 3 (This would be the third hatchling caught from nest 51 in 2021) The hatchlings are also marked with a much smaller tag known as a coded-wire tag or CWT which is injected into the right rear leg (see photo right). You will be taught how to implant these tags. Each tag has at least one unique number, and sometimes two, written on it that must be read before it is injected into the turtle. You will be instructed how to read the tags and then the tag ID(s) is recorded on the data sheet. All



hatchlings will be held at the PIERP for 24 hours after they are tagged so that we can check that they have not lost their CWT before release. Just prior to release all animals will be scanned (see photo below). The hatchlings are then released into completed wetland cells.



## INVASIVE SPECIES

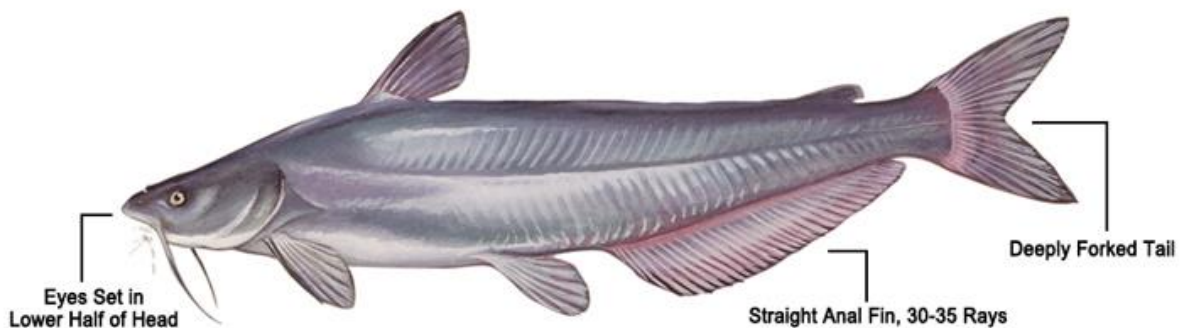
While checking traps you are likely to encounter invasive species that we must remove and euthanize. There are three species of fish that we encounter occasionally that absolutely need to be kept if they are caught in our nets and traps. The first is the northern snakehead, an introduced, invasive fish from Asia, the second and third are invasive freshwater catfish from Mississippi drainage introduced into Chesapeake Bay. They are the flathead catfish and the blue catfish. Below are pictures of these fishes and species you may confuse them with. You should be prepared to recognize them and euthanize them in the field. All of these invasive fish should be brought back to the turtle shed and placed in the freezer.



Northern Snakehead – it is the only fish that you will catch that has this mottling color pattern and the long continuous dorsal fin.



Flathead catfish – note the projecting jaw and the square tail – You are least likely to encounter this species



Blue catfish – note the position of the eyes, the long straight anal fin, and the deeply forked tail – the lack of spots distinguish it from a channel catfish. Similar to native white catfish see below

## Do Not Keep this Similar Species



White catfish – this is a native species and should be released. Note the rounded anal fin, position of the eyes, and the moderately forked tail.

### Dispatching Fishes

According to our IACUC protocol we have a specific way with two steps to dispatch fishes. The first is to deliver a blow to the head. This may be best accomplished by picking up the fish and then hitting the head on the gunwale of the boat. The second step is to insert a pair of shears through the gill arch and separate the gill arch from the body and thereby exsanguinating the fish. The fish should die rapidly after the two-step process and then be brought to shore. Also the snakeheads are a very tasty fish and a great source of protein so these fish are not wasted, but happily eaten.

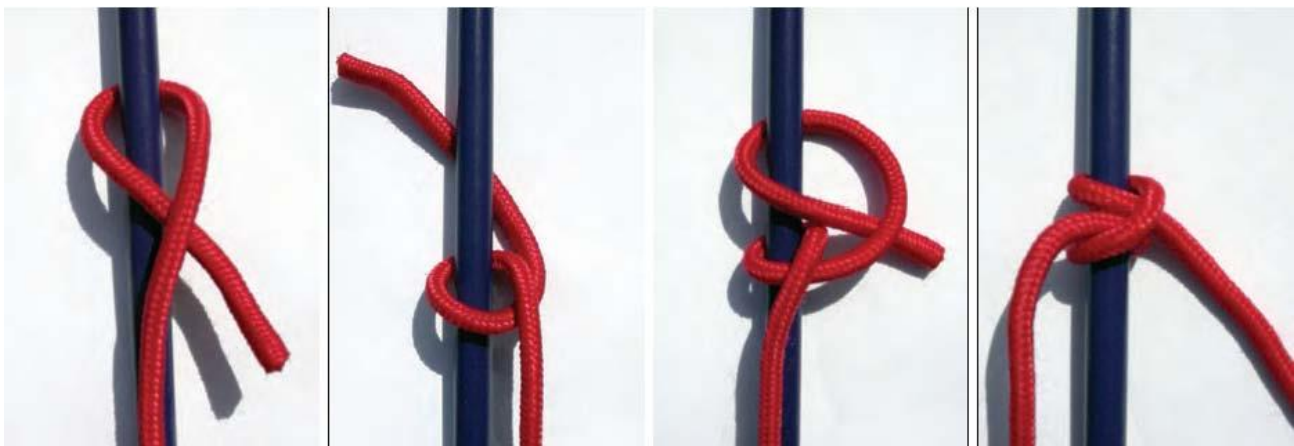


## Knots, Nets, Mending, and Dipping

One of the more challenging tasks that you must learn during the summer is how to tie knots, and mend and maintain nets. Let's start with the basics, there are three basic knots that you should learn, 1) the sheet bend, 2) the clove hitch, and 3) the bowline. The clove hitch and the bowline are essential for tying up and setting nets and boats. The sheet bend is the basic net mending knot. Illustrations of how to tie each of these knots are provided.

### THE CLOVE HITCH

Let's begin with the clove hitch because it is the easiest. Simply grab a rope and start practicing. Find something to tie around. Go around the item you are tying to once and take the bitter end of the rope (the end that is currently not tied to something such as a boat) and make sure that it is underneath the rope when you finish your first wrap. Then repeat the process again, make another loop and make sure that the bitter end is underneath. Simple! Right ! Practice!



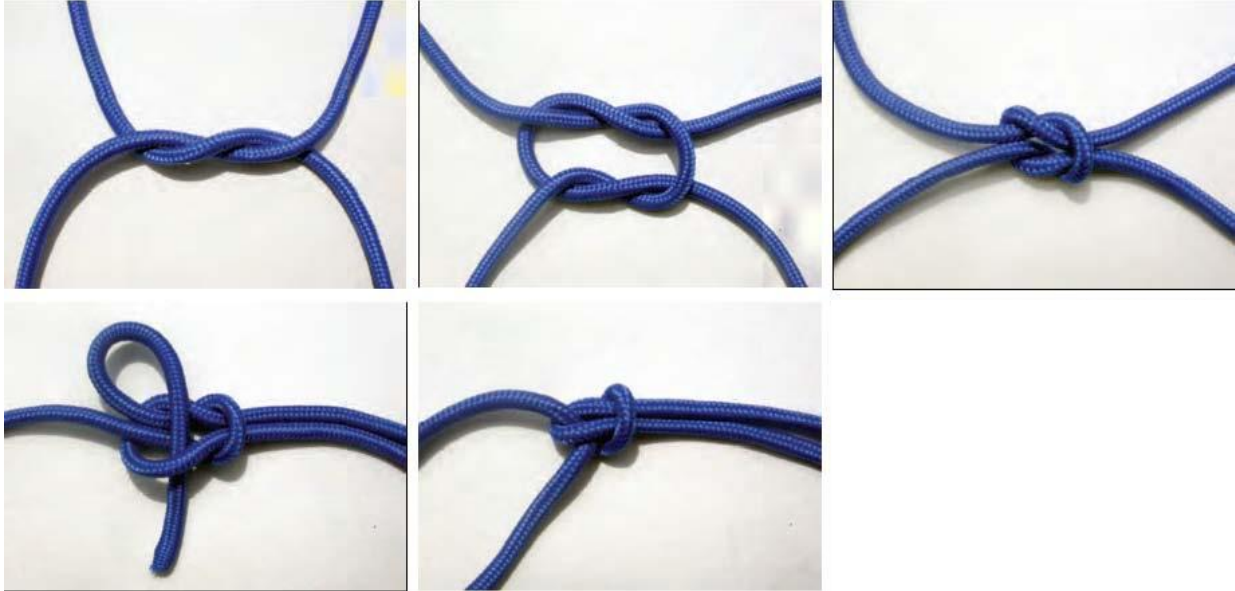
### THE BOWLINE

The second knot is the bowline. For this knot your rope around the object that you are tying to and make a loop in the end that is tied to your boat with the end going to the object that you are tying to on top. Then take the bitter end that is around what you are tying to and come up through the hole, go behind the line to the boat and back down the hole. A little more complicated but an important knot. Practice!



## THE SHEAT BEND (NET MENDING KNOT)

The final knot – the sheet bend is very similar to a square knot except that one of the ends passes under the loop in the opposite end. You will learn how to tie this knot when I teach you how to mend net. Tying it into net is a little more complicated because one half of the knot is already there for you in the net. The trick is recognizing this loop and seating the knot into it correctly.



## NET MENDING

Mending net is a tedious and time-consuming task and probably one of the most trying things that you will learn this summer. However, you should take this as a challenge because mending some of the larger holes will be one of the more interesting things that you will learn to do this summer. Crabs, otters, muskrats and other animals will get caught in the traps and make holes in them that need to be repaired. Traps with holes will not catch turtles. Fixing holes requires that the nets be clean and that you have a net needle loaded with string. The basic idea is to reconstruct the net by replacing the meshes of the net that have created the hole. The sheet bend is the only knot that firmly holds so that the line does not slip and deform the mesh when you are repairing the net. I will be teaching you to mend net because it is not easily learned from the materials provided here.

Prior to mending a net it must be clean. This is accomplished by washing the net with the garden hose and removing all the mud and debris from the net that accumulates while it is in the water, Never let a net fish





for more than 7 days because it will accumulate small organisms that grow on the net and are extremely difficult to remove. Once the net is clean, the net must be spread to dry because this kills the animals growing on the net. At the same time that you are spreading the net, you can also search for holes and mark them with flagging tape. Make sure that you inspect nets carefully for holes and mark them, particularly in the cod end of the net. Once this is completed the net can be mended during the cooler times of the day.

### **DIPPING NETS**

Prior to mending a net it must be clean. This is accomplished by washing the net with the garden hose and removing all the mud and debris from the net that accumulates while it is in the water. Never let a net fish for more than

7 days because it will accumulate small organisms that grow on the net and are extremely difficult to remove. Once the net is clean, the net must be spread to dry because this kills the animals growing on the net. At the same time that you are spreading the net, you can also search for holes and mark them with flagging tape. Make sure that you inspect nets carefully for holes and mark them, particularly in the cod end of the net. Once this is completed the net can be mended during the cooler times of the day.





## Housing at the Field Site

My wife and I own the house where you will be stay. We have gender segregated housing that occurs in a large bedroom with bunk beds for one gender and a garage apartment for the other gender. Please be aware that the house and everything it belongs to us and that we



expect that it be treated with respect and taken care of appropriately. We maintain this large house solely so that I can accommodate a field crew because asking you to obtain housing on your own would be cost prohibitive in the area. We also ask that you be conscientious about energy use because we pay that out of our pocket, it is not covered by my grant and therefore minimizing the use of lights, air-conditioning, and other forms of electric consumption reduces our costs. Finally, because there is a large number of people living in a relatively small space, please be respectful of other people and their property.

### Meals

All meals and food are provided. Breakfast is “on your own” before we head out to the island. Breakfast is usually cereal or a bagel, or whatever you ask me to get for you, but you must prepare it on your own and clean up afterward. We must take lunch out to the island so everyone is responsible for making their own sandwich and whatever else they may want to take out to the island. We usually try to leave the house at 7 am so it is important that you are ready to go at that time. We do not work on the weekends and therefore people eat at different



times. Please always **CLEAN UP AFTERWARD**. Please remember that this is the home for my family and there are many people in addition to yourself that are using the limited space here.

Dinners are sit-down meals with the entire field crew and are a social event that allows everyone to reflect on the day's work and form a greater bond with those whom you will spend the summer. Everyone participates in cooking and for those who are inexperienced provides the opportunity to learn new skills and for those who already know how to cook to share their talents. You may be required to step up and take charge on cooking dinner. Ask if you can help in the kitchen; cooking for a lot of people is tiresome and helping make a dish will speed things along. Creating a grocery list is a group project and should not only involve the cooks. Think about what you want to cook and the ingredients that you will need so that they can be purchased on our weekly shopping run. After dinner the kitchen needs to be cleaned, including washing dishes. Knives, plastic containers, pots, pans, wooden utensils, cutting boards, and certain mugs and bowls (if marked) must be hand washed, everything else may go in the dishwasher. Try to conserve water; this may include not rinsing dishes before putting them in the dishwasher or turning the water off while scrubbing dishes. If dishes are hand washed either dry them with a clean towel or put them on the drying rack before putting them where they belong. Counters should be sprayed with disinfectant and wiped down. The floor should be swept. Leftover food should be put in containers and stored in the fridge. Wednesdays are racing nights. I will be sailing and will not be joining for dinner.



## **Regular chores**

Before heading out for the day, make sure the kitchen is clean and take out the compost if needed (ants become a problem if not). When returning home from the island, boots and shoes should be lined up neatly in front of the door, life jackets should be put away in the closet and if wet dried out, radios put on their respective chargers turned off, and DNA should be organized and stored in the freezer. The compost container should be emptied into the compost pile after dinner and breakfast. On Wednesday nights garbage cans are to be taken to the end of the driveway and picked up and returned on Thursday. When the dishwasher is done running it should be unloaded and everything put away. As the season continues the garden needs to be picked every other day. Occasionally you may be asked to participate in yard or garden work.

## **Composting**

We have compost bins that we maintain and composting is an important part of reducing food waste and as such should be used. The compost container should be emptied and cleaned out each day to prevent ants.

### Common Items that are compostable:

Fruits

Vegetables

Peels

Eggshells

(Non-glossy) Paper

Coffee grounds

Tea bags

Dinner Scraps

### Common items that are not compostable:

Meat/bones

Dairy

Non-organic items

## **Respect**

While your number one priority is the fieldwork, this can be affected by interpersonal conflicts. Communication combined with respecting each other's privacy in your own rooms, living room and in the yard goes a long way towards mitigating this issue. Places to achieve privacy during phone calls include the end of the pier, the driveway, and behind the yellow turtle shed. Also please be respectful of our property and the house. Feel free to use it but please make sure you put it back away and clean up any mess you may make. Please do not put your feet on the furniture.

## **Laundry**

Remember to always be courteous and try to coordinate laundry days with others and to always promptly remove clothes from the washer/dryer after each cycle is finished. The detergent cup can go straight into the washer to prevent a sticky mess, and the lid should be left up after each cycle to prevent mildew. The dryer is older and clothes may require air drying and/or an additional half cycle. The lint trap to the dryer should be cleaned after every cycle to prevent fires.



## **Entertainment**

There is no WIFI available in the house. However, the St. Michaels branch of the Talbot County Library has free WIFI that is available inside and outside the library 24/7. There are a wide variety of books and DVDs available for checkout by either getting a library card (available by having a piece of mail proving your address) or by asking to borrow a library card.

## **St. Michaels**

Don't speed. Seriously the speed limit is 25 mph and out of state license plates make you a target.

## **Fun Backyard Activities**

Kayaking- Always wear a life jacket, paddle is in the shed

Canoeing- Always bring a life jacket for each person, paddles are in the shed

Swimming- Be aware of boats and jellyfish later in the season, remember to raise ladder after swimming

Fishing and crabbing - Willem has gear and advice/opinions on where and how to use it, but if you are a keen fisherman bring your own gear.

Birding

Herping

## **Ghosts**

There are no known ghosts on the property. Well, we haven't found any yet.

## **What do you need to bring?**

Insects and exposure to the sun can present a problem for some field assistants. You will be exposed to the sun for long periods of time. Bring at least one 1-quart water bottle. Bring loose, baggy clothes that are cool, comfortable, and that you don't mind if they get filthy dirty. I find that jeans are too hot and take too long to dry. If you have light skin, I recommend that you wear protective clothing until you become adjusted to the sun and are beyond the burning stage. Protective clothes help considerably to keep bugs and sun from becoming a problem. I also recommend light colored clothes as they are much cooler than darker clothes. Bring a good hat, the sun is intense and draining. Additionally, you are required to wear enclosed shoes while working and boots may be preferred when working in the rowboat to keep your feet dry. You can wear sandals and flip flops around the house. Also, some good sun glass, ones that block UV light. light 100%. One last recommendation, bring some foul weather gear and clothes to keep you warm. Early in the season it can be cool on the water. Some additional items that will be important to your field work that you should bring include binoculars, and a waterproof bag to carry your personal belongings in the field. Finally, if you have a favorite taxa you are interested in I recommend that you bring field guides to help you with identification.

Remember that your job here is to catch turtles, not get a suntan. You will find that exposing yourself directly to the sun for long periods of time will tire you rapidly and decrease

your performance during latter periods of the day. Believe me, you will have a great tan by the time you leave at the end of the summer.

**Check list of things to bring—in addition to the other things you would normally bring**

- a positive attitude
- a water bottle, maybe two
- linens - sheets, pillowcases, towels, and blankets or a sleeping bag \*\*\*
- a good fan \*\*\*
- a bike \*\*\*
- your laptop—WIFI is available at the local library which is nearby
- a good hat—I prefer a wide brim hat
- some of your favorite movies or TV shows on DVDs
- sunscreen – I will have plenty available too
- a pocket knife
- waterproof case for your cell phone
- watch
- binoculars
- flashlight or headlamp
- field guides for your favorite flora and fauna
- rain gear
- long pants that are light and cool. Long pants are required on the PIERP
- at least one pair of enclosed shoes that you can walk long distances in comfortably. Enclosed shoes are required on the PIERP.
- a pair of sandals for at the house
- clothes you are willing to throw away at the end of the summer
- a nice set of clothes you feel comfortable wearing to a summer party (e.g. shorts and button down shirt)
- a source of your favorite music
- your favorite recipes
- your musical instrument
- some leisure books

\*\*\* items we can provide for international travelers

**Contact Information—you can receive mail at this address**

Address:  
8716 Bozeman- Neavitt Road  
St Micheal's Maryland 21663  
Willem Cell: 740-503-4983  
Kate Kelley (My wife) Cell: 740-438-2658  
Email: roosenbu@ohio.edu

**How do I get there?**

Google maps or your phone will get you to the house in Maryland without a problem using the above address. However below are some directions for a slightly different route that can be faster. One thing to keep in mind is that traffic can be gnarly in the DC metropolitan area and is

something to try to avoid when you are traveling, in particular going across the bay bridge near Annapolis on a Friday afternoon.

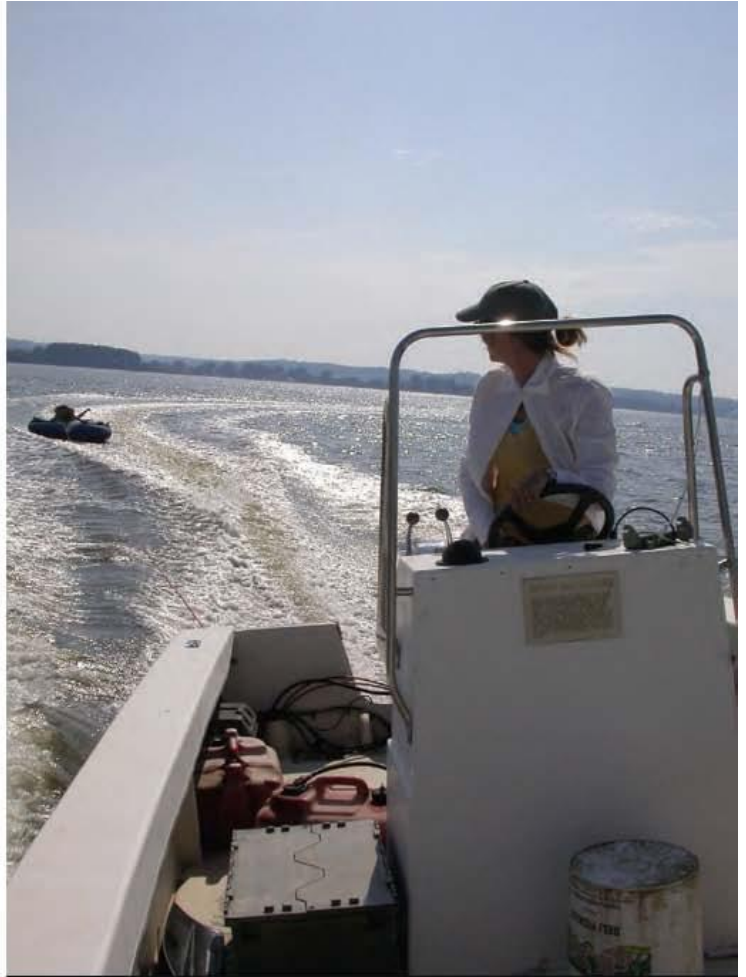
Directions to the house in St. Michaels, Maryland.

- 1) From Athens, take 50 east to Parkersburg and then continue on Rt 50 to Clarksburg, WV. In Clarksburg take I-79 North for about 30 miles until you get to Morgantown. Before Morgantown take I-68 east until you get to I-70 in Hancock, MD (approximately 90 miles). Continue on I-70 east toward Baltimore MD) From I-70 take Exit 80 onto Rt 32 south which will eventually turn into I-97 after about 30 miles.
- 2) Take I-97 to route 50 east toward the Chesapeake Bay Bridge. After approximately 10 miles on I-97, take the left hand exit for US 50/301 North toward Annapolis and the Chesapeake Bay Bridge.
- 3) Go across the Chesapeake Bay Bridge – there will be a toll, but relax it is free going home. If you have an EZ Pass it will be accepted at the bridge otherwise you will get a bill in the mail.
- 4) After approximately 15 miles after the Bay Bridge, route 50 and 301 split. Exit right onto route 50 toward Ocean City MD.
- 5) After approximately 16 miles past the 50 / 301 split, Exit right onto MD 322 just before the town of Easton.
- 6) At the 4<sup>th</sup> light, exit right onto MD 33 East – You will want to obey the speed limit on 33, particularly in the Town of St. Michael where the speed limit is 25. Cops in St. Michael's love people from out of state.
- 7) After approximately 2 miles past St. Michael's turn left onto MD 579 (Bozeman-Neavitt Road).
- 8) Continue on MD 579 approximately 3 miles and look on the right side of the road and look for a sign that says Plenary with a staff of wheat on it. Turn right onto this driveway. Continue straight until you get to the house.

If you can't find us please call us 740-503-4983 (Willem Cell) or 740-438-2658 (Kate Cell).

Caution – Both Mapquest.com and most GPS units will route you down Rt 2 to get to MD 50. This is a slow and painful route with many stop lights – I highly recommend taking the route described herein to expedite your trip. Also, avoid travel across the Bay Bridge after 1 pm on Friday as the traffic gets very heavy as everyone from DC and Baltimore make a mad dash to the beach. Safe travels.





**Welcome Aboard  
and Look Forward  
to a Fantastic yet  
Hard Working  
Summer.**



## APPENDIX A – AGREEMENT AND RELEASE OF LIABILITY

This Agreement and Release of Liability (“Release”) is being executed by \_\_\_\_\_, whose address is \_\_\_\_\_ (“Participant”) in favor of Ohio University in Athens, Ohio (“University”) and Willem Roosenburg (“Roosenburg”), both in his personal capacity and in his capacity as an employee of University. Participant represents that she/he is fully competent to sign this Release, and she/he is 18 years of age or older, and therefore is an adult according to the laws of the State of Ohio.

Participant is registered to participate in a research project offered by Roosenburg, whereby Participant will take part and assist in research concerning turtles in the Chesapeake Bay area (the “Program”). The Program will take place in the Summer of \_\_\_\_\_, from \_\_\_\_\_ to \_\_\_\_\_. In consideration of the Program being offered and made available for participation by Participant and others, the Participant agrees as follows:

**COVID-19 Acknowledgment: By registering as a Participant for the Program, it is fully understood that Participant may be exposed to COVID-19 and other infections. Similar to other highly-contagious viruses, it is understood that it is possible to contract the COVID-19 disease, even if the Participant complies with all health and safety measures as required by University and as recommended by the Centers for Disease Control and Prevention (“CDC”) and the Ohio Department of Health (“ODH”). It is understood that although University is following the coronavirus guidelines issued by the CDC, ODH, and other experts to reduce the spread of infection, Participant can never be completely shielded from all risk of illness caused by COVID-19 or other infections.**

1. Participant hereby acknowledges that the Program will take place in outdoor areas where Participant may be exposed to harsh environmental conditions, unexpected weather, wildlife, and vegetation. Participant further acknowledges that this Release is attached as an appendix to the most-recent version of the Diamondback Terrapin Project Field Manual (hereinafter referred to as the “Field Manual”) which has been provided to Participant. Participant acknowledges that, prior to signing this Release, Participant received and read a copy of the Field Manual, which provides a non-exhaustive description of the activities in which Participant will engage while participating in the Program. Participant hereby agrees that Participant will abide by all instructions, rules, and requirements stated in the Field Manual.

2. Participant understands that, during Participant’s participation in the Program, Participant will be living in a house owned by Roosenburg, located at 8716 Bozeman-Neavitt Road, St. Michael’s Maryland, 21663 (the “House”). Additionally, Participant will be operating/traveling in several vehicles while participating in the Program (hereinafter referred to as the “Vehicles”). The Vehicles are identified in the Field Manual, and include: (1) a 22-foot center console C-Hawk boat; (2) a 14-foot aluminum rowboat; (3) a canoe; and (4) a Utility Terrain Vehicle. Instructions, rules, and requirements regarding Participant’s operation/use of the Vehicles are included in the Field Manual. Participant is responsible for coordinating Participant’s own transportation to and from the Chesapeake Bay area at the beginning and end of the Program. In the event that transportation is coordinated or provided by either Roosenburg or University, Participant agrees and understands that neither Roosenburg, nor the University will be liable for any loss, injury, claims, or damages related to such transportation.

3. Participant understands and recognizes that Participant is responsible for Participant’s own well-being, and the well-being of the others engaged in the Program. Participant recognizes that it is in Participant’s best interest, as well as that of the others engaged in the Program, to follow the suggestions, guidelines, and/or rules stated in the Field Manual, or otherwise communicated to Participant by Roosenburg during the Program. Participant also agrees and understands that Participant is solely responsible for all of Participant’s own personal equipment or property.

4. Participant understands and appreciates the potential dangers, hazards and/or risks, directly and/or indirectly inherent in participating in the Program, which could include serious personal injury, the loss of life, serious loss of limb, or loss of property. Participant agrees to utilize all available safety measures.

5. Participant understands and agrees that Roosenburg, the University, the University's Board of Trustees, employees, and agents, and the State of Ohio (collectively the "Released Parties") are not responsible or liable for any injury, damage, loss, accident, delay, or other irregularity that Participant may experience, that arises from or relates to Participant's participation in the Program, including but not limited to the following:

a. Any injury, damage, loss, accident, delay or other irregularity that arises from or is related to the defect of any motorized means of transportation including, but not limited to, any of the Vehicles;

b. Any injury, damage, loss, accident, delay or other irregularity that arises from or relates to Participant's use of any of the Vehicles, including as an operator or passenger;

c. Any injury, damage, loss, accident, delay or other irregularity that arises from or relates to Participant's travel to and from the Chesapeake Bay area, that is related to the Program;

d. Any injury, damage, loss, accident, delay or other irregularity that arises from or relates to Participant's presence in the House, or Participant's use of the House as a residence during the Program;

e. Any injury, damage, loss, accident, theft or other action sustained by Participant's personal equipment or property;

f. Any other injury, damage, loss, accident, delay or other irregularity sustained by Participant that arises from or relates to Participant's participation in the Program.

6. Knowing the dangers, hazards, and risks involved in the Program, and in consideration of being permitted to participate in the Program, Participant agrees to assume all of the risks and responsibilities surrounding Participant's participation in the Program, as well as any activities undertaken as an adjunct thereto, including, but not limited to, transportation related to the Program. Participant, on Participant's own behalf and on behalf of Participant's family, heirs, executors, administrators, assigns and personal representative(s), hereby releases and forever discharges the Released Parties from any present or future claims that Participant may have with regard to any loss, harm, injury, damages, demands, costs, expense, actions or causes of action whatsoever that arise out of or relate to Participant's participation in the Program, including but not limited to those based on negligence or failure to supervise. Furthermore, in consideration for being allowed to participate in the Program, Participant agrees to indemnify and hold the Released Parties harmless from any and all direct, indirect, special or consequential damages or costs, legal and otherwise, which Participant may incur, that arise out of or relate to Participant's participation in the Program, even if due to the negligence of any of the Released Parties.

7. Participant assures the Released Parties that Participant has consulted a medical doctor with regard to Participant's personal medical needs, such that Participant can and does further state that there are no health-related reasons or problems which preclude or restrict Participant's participation in the Program. Participant understands that members of the Released Parties who may be participating in this Program are not necessarily medically trained to care for any physical or medical problems that may occur during this Program. By signing this Release, Participant acknowledges that she/he has adequate medical and hospitalization insurance for any injuries that Participant may incur as a result of participating in this Program. Participant is aware of all applicable



personal medical needs of Participant and will meet any and all needs for payment of hospital costs while Participant is engaged in the Program. Participant grants the Released Parties full authority to take whatever action they may consider to be warranted under the circumstances regarding Participant's health and safety if Participant is unconscious or otherwise unable to do so her/himself, and fully releases the Released Parties from any liability for such decisions, actions, or expenses as may be taken in connection therewith. Participant authorizes the Released Parties, at their discretion, to place Participant, at Participant's expense and without further consent by Participant, in a hospital for medical services and treatment. Participant hereby releases the Released Parties from all medical and transportation expenses incurred on behalf of, or for the benefit of, Participant.

8. Participant agrees to participate fully in the Program. Participant hereby recognizes that the Program and attendant activities are group endeavors and agrees to accept and abide by the Released Parties, or the will of the majority whenever a matter of choice is presented to the group. Participant acknowledges that the Released Parties reserve the right to cancel, without penalty, the offering and conduct of the Program and the right to make any alterations, deletions, or modifications to the Program as deemed necessary by the Released Parties. If Participant leaves the group, he/she does so at his/her own risk and the Released Parties bear no responsibility to Participant.

9. Participant acknowledges that the Released Parties reserve the right to cancel or modify, without penalty, the Program.

10. The Participant agrees to respect and abide by the laws of the location of the Program, and any other location traveled. If Participant is an Ohio University student, Participant agrees to review in advance of the Program, respect and abide by University's Student Code of Conduct, which is incorporated herein and can be found at <https://www.ohio.edu/communitystandards/upload/Ohio-University-Student-Code-of-Conduct-through-081815-2.pdf>, in addition to any other rules provided to the participants at the Program, written or oral. Participant understands that the consumption of alcohol and/or use of drugs is strictly prohibited and could result in Participant's dismissal from further participation in the Program, or a University Code of Conduct charge. Participant further agrees to accept corrective action up to and including termination of participation in the Program, if Participant's conduct is determined to be detrimental to the best interest of Participant, other participants, the Program or the Released Parties. Participant acknowledges and agrees that she/he may be required to leave the Program at the sole discretion of Roosenburg. Participant also may be required to leave the Program for medical reasons. If asked to leave, the Participant agrees to leave immediately.

11. Participant further agrees that this Release shall be construed in accordance with the laws of the State of Ohio, which shall be the forum for any lawsuits filed under or incident to this Release or the Program. The terms and provisions of this Release shall be severable, such that if a court of competent jurisdiction holds any term to be illegal, unenforceable, or in conflict with any law governing this Release the validity of the remaining portions shall not be effected thereby.

**THIS IS A RELEASE OF LEGAL RIGHTS. READ BEFORE SIGNING.**

In signing this Release, Participant acknowledges that she/he understands and voluntarily agrees to its terms and conditions. The Participant declares that no oral representations, statements, or inducements, apart from the terms contained in this Release, have been made. This Release shall be binding upon the Participant, as well as Participant's family, heirs, executors, administrators, assigns and personal representative(s).

---

Participant

Date