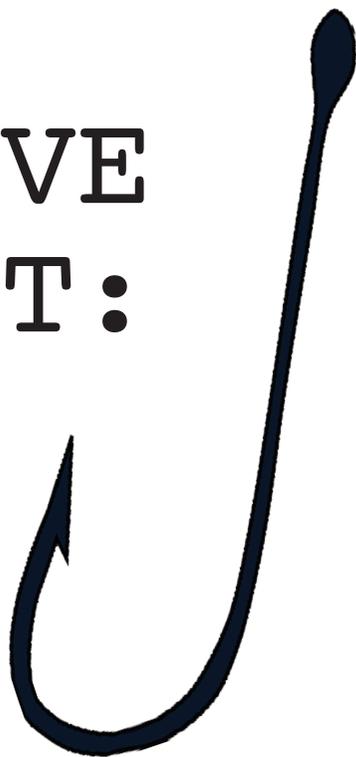


THE
INVASIVE
HITLIST:
Snakehead



A **100% waterproof** field guide to educate anglers on the threat of the Northern Snakehead (*Channa argus*).

Executive order 13112 defines an **invasive species** as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native whose introduction does or is likely to cause economic or environmental harm or harm to human health.

Invasive species impact ecosystems by reducing the abundance of native species and altering ecosystem processes through predation, competition for resources, hybridization, and the introduction of pathogens and parasites. They may also adversely impact society by hindering economic development, preventing recreational and commercial activities, decreasing the aesthetic value of nature, and serving as vectors for human disease transmission.

Invasive species are estimated to cost the U.S. more than \$120 billion in damages a year. It is an urgent problem, and it is our job to fix it.

Invasive Hitlist: Snakehead is part of our campaign against invasive species worldwide. Check out our website www.invasivehitlist.org for more information.

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**MISSION
BRIEFING.**

REPORTING FROM HEADQUARTERS

At the *Invasive Hitlist* headquarters, we've been scrambling to stay on top of things. But no matter how crazy it gets here, it's nothing compared to what's going on out there.

Which gets me to your mission.

Hope you had a nice vacation from fishing, because while you've been gone, all heck has broken loose. Despite our efforts, the threat of invasive species around the globe keeps growing. Here at ground zero, our waters are in peril, and only a very small handful of people have the expertise to make things right. You're one of them.

You sitting down? Good, because we've been invaded by the **Northern Snakehead**.

I know, I know. But I don't want you to blame yourself. Turns out they've been established in American rivers for over a decade. What I can't get my head around is how we let them slip under our nose like this. But at least, with you on board, we can control 'em...

In this book you'll find everything you need to know to stop them.

<p>Bottom line: these fish are now in our waterways and taking over new ones, they must be controlled, and you're the one to do it.</p>

KNOW YOUR
PREY.

Channa argus. Otherwise known as the Northern Snakehead. Not the most glamorous name, but a highly accurate description. With muscular 33-inch bodies, snakelike features, and razor sharp teeth, these fish are a force to be reckoned with. You'll know them by the dark brown splotches on their scales. Appropriate, considering that the spots mar their skin in much the same way snakeheads mar our ecosystem.

Want to go on a vacation to the lower Amur River Basin? Fancy a stroll along the banks of the Yangtze? Well guess what, they've both been dealing with these water devils for millennia. China, Russia, North and South Korea have all had to endure this predator monopolizing their waterways and now--thanks to the folly of man--it's our local river's turn. The difference, of course, being that the our waterways aren't prepared for the violence these hellions are capable of unleashing. While the East Asian ecosystems have evolved along with these predatory beasts, our waters are defenseless against 'em.

juvenile snakehead



mature snakehead

A female snakehead can lay 15,000 eggs 1-5 times a year, meaning that once snakeheads enter an area, they waste no time multiplying. And while most momma fish have the decency to just lay their eggs and leave, female snakeheads viciously guard their nests. This makes it hard for any native fish concerned with, oh, I don't know, maintaining the food chain, to eat snakeheads when they're small enough for that to be a possibility.

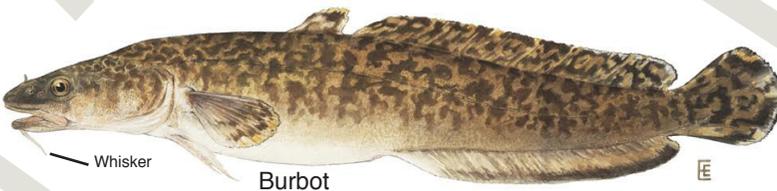
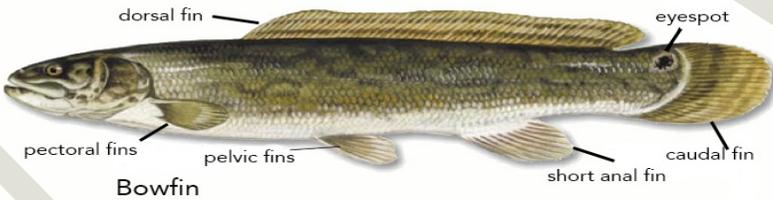
And what do those baby snakeheads do once they're grown? What any top-level predator with no natural competition, a desire for blood, and nothing to lose would do. They wreak havoc. They'll eat pretty much anything they can sink their teeth into. Don't you for a second assume that the snakehead will be content with just fish! They also have been known to eat small frogs and ducklings.

Friendly Fire!

Be aware that throughout much of the Eastern United States we have two native fish species allied in our fight against snakehead, the bowfin (*Amia calva*) and the burbot (*Lota lota*). So while you're on your hunt please be careful. The snakehead can look very similar to both of our allies!

Both snakehead and bowfin have elongated, cylindrical shape, and long dorsal fin that runs along their backs. However, they are very different!

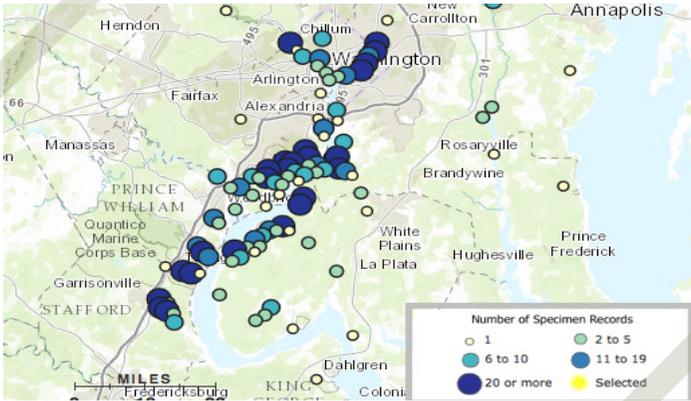
Both the burbot and snakehead have a long dorsal (back) fin, but the dorsal fin of the burbot is split. Burbot also possess a single barbel (whisker) beneath the lower jaw. So if the fish has this whisker it's not the enemy. Keep your eye on the prize, and keep our local fish safe in the fight against snakehead!



Bottom line: snakeheads spawn aggressively, spread rapidly, and have no natural predators to keep them at bay.

STALK YOUR
TARGET.

That's right. take a good long look. They've officially settled here.



Map of the snakehead's presence in the Chesapeake Bay watershed.

The first established snakehead population on US soil was discovered over 20 miles from the Potomac in Crofton, Maryland about 13 years ago. I'm sure you're thinking, "Oh, come on, this whole snakehead thing really is not that bad." Not that bad? You think I would MAKE UP a problem like this? Invasive species are bad news. According to the National Wildlife Federation, threats from invasive species are the cause of almost 42% of all endangered species worldwide. And if their words aren't enough to convince you, then maybe you'll listen to the fact that Fish & Wildlife Service asserts that the damage done by Northern Snakeheads "would likely be in the millions of dollars and would appear to significantly outweigh the benefits generated by the current market." We can't sit idly by and let people dump unwanted species into our waters! We need to take action!

Snakeheads are in most of the Chesapeake Bay area. That means the Anacostia River, the Potomac River, and most of the creeks and tributaries that lead to them. "So what?" that voice inside your head whines. So everything! We need to get these scoundrels either into our bellies or into the ground. Doesn't matter. Whatever gets them out of our waters quickest.

It gets worse.

Not only are these suckers comfortable anywhere from 32 to 85 degrees Fahrenheit--which makes it easy for them to survive in pretty much any river in US territories--they can WALK ON LAND.

Okay, perhaps walk is an exaggeration, but they do have a rudimentary lung that allows them to survive out of water for days at a time. In this time they writhe their snake-like bodies across the ground, which means they can colonize entirely landlocked bodies of water. It's only a matter of time before they make it out of the Chesapeake area, and on to the next territory.

The only redeeming quality of snakeheads is that they taste good, but ironically enough, our attempt to exploit that fact is probably how they ended up here. Go figure. Some knucklehead must have released a fish intended for human consumption into the wild. Once in the ecosystem, Mr. and Mrs. pioneer snakehead plundered and proliferated, devastating the ecosystem and leaving native fish populations in shambles.

<p>Bottom line: they've established a stronghold between Maryland and New York, and have started scouting bases in Arkansas, Florida, North Carolina, California, and even Lake Michigan.</p>

KNOW YOUR
HUNTING
TOOLS .

As a person who respects the waters, it is your duty--nay--your PRIVILEGE to hunt these snake-demons whenever you get the chance. Your best bet for nabbing a snakehead are between May and September.

As a nature aficionado, I endorse the catch and release method. It's good for the environment, but it's also good manners not to kill innocent fish you don't plan to eat. But the snakehead is no innocent fish and as such you are free to unleash your fury on 'em. You're only doing to them what they have already done to so many unsuspecting fish in the Potomac and the Anacostia rivers. But while the snakehead acts out of cold, unfeeling instinct, you will act from a place of righteous indignance.

They're ambush predators, which means they employ the wait-and-see hunting method. They lay patiently on the surface of the water, and then when some sort of prey comes by...

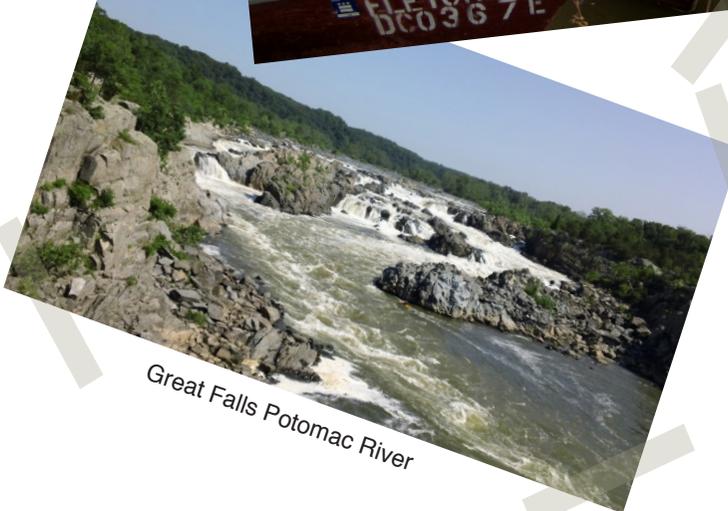
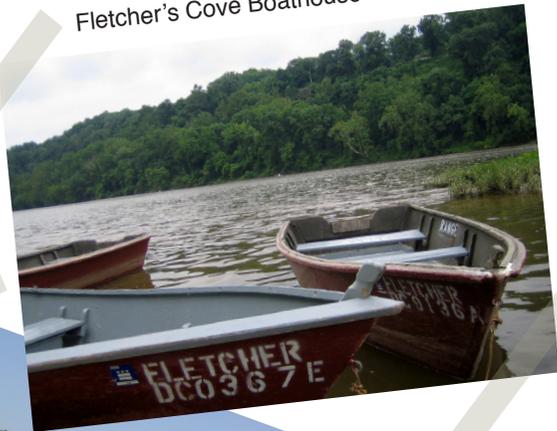
BAM

They strike. Hard. They're strong and a formidable sport fish, so have a good time with it. You'll want to concentrate your hunting in shallow waters between 1 and 4 feet in depth.

Now, no need to be nervous. Snakeheads aren't known to attack humans and they won't attack any small pets on your fishing boat. They stick to rodents, ducklings, reptiles, and fish. So unless you happen to be the world's first literate fieldmouse, you should be fine.

(If you do happen to be a literate fieldmouse, I apologize for any offense my previous comment might have caused and kindly request that you report your existence to Fish and Wildlife Service immediately.)

Fletcher's Cove Boathouse



Great Falls Potomac River

Hunting tools

There is more than one way to skin a cat, and you can bet your sweet bippy that there is more than one way to slaughter a snakehead. While I grant you some creative freedom, these are some of the methods I'd recommend when you're first getting started.

Bow and arrow

It is legal in some parts of Maryland, Virginia, and several other states to bowfish for snakehead. They like to ambush their prey? Give 'em a taste of their own medicine. Shoot them from afar when they don't expect it, but only if you know what you're doing. Don't go around impaling random civilians because your eco-positive hunting tactics have given you a God complex.

Rod and reel

1. If you're using a rod and reel, immediately set the hook and reel in. Snakeheads will fight you the entire time you are reeling in so be prepared.
2. Cast your line out far and keep the bait moving across the top of the water.

Bait

So. What kind of bait do you use to catch something so relentless? The options are surprisingly diverse: mizmo tubes, spinner bait--buzz bait work fine. Frog lures are best, but my favorites are the baby duckling lures. Seeing those cute fake duckies floating in the water sends a chill down my spine; reminds me why these snakeheads need to be stopped.

Once you catch a snakehead make sure to do the following 3 things:

- Remove the head
- Separate the gill arches from the body
- Remove all of its vital organs
- Record the catch size, number, and location

The fish has to be stone-cold dead for you to legally have it in your possession. Dont forget these are enemy soldiers, so carrying them across state lines while living is highly illegal without a permit. There are a number of places you can report it, that'll just ask you to give basic information like your name, the size of the fish, and where you caught it. They make it real easy, so you can check in quick and get down to enjoying your snakehead meat.

Report your catch:

-Maryland Department of Natural Resources:
(410) 260-8287

-Virginia Department of Game and Inland Fisheries: (804) 367-2925

Bottom line: these are a few great ways to hunt this diabolical fish, and allow you to reap your reward. Be sure to report your kill to your local State Game and Fish Agency.

REAP YOUR
REWARD.

As soon as you've gotten the hang of hunting snakeheads, I grant you full permission to treat yourself to some of the most satisfying (both culinarily and environmentally) meals of your life.

Bet you expected them to be poisonous or something? Not at all. In fact, these rascals are positively delicious. It just goes to show that you shouldn't judge a book by its cover, or by the number of fish and ducklings it decapitates with its guillotine jaws.

Once they're gutted, cleaned, and no longer a threat to the natural order, snakeheads are actually kind of nice. Their meat is white, flaky, has a mild flavor, and the texture is slightly firmer than that of tilapia or cod. Unbelievable! I'll let that plot twist sink into your head before you sink your teeth into some choice snakehead flesh.

'Bout done? Good. Here we go.



DROWN 'EM IN OIL

What you'll need

- 2 quarts vegetable oil for frying
- 8 4 ounce snakehead fillets
- 1 cup all-purpose flour
- 2 tablespoons garlic powder
- 2 tablespoons paprika
- 2 teaspoons salt
- 2 teaspoons ground black pepper
- 1 egg, beaten
- 1 12 fluid ounce can or bottle beer
- salt and pepper to taste

1. Print out the picture below and put it in a place that is clearly visible to you throughout the cooking process. Its presence will inspire you by reminding you of the good you have done for the community.



Shenandoah and Potomac Rivers

2. Glug your oil into a deep fryer. Set the heat to 365 degrees F. Do not burn yourself. The scorching heat is for cooking snakehead meat, not human meat.

3. Rinse the fish, and pat it dry. Be sure to remind the fish how many native species will thrive in its absence while you season it with salt and pepper.

4. Combine flour, garlic powder, paprika, 2 teaspoons salt, and 2 teaspoons pepper. Stir egg into dry ingredients. Gradually mix in beer until a thin batter is formed.

As you are mixing, feel free to chuckle at the following joke:

What did the environmentally-conscious chef say when he learned the Potomac had one fewer Northern Snakehead?

The ecosystem is "Batter" off now

5. Dip fish fillets into the batter.

6. Drop the snakehead fillets one at a time into hot oil. Revel in the sizzling sound they make. Fry fish, turning once, until both sides are golden brown.

7. Drain on paper towels, serve warm, and bask in the fact that you're saving the environment one fillet at a time.



SMOKE 'EM OUT

What you'll need

- 36 ounces snakehead fillets
- 2 teaspoon dried oregano
- 4 teaspoons chili powder
- 1 teaspoon salt
- 4 tablespoons butter
- 6 tablespoons lemon juice
- 1/2 teaspoon cayenne pepper

1. Preheat oven to 450 degrees.
2. Combine oregano, chili powder, cayenne pepper, and salt.
3. In a shallow bowl combine the melted butter and lemon juice.
4. Dip snakehead into butter mixture, then press into the spice mixture. As you do so, recite the following limerick:

*There once was fish from Yangtze
Who was vicious and mean as could be
He came here by mistake
And ate fish in our lakes
So now he'll be eaten by me*

5. Place the snakehead fillets in a shallow casserole dish. Optional: give each fillet a good, hard pinch because (even though they can't feel it) those darn snakeheads are ruining our rivers.
6. Bake at 450 degrees for about 15 minutes, or until fish flakes when pressed.
7. Go to bed satisfied, you magnificent fish hunter, you.

Bottom line: snakehead is as delectable as it is destructive.

Sources

Executive Order 13112 (February 2, 1999)

InvasiveSpeciesInfo.gov

Maryland Department of Natural Resources

National Wildlife Federation

U.S. Department of the Interior National Invasive Species Council

U.S. Fish and Wildlife Service

Images

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BLM Fisheries and Aquatics Program

The Bureau of Land Management (BLM) manages more land than any other federal agency and the Nation's most ecologically diverse aquatic habitats.

These habitats range from isolated desert springs to Alaska's North Slope tributaries. BLM-managed aquatic resources support the Nation's aquatic biodiversity, support public recreation, and sustain Native American cultural heritages.

The Fisheries and Aquatics Program is responsible for the management and conservation of all BLM aquatic habitats, aquatic ecosystems and all species of fish, wildlife, and invertebrates that are dependent upon them. This includes eradication and prevention of aquatic invasive species and supporting public outreach efforts that promote the awareness of invasive species and increased understanding of aquatic resource management and science.

For more info: www.blm.gov



Fisheries for Veterans Project:

The Fisheries for Veterans Project is an innovative service partnership that uses public lands aquatic resources and habitats as a tool to serve as a unique community driver connecting veterans and their families, local communities, government programs, and non-profit organizations.

The Fisheries for Veterans Project works with local communities to help design, develop and conduct community-based activities and outcomes that address public needs and result in increased social morale and well-being and demonstrate local community aquatic resource connections, relevancy and intrinsic values of public lands.

We also provide educational and job skills though structured on the ground activities that involve and connect the public with land management and habitat restoration activities.

All Fisheries for Veterans activities are free of charge and open to all veterans, all veteran family members of any disability, and of any service campaign. We invite participation by any agency, program, organization or anyone who wants to contribute and help us make a difference.

For more info: www.f4v.org



About the authors

Caitlin, Andrew, Noah, and Caitlin are undergraduate students at Georgetown University in Washington, D.C. As part of the Science in the Public Interest program, they developed *The Invasive Hitlist* series as a way to combat the global challenge of invasive species locally.

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